

**CARDIO-PULMONARY RESUSCITATION: PERCEPTIONS, NEEDS AND
BARRIERS EXPERINCED BY THE REGISTERED NURSES IN BOTSWANA**

by

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DECLARATION

I declare that **CARDIO-PULMONARY RESUSICTATION: PERCEPTIONS, NEEDS AND BARRIERS EXPERIENCED BY THE NURSES IN BOTSWANA** is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

SIGNATURE

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DATE

CARDIO-PULMONARY RESUSCITATION: PERCEPTIONS, NEEDS AND BARRIERS EXPERINCED BY THE REGISTERED NURSES IN BOTSWANA

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ABSTRACT

In Botswana, nurses play a major role in the provision of healthcare. Most of the time it is the professional nurses who frequently discover patients with cardiac arrests and it is necessary for them to be trained to perform CPR as efficiently as possible. The aim of this study is to describe and explore the perceptions, barriers and needs as experienced by nurses in Botswana during the provision of CPR.

For this study, the researcher utilised both quantitative and qualitative research designs in four phases. Phase one assessed and audited the existing available facilities in the provision of CPR. Phase two investigated the existing knowledge and skills of registered nurses in the performance of CPR. Focus groups discussions and semi-structured interviews were held during phase three to identify the perceived barriers, needs in the performance of CPR. In phase four, the researcher made recommendation to improve the provision of CPR in relation to system, nurse and patient. Convenience sampling and purposive sampling were used in this study respectively.

The auditing of the equipment in the two referral hospitals showed that the availability of equipment was below 50%. The CPR knowledge and skills demonstrated by the nurses in the pre-test were inadequate.

Following CPR training with the help of a manikin, the knowledge and skills among registered nurses improved substantially.

The focus group discussions and semi-structured interviews among registered nurses and senior nurse mangers revealed that there was a lack of organisational support and resources, lack of knowledge and skills

among registered nurses, inadequate policies and protocols are the major contributory factors affecting the registered nurses performance in the provision of CPR.

In order to enhance the performance of the registered nurses while providing CPR, the researcher recommends the two referral hospitals to

- have adequate provision of equipment
- introduce regular BLS training program for registered nurses
- have clearly defined policies regarding the nurses' role on end-of-life care

KEY CONCEPTS

Cardio-pulmonary resuscitation; perception; barriers; needs; system; patient characteristics; nurse competencies.

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This dissertation is dedicated to my parents
Meenakshi (mother) and Duraiswamy (father)

*Eenra pozhuthin perithuvakkum than magatraic
chAndron enek ketta thAi*

A mother relishes the moment she hears that her off-spring is a scholar
Much more than the moment it was born

Thirukkural (Tamil)

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CHAPTER 7

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CHAPTER 8

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List of abbreviations

AACN	American Association of Critical Care Nursing
ACLS	Advanced Cardiac Life Support
AHA	American Heart Association
ALS	Advanced Life Support
ANA	American Nurses Association
A & E	Accident and Emergency unit
ARC	Australian Resuscitation Council
BLS	Basic Life Support
CPR	Cardiopulmonary Resuscitation
ERC	European Resuscitation Council
HSFC	Heart and Stroke Foundation of Canada
ICN	International Council of Nurses
ICU	Intensive Care Unit
ILCOR	International Liaison Committee on Resuscitation
ILS	Immediate Life Support
NAB	Nurses' Association of Botswana
NMC	Nursing and Midwifery Council (UK)
NMCB	Nursing and Midwifery Council of Botswana
RCN	Royal College of Nursing
RCSA	Resuscitation Council of Southern Africa
RCUK	Resuscitation Council of the United Kingdom
RCLAR	Resuscitation Council of South America
SADC	Southern African Developmental Council
SPSS	Statistical Package for Social sciences
USA	United States of America
UAE	United Arab Emirates
UK	United Kingdom
WHO	World Health Organization

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CHAPTER 1

INTRODUCTION AND OVERVIEW OF THE STUDY

1.1 INTRODUCTION

Over a relatively short period of about 45 years in the evolution of hospital practice, cardio-pulmonary resuscitation (CPR) has been elevated from its original historical position as a new experimental technique to its contemporary status as a clinically universal procedure. As a result of this, all hospital-based health care professionals are expected to be proficient and competent in the performance of this life saving procedure (Tasker 2005:1102). CPR is also referred to as “basic life support” (BLS). This procedure expects nurses and other skilled practitioners such as medical doctors, paramedics and first aiders to perform it as a response to either cardiac or respiratory arrest (Davies & Gould 2000:400). The technique combines oral resuscitation (mouth-to-mouth breathing) which supplies oxygen to the lungs, with external cardiac massage (chest compressions). Both these techniques are intended to re-establish cardiac function and blood circulation (Handley, Koster, Monseieur, Perkins, Davies & Bossaert 2005:S7). CPR has therefore become an integral part of modern health care.

According to Handley et al (2005:S7), the term *cardio-pulmonary resuscitation* (*hereinafter referred to in this study as ‘CPR’*) refers to the attempts to establish and maintain airway patency by supporting breathing and circulation without the use of equipment other than the protective shield. It consists of an initial assessment of the patient and a subsequent number of steps that includes airway maintenance, rescue breathing and chest compressions. CPR is one of the procedures that can be administered without an explicit order from a doctor. Since most incidences of cardiac arrest are both sudden and unexpected, immediate actions are necessary.

After a cardio-pulmonary arrest has occurred, a patient becomes unconscious because of inadequate cerebral perfusion, and no pulse can be detected. Shortly after a cardiac arrest, respiratory arrest follows. One of the consequences of cardiac arrest is that oxygen cannot be delivered to tissues. This results in tissue metabolism and subsequent metabolic and respiratory acidosis. Permanent heart, brain and other tissue damages will occur within four to six minutes unless successful attempts to resuscitate

the patient have already been instituted within that short window of clinical opportunity (Potter & Perry 2005:1126).

The performance of CPR is usually accompanied by many detrimental features that are attributable to the fact that it nearly always takes place in an unforeseen emergency context. Because of this, CPR is often characterised by pressure and urgency, and it may also take place in circumstances that are confusing and disorderly. This occurs because of the unanticipated nature of the crisis as well as the necessity for therapeutic coordination in conditions of circumstantial chaos (Alspach 2005:8). Despite the training, expertise and awareness that support the practice of CPR, as well as its well-established position in clinical education and the establishment of a systematic and internationally accepted protocol and an abundance of available training and information sources (such as in-service training programmes and international accredited sources like BLS and advanced cardiac life support (ACLS) programmes). Alspach (2005:8) is of the opinion that the actual performances of CPR skills in real life often fail to comply with established international standards and benchmarks.

The current techniques used in CPR throughout the world were pioneered in the 1960s, and should be familiar to health professionals and many members of the public (Davies & Gould 2000:400). Since modern techniques of CPR were first introduced 45 years ago, there have been significant advances in life-saving techniques and cardiac care. These techniques have been successfully used to restore the lives of many people whose breathing had ceased and whose hearts had stopped beating after cardiac arrest.

Because of the success of these techniques, the American Heart Association (AHA), in conjunction with their National Research Council, have developed, promoted and presented numerous CPR training programmes to diverse groups of participants throughout the United States of America (USA) (Nolan 2005:S3).

CPR has become well established in the health care system of developed countries since its techniques were first described and demonstrated nearly half a century ago. In the USA, the United Kingdom (UK), Canada, Australia and most European countries, CPR is universally available to all hospital patients and the people outside hospitals as

well. The noticeable improvement in the survival rate of cardiac arrest victims in the UK between 1985 and 1997 can probably be ascribed to a number of factors such as an increase in the number of training programmes in CPR, improved standards in the training of nurses, and the more widespread availability of defibrillators and monitoring equipment (Gwinnut, Columb & Harris 2000:125). Contemporary nursing, medical and paramedical personnel are therefore in a position to deliver the best possible CPR to their clients because of improvements in the quality of the training, the greater accessibility of the necessary materials, availability of advanced drugs, and improvements in technology such as defibrillators and monitoring equipment.

In a study conducted in Denmark, Jorgensen (1997:15) states that successful CPR after an in-hospital cardiac arrest and its subsequent effect on the quality of the patient's life, depend on the availability of basic and advanced life support systems, opportunities to defibrillate an arrested heart immediately, and the quality and effectiveness of CPR interventions. A similar study undertaken in Turkey by Tok, Keles, Toprak and Topcu (2004:271) revealed that all patients who were resuscitated within the first four minutes after cardiac arrest in a critical care unit (CCU) or in an accident and emergency unit (A&E) enjoyed much higher survival rates than those who had not received such care. Patient outcomes are therefore radically improved when the best technology is at hand, the personnel who perform the CPR are familiar with the latest trends and research in CPR, and when the resuscitation is conducted within three to five minutes of witnessed cardiac arrest by practitioners with excellent clinical skills. Because it is professional nurses who most frequently discover patients who have suffered cardiac arrests, it is necessary for them to be trained to perform CPR as efficiently as possible (Davies & Gould 2000:401). The characteristics of health care environment of Botswana require nurses to be competent and equipped with whatever knowledge and skills they need to provide CPR – which is still a developing procedure in Botswana. If nurses (who are usually the first people to respond to the needs of cardiac arrest patients) are not properly skilled and trained in the life saving procedures of CPR, the chances of survival for patients thus affected will be radically reduced (Madden 2006:219).

An evolving phenomenon in the care of patients and their families is embedded in the field of emergency medicine, in which tremendous efforts and energy have been invested to enhance patient outcomes. In the field of CPR, for example, new

developments and information have precipitated changes in the manner in which nurses think and behave.

1.1.1 The AACN Synergy Model for Patient Care

The American Association of Critical Care Nursing (AACN) Certification Corporation has developed a model for acute and critically ill patients which will be applied in this research and subsequently referred to as the AACN Synergy Model for Patient Care. The AACN Synergy Model for Patient Care proposes that synergy occurs when the needs and idiosyncrasies of patients, clinical units and systems are matched by a corresponding level of competence on the part of nurses (AACN 2006b). The AACN Synergy Model for Patient Care provides an invaluable framework for nursing practice that is driven by the needs and characteristics of patients and the evolving demands of the health care environment that will develop in the future. In terms of this framework, it is the individual needs and characteristics of patients and their families that influence and determine the competencies that nurses will need to acquire (Kaplow & Reed 2008:17).

According to Pacini (2004:1), changes in the field of health care within the context of contemporary societies is occurring at such a rate that it is almost impossible for any single practitioner or group of practitioners to ensure that they remain familiar and conversant with the latest developments. The mechanisms that are utilised for delivering services, for generating products and processes, and for reconfiguring systems are becoming increasingly complex and intricate. Because of these difficulties, it is necessary to adopt new approaches that will enable practitioners to remain aware of whatever new advances are relevant to their practice so that they will be able to institute interventions that will improve patient outcomes. In order to cope with inherently uncontrollable and unpredictable situations, it is necessary to adopt and establish new approaches and procedures such as shared leadership. This can be achieved by communities of caring and self-managing work teams to support values that make the welfare and interests of patients and their families central to their mission (Kaplow & Reed 2008:17).

This study of CPR addresses one of the most important procedures that have been demonstrated to improve patient outcomes. This study will focus mainly on CPR in the

developing country of Botswana, where, because environmental factors are not always optimal, patient outcomes might be compromised. In order to understand the context and rationale of this study, it is necessary to take a closer look at the *health care system* that prevails in Botswana and to appreciate the emphasis that is placed on the *competencies of nurses* in providing health care for *patients with varying characteristics* and in the *improvement of patient outcomes* in the two referral hospitals that exist in the country.

1.1.2 The global context of cardio-pulmonary resuscitation

According to Deakin (2005:685), Finn and Jacobs (2003:471) and Peterson (2006:55), considerable progress has been made in bringing the science and practice of CPR to health care professionals and lay individuals in Europe, the USA, the UK, Australia and New Zealand. Various professional bodies such as the Australian Resuscitation Council (ARC), the New Zealand Resuscitation Council (NZRC), the Heart and Stroke Foundation of Canada (HSFC), the Resuscitation Council of Southern Africa (RCSA) and the Resuscitation Council of Latin America (RCLAR) have been established to provide guidelines and training in CPR. The European Resuscitation Council (ERC) has its own resuscitation guidelines that concur with those of the International Liaison Committee on Resuscitation (ILCOR) (Nolan 2005:S3-S6). Since 1966, regional councils on CPR have followed their own procedures until 2000. In that year, the first International Guidelines Conference on CPR and Emergency Cardiac Care (ECC) formulated an international consensus on the scientific basis of CPR and devised a set of common guidelines for practitioners of CPR (Cummins & Hazinski 2000:431). Training and education in CPR for nurses are provided in South Africa by the Resuscitation Council of Southern Africa, which is an internationally recognised and privately owned non-governmental organisation that has accepted as its mission and necessity to establish standardised resuscitation techniques and to coordinate training programmes in resuscitation (RCSA 2006:[1]).

The course in CPR that is offered by the RCSA on BLS for healthcare providers is designed for participants who provide health care for patients from a wide variety of contexts that include in-hospital and out-of hospital settings. The total duration of this course is six hours, and it is accompanied by a CD-ROM and video clips are demonstrate techniques for adult, child and infant CPR and the implementation of

procedures to manage choking. The guidelines offered in this course are also regularly updated for practitioners. RCSA courses are held on a weekly basis and are authorised and accredited to award points for continuing professional development (RCSA 2006:[2]). Botswana has not yet established a resuscitation council of its own.

1.2 BACKGROUND TO THE RESEARCH PROBLEM

A close study of figure 1.1 shows that Botswana is a country with a diverse ecology and numerous contrasting geographical and topographical features. It contains, for example, internationally recognised wetlands in the north (the Okavango wetlands and their environs), the famed Kalahari Desert in the south and west, Zimbabwe in the east and the great Limpopo River in the south that constitutes the border between Botswana and South Africa (Unimaps 2009:[2]).

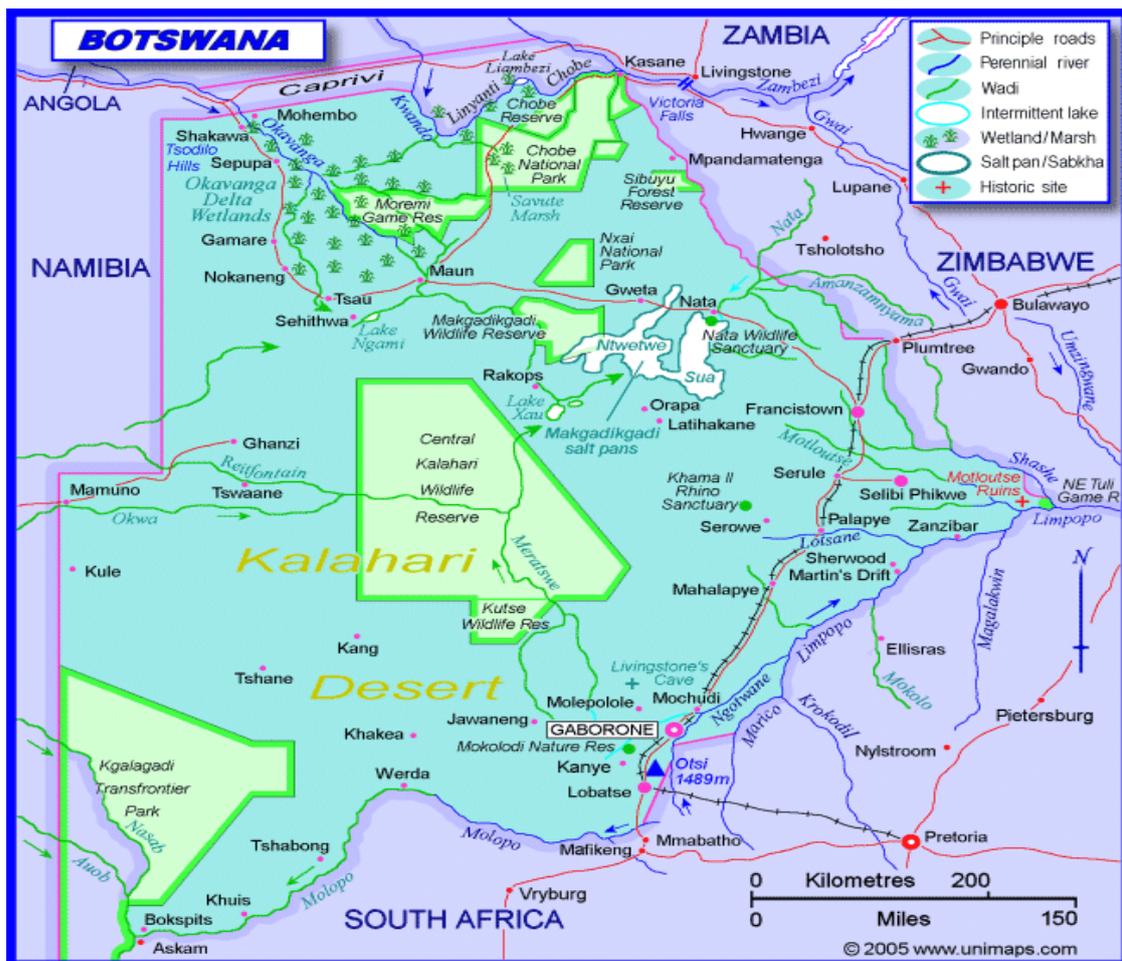


Figure 1.1: Map of Botswana

Source: Unimaps (2009:[2])

From the map of Botswana's geographical and topographical features (see Figure 1.1), it is evident that the management of any serious illness such as cardiac arrest is a challenge to the health care system. Nurses in remote rural areas are often not equipped to deal with such emergencies. Their competencies, the characteristics of the patients and inefficiency of the health care system may compromise the health and well being of the patients.

1.2.1 Overview of Botswana

Botswana is situated in Southern Africa. It is bordered by South Africa to the east and south, by Zimbabwe in the northeast and Namibia in the west. Botswana has a population of about 1.7 million (Republic of Botswana 2005a:1). More than two-thirds of the country in the west is taken up by the Kalahari Desert. The eastern part of the country is more developed, more populated and more arable than the western part of the country. Since most of central and western Botswana is arid, the population is concentrated along the south-eastern, eastern and north-eastern boundaries of the country. Gaborone, the capital city, is located in the southeast of the country. The other main towns are Francistown in the north and Lobatse in the south. The two major cities, Gaborone and Francistown, account for more than 20% of the total population of the country (Republic of Botswana 2005a:4). The urban population accounts for 49.2% of the total population of the country while the rural population accounts for 50.8%. The rural population, however, is distributed over 90% of the land mass of the country.

The urban density of Botswana ranges from 10 to 34 persons per square kilometre, while the lowest rural population density is 0.1 people per square kilometre (Republic of Botswana 2005a:7). The population of the country is widely distributed throughout its vast and varied landscape. Because the rural population of Botswana is so widely scattered throughout such larger areas in which roads and communications are very often poor, the provision of emergency care for this segment of the country's population is both extremely difficult and expensive. Accessibility to emergency medical services for many people in developing countries remains a major challenge for the governments of these countries. The provision of timely treatment for life-threatening emergencies is not a priority in many of the health care systems in developing countries (Razzak & Kellermann 2002:2). The nature of emergency health services in Botswana is largely focused on the provision of adequate pre- and in-hospital care for patients suffering

from life-threatening emergency conditions. Because the country’s telecommunication networks in the major urban areas have improved exponentially during the last two decades, most patients can now access the health care that they need by using their mobile telephones. But for the rural population, the accessibility of health care is still a major problem because of poor communications, sporadic and inefficient transport systems and the non-availability of emergency care in the primary and secondary hospitals. In Botswana, as in most African countries, nurses are usually the first, and often the only, point of healthcare contact for patients. Nurses are often responsible for providing as much 80% of required health care services in outlying districts and areas (Phaladze 2003:22).

1.2.2 Statistics for health care personnel in the Southern African region

In table 1.1 the total health care workforce in the Southern African region is given.

Table 1.1 Health care personnel in the Southern African region

Country	Total population	Number of nurses	Number of Physicians	Nurses per 100 000 population	Physicians per 100 000 population
Angola	11 446 288	13 135	889	115	8
Botswana	1 788 187	4 753	715	265	40
Lesotho	2 008 170	1 123	89	62	5
Mozambique	18 828 571	3 954	514	21	3
Namibia	1 750 000	6 145	598	306	30
South Africa	45 198 353	184 459	34 829	408	77
Swaziland	1 083 603	6 828	191	630	16
Zambia	10 921 310	19 014	1 264	174	12
Zimbabwe	12 967 017	9 357	2 086	72	16
Overall	105 991 499	248 748	41 165	234	39

Source: World Health Organization (WHO) (2004:2)

Table 1.1 makes it clear that nurses constitute the largest group of health care providers in the Southern African Development Council (SADC) region. This remains the case despite the fact that there are considerable variations in the number of nurses per 100 000 members of the populations in these countries. Although Lesotho, Zimbabwe,

Zambia and Angola have the lowest number of nurses per 100 000 members of their populations, these countries reflect a higher ratio of nurses to doctors. Although Botswana and Namibia have a larger number of nurses for their populations, they still compare unfavourably to South Africa and Swaziland in this regard.

Nurses play a vital role in the provision of primary health care (PHC) services. Nurses are challenged to develop new skills and specialisations in whatever areas they can to meet the needs of their patients and their families as well the needs of the broader community. The International Council of Nurses (ICN 2007a:1) acknowledges the need for nurses to adapt and expand their roles in the light of scientific and societal changes in the health services of their communities.

The ICN position statement on career development in nursing (ICN 2007b:2) maintains that nurses themselves are the first to recognise the need for further education to prepare them for their expanding roles in various areas of nursing practice, patient care and patient outcomes – more especially since nurses in the remote rural areas of countries like Botswana are the only medical professionals that most people in need of health care will ever encounter.

In spite of the heavy burden of health care that rests on the shoulders of nurses in Botswana, the delivery of emergency care is still limited by the lack of specialised CPR training for nurses. According to the ICN position statement on health and human resources development (ICN 2007a:2), the attainment of the highest possible level of health in a country depends, to a considerable degree, on the availability and preparedness of a sufficient number of appropriately trained, skilled and distributed health care personnel who are capable of providing quality services. The failure to provide such quality services has a detrimental effect on individuals and on the health of the nation as a whole. The ICN (2007a:2) maintains that the nursing profession needs to be kept constantly and accurately informed about the consequences of the planned and unplanned health service changes that affect the duties and responsibilities of the profession.

In a review of contemporary health care trends, O'Neil (1999:13) recommends that the certification and licensing of the health care professionals of the future must be linked to the demonstration of continuing competence. O'Neil therefore recommends that nursing

education and nursing practice should become more integrated because this would be in keeping with contemporary changes in health care delivery and in society at large.

1.2.3 Health care services in Botswana

In Botswana, healthcare is delivered through a decentralised system in which the PHC is a central concern. Health care services vary from the most basic PHC to the specialised health services that are available in the private sector for those members of the population who can afford it. Health services for the public are delivered in health facilities such as hospitals, clinics, health posts and mobile stops. Eighty per cent of all Botswana have access to a health facility and live within a 15-kilometre radius of such a facility. Since health services are subsidised by the government, the aim of the Ministry of Health is to provide universal access for all Botswana (Botsogo News 2006:2). The Ministry of Health is the final arbiter in all matters relating to health policy and practice in Botswana – even though the Ministry of Local Government administers the clinics, health posts and mobile stops through local authorities. The Ministry of Health is responsible for administering the policies and procedures that govern primary, district and referral hospitals in behalf of the central government.

The following institutions are responsible for providing health care services in Botswana:

- The Ministry of Health
- Unified local government services
- The mining companies
- Private medical practitioners (who provide Western-style medical services) and traditional health care providers (who provide traditional African health care)
- Medical missions

The entire system is built on a referral hierarchy that is divided into six levels. This is depicted in table 1.2.

Table 1.2 The hierarchy of health care systems in Botswana

Level	Type of facility	Health and medical personnel	Number of facilities
1	Referral hospitals in Gaborone, Francistown and Lobatse. (These hospitals offer a range of specialist and sophisticated health services.)	Specialised professionals such as medical specialists, nurses, midwives, pharmacists and members of allied health professions	2 referral hospitals; 1 psychiatric hospital
2	District hospitals (These provide preventive, promotive, curative and rehabilitative services.)	District medical officers, nurses, midwives and other health-related professionals	14
3	Primary hospitals in villages with more than 10,000 inhabitants in certain remote areas (These hospitals provide preventive, promotive, curative and rehabilitative services.)	Physician, nurses, midwives and allied health professionals	17
4	Clinics: There are two types of clinics: (1) Clinics with maternity wards in villages with more than 1,000 inhabitants (2) Clinics without maternity wards in villages with more than 1,000 inhabitants (These provide preventive and promotive health care.)	Nurses, midwives and family welfare educators	266
5	Health posts in rural areas that contain a population of 500 people (These provide basic preventive and curative services.)	Nurses, family welfare educators	343
6	Mobile stops in remote areas with small and sparsely scattered populations (These basic preventive and curative services.)	Health teams of nurses and midwives	861

Source: Republic of Botswana (2004:2)

1.2.4 The incidence of trauma and emergency cases in Botswana

Since trauma and medical emergencies are on the increase in Botswana, the incidence of mortality and morbidity rates are also on the increase. This is aggravating certain social and health problems in the country (Golokai 2003:6). According to the Road Traffic Safety Annual Report (Republic of Botswana 2008a:4), there has been a steady annual overall increase (with minor reversals in some years) in the number of road and traffic accidents that have been occurring in Botswana. In 2007, about 3% (497) of the total number of people involved in such accidents (19,487) were killed, and about 39% (7,639) were listed as casualties (Republic of Botswana 2008a:9).

Table 1.3 Motor vehicle accidents: the trend between 1998 and 2007

Year	Number of accidents	Number of casualties	Number of fatalities	Casualties per 10 000 population	Fatalities per 100 000 population
1998	14 279	6 887	453	44	29
1999	16 922	8 061	494	50	31
2000	16 313	7 790	529	47	32
2001	17 125	7 945	526	47	31
2002	18 610	8 014	520	47	31
2003	18 328	7 963	557	47	33
2004	18 136	7 840	532	46	31
2005	17 522	7 069	450	41	26
2006	17 035	6 952	429	40	25
2007	19 487	7 639	497	43	28

Source: Republic of Botswana (2008c [3])

According to Golokai (2003:7), people who have been involved in road accidents often lose their lives before pre-hospital care and basic life support can be provided. The high rates of casualties that result in death could be reduced largely if all health care professionals were well trained in the skills of CPR (Golokai 2003:7).

The WHO (WHO 2009:2) report on cardiovascular diseases predicts that heart diseases and strokes will become the leading causes of deaths and disabilities throughout the world by 2020. It also predicts that the number of fatalities from these conditions is projected to exceed 20 million per year by 2020, and over 24 million per year by 2030. The report further adds that because of inequitable and inaccessible health care in many countries and investments in resources that are not cost effective, secondary prevention coverage will be far worse in low- and middle-income countries. According to this report, the government expenditure in developing countries may have disabling economic implications if these current trends continue.

The following table (Table 1.4) sets out the morbidity and mortality rates in in-patient and outpatient facilities in Botswana.

Table 1.4 In-patient morbidity and mortality due to cardio-pulmonary/heart diseases

Causes	Morbidity				Mortality			
	2002		2004		2002		2004	
	(out of 97 980)	%	(out of 102 980)	%	(out of 9 235)	%	(out of 11 041)	%
Hypertensive heart diseases	2 103	2.15	2 704	2.63	135	1.46	150	1.36
Other diseases of the circulatory system:	1 192	1.12	2 702	2.62	240	2.60	614	5.56
• Myocardial Infarction	59	0.06	No data	No data	10	0.11	No data	No data
• Cardiac dysarrhythmias	1 126	1.15	No data	No data	228	2.47	No data	No data
• Other pulmonary diseases	No data	No data	No data	No data	No data	No data	No data	No data

Source: Republic of Botswana (2002:91; 2004:96)

Among a total of the 1,603,503 outpatients who were treated in all the health facilities of Botswana in 2004, morbidity caused by hypertension alone accounted for 191, 316 cases (11.9%) (Republic of Botswana 2004:6).

As the number of trauma and medical emergencies in Botswana has increased, a corresponding need has arisen to train registered nurses in emergency nursing serving the community in these facilities. Razzak and Kellermann (2002:2) cited a study that was conducted in Southern Nigeria. When the respondents from the communities in this study were asked to identify their health service priorities, many mentioned an improvement in the training of health centre staff and the provision of emergency health care services as priorities. In many communities in Africa, people visit the PHC centres because of medical emergencies rather than for preventive health care services. Access to medical care for urgent life-threatening conditions is therefore a key expectation in communities such of the one mentioned above. In developing countries, health care facilities differ widely in terms of equipment, staff and resources and vary enormously in their capacity to provide emergency care. It therefore remains a priority to make emergency care available at every level of a country's health care system

(Razzak & Kellermann 2002:4). Since nurses are the first and sometimes the only health care personnel to attend the emergencies, there is an urgent need to provide adequate training in BLS and CPR for registered nurses who work in Botswana.

1.2.5 The preparation and roles of nurses in Botswana

Nursing education in Botswana prepares nurses to provide quality, holistic and humanistic nursing care for individuals, families and groups in a variety of settings. According to the Nurses' Association of Botswana (NAB) (NAB 1999:2), nurses are trained and prepared to promote and maintain the wellness of clients, to assist in recovery and/or adaptation at all levels of the health–illness continuum, and to comfort patients when death is imminent and to maintain their dignity and peace of mind at that time. The curriculum for Botswana's basic Diploma in General nursing (Republic of Botswana 1995a:3) states that the effectiveness of the delivery of PHC services in Botswana depends mainly on the skills, knowledge and preparedness of nurses and other health care professionals.

According to the curriculum for the Diploma in General nursing (Republic of Botswana 1995a:1), a professional nurse is expected to have mastered whatever competencies are necessary for providing comprehensive PHC services to Botswana of all ages. The training in general nursing prepares individuals to be competent, accountable, effective and innovative practitioners and equips them to provide quality nursing care in a variety of different settings (Republic of Botswana 2008b:3).

1.2.5.1 General training of nurses in Botswana

The Nursing and Midwifery Council of Botswana (NMCB) regulates the practice and training of nurses and midwives in Botswana. The institutions that specialise in the training of nurses are responsible for training nurses at the diploma level in Botswana. There are currently eight health care training institutions in Botswana that are responsible for preparing nurses to complete their diploma and post-basic diploma studies.

Because of the adoption of the PHC strategy, changes in clientele expectations and technological advancements in the delivery of health care services in Botswana. A

restructuring of the current curriculum for general nursing was implemented in 1994 on the basis of the recommendations made by the Kellogg consultants. The curriculum now offers a three-year full-time programme that includes two years of theory and concurrent practice, and a third year devoted to clinical attachment/internship that facilitates the synthesis of the various professional roles and activities that nurses are expected to perform (Republic of Botswana 1995a:2; 1995b:2).

The number of post-basic programmes has been gradually introduced in response to the needs of communities in Botswana. These post-basic programmes are devoted to the following specialities:

- Midwifery
- Nurse Anaesthesia
- Family Nurse Practice
- Community Health Nursing

All these programmes build on what nurses have mastered in the basic nursing programme, and the duration of these programmes varies from 18 to 24 months. The University of Botswana introduced a degree programme in 1978 to prepare the nurses in the specialities of Nursing Education and Nursing Administration. The duration of each of these degree programmes is three years. The University of Botswana also introduced a Bachelor of Nursing Science degree programme in 1999 and a Master of Nursing Science programme in 1996 (Republic of Botswana 2008b:4).

Table 1.5 The duration of training and core competencies of the different nursing education programmes in Botswana

Name	Institute	Length of training	Competencies
General Nursing (Diploma)	Institute of Health Sciences	3 years	<p>These nurses are trained to:</p> <ul style="list-style-type: none"> - collect data systematically and compile records by using an established system - individualise nursing care plans. These care plans that describe the interventions designed to achieve expected outcomes are developed in collaboration with the client. - ensure that the observations and interventions that are carried out on clients are documented in a timely fashion, accurately and legibly recorded by making use of internationally approved abbreviations, and duly signed with name and title. Consultations and collaboration with the health team and other stakeholders is maintained in order to promote quality health care. - practise their nursing skills in a manner that is culturally acceptable to the client - display a competency that is commensurate with level of educational preparation and clinical placement - undertake referrals without delays and to ensure that clients are accompanied by a registered nurse - maintain a continuous therapeutic relationship with clients and all significant others (NAB 1999:7)
Midwifery (post basic diploma)	Institute of Health Sciences	18 months	<p>Midwives are trained to:</p> <ul style="list-style-type: none"> - identify high-risk client - demonstrate a clear and accurate knowledge of the referral system in Botswana - identify the need for comprehensive management and care that is outside the scope of midwifery practice - utilise the midwifery process (which consists of assessment, diagnosis, planning, implementation and evaluation) - interpreting implement practice guidelines and protocols are being developed for the various areas of midwifery that include ante-partum, intra-partum, post-partum, MCH/Family planning and neonatal care (NAB 2001b:8)
Nurse Anaesthesia (post-basic diploma)	Institute of Health Sciences	18 months	<p>Nurse anaesthetists are trained to:</p> <ul style="list-style-type: none"> - possess all the knowledge, skills and attitudes that are required for the safe administration of anaesthesia and for the management of critically ill patients - assess and prepare patients before anaesthesia - provide anaesthesia for patients and to manage them during surgery - assess and manage patients after anaesthesia - intubate patients in theatre and in the wards - use whatever anaesthetic drugs are appropriate for different surgical procedures and the type and condition of the patient - collaborate with surgeons in the ward and with theatre staff in the management of the patient before, during and after surgery - perform spinal anaesthesia

Name	Institute	Length of training	Competencies
			<ul style="list-style-type: none"> - observe and maintain whatever ethical principles are applicable to their activities - observe and implement the regulations that govern the practice of nursing in Botswana (in the curriculum for a post-basic Diploma in Nurse Anaesthesia that has been offered since 1995)
Family Nurse Practice (a post-basic diploma)	Institute of Health Sciences	18 months	<p>The nurse who is trained in Family Nurse Practice is able to:</p> <ul style="list-style-type: none"> - collect patient histories in a systematic manner - perform physical examinations - perform and order preventive, diagnostic procedures and tests based on the client's history - identify and determines the relative risk factors of the client, to critically analyse and synthesise all the data collected on the basis of the history, physical examination and diagnostic results - make an appropriate differential diagnosis - recognise emergency situations and initiate appropriate care - plan care in compliance with existing national standards and protocols - prescribe appropriate drugs and other therapeutic regimens - provide relevant client education - perform delineated procedures within the scope of family nurse practitioners. - study the customs and expectations of the community within which he/she practises, and to participate in community activities/programmes (NAB 2001b:8)
Community Health Nursing (a post-basic diploma)	Institute of Health Sciences	18 months	<p>A nurse who has been trained in Community Health Nursing is able to:</p> <ul style="list-style-type: none"> - systematically collect data that is comprehensive and accurate - analyse, synthesise and interpret all data before formulating community nursing diagnoses - record data and share information with all stakeholders - identify and determine the necessary resources to facilitate and/or assist in the development of community programmes, policies and services - plan for the mobilisation and appropriate use of available resources - provide direct care to individuals, families and groups within the community setting - participate in community and national activities - provide leadership and participate in the implementation of national health policies and programmes - educate the community about available services, programmes and resources - apply scientific knowledge in the documentation of Community Health Nursing practice - monitor client responses to community health interventions - interpret and communicate results of a programme evaluation to planners and decision-makers - participate in a review of health policies (NAB 2003:9)

Source: Nurses Association of Botswana (1999; 2001; 2003)

All nurses are trained at the diploma level and in post-basic diploma courses in institutes of health sciences that are under the auspices of the Ministry of Health. The competencies that are gained in these different programmes prepare them to provide quality PHC.

1.2.5.2 The scope of practice of nurses in Botswana

According to the position statement of the ICN (2004:1), the scope of practice for nurses is not limited to specific tasks, functions or responsibilities. It includes offering direct care and evaluating its impact, advocating on behalf of patients, supervising others and being able to delegate tasks to others, leading, managing, teaching, undertaking research and developing policies for a health care system. Since the scope of practice is dynamic and always needs to be responsive to health needs and the latest developments in knowledge and technology, periodic reviews are required to ensure that practice remains consistent with current health needs and that it supports improved health outcomes on a continuous basis (ICN 2004:1).

In Botswana, the Nurses and Midwives Act, number 61.03 of 1995 (Republic of Botswana 1995c) established the Nursing and Midwifery Council of Botswana (NMCB) (1995) to regulate the practice of nursing and midwifery.

1.2.5.3 Training in CPR and life-saving procedures

With regard to the need for maintaining the quality of skills in CPR, the AHA (2005:3) guidelines recommend that all nurses who are in contact with patients should have regular resuscitation training. The level of competency in CPR displayed by individual nurses is a critical factor in determining successful outcomes after a patient has suffered from cardiac arrest.

The Diploma in General Nursing Programme that leads to the qualification of registered nurse in Botswana, is a three-year full-time course that is offered by the Institute of Health Sciences which is affiliated to the University of Botswana. This diploma is regulated by the Nursing Council of Botswana. During basic nursing training, the curriculum for registered nurses in Botswana includes instruction in BLS skills such as CPR. The training programme, however, only comprises two hours of theory and two

hours of practice, and it does not provide the specific knowledge and the necessary practical skills that a student nurse requires to become competent in the provision of CPR during emergencies. The course for nurse anaesthetists provides the necessary knowledge and skills for three to four hours in the classroom and in the skills laboratory (Republic of Botswana 1995a). A nurse anaesthetist is a registered nurse who has completed the post-basic diploma in anaesthesiology. The same kind of definition applies to the family nurse practice course and to the post-basic midwifery course (Republic of Botswana 1994). In spite of the fact that the curriculum for the training of Family Nurse Practitioners mentions cardiac arrest, it does not explicitly state the number of hours of CPR that are devoted to the delivery of theory and training in practice. While post-basic midwifery students are taught neonatal resuscitation when they learn about asphyxia neonatorum, the number of hours devoted to resuscitation are not recorded. It should be noted that all nursing science curricula are currently under revision in Botswana.

Students enrolled for the degree of Masters in Nursing Science at the University of Botswana follow a course that provides orientation in BLS, advanced life support (ALS), and in the correct transportation of patients. Apart from this course, there is no other continuing education nursing science programme in Botswana that provides general nurses with the necessary clinical knowledge and skills to practise CPR during emergencies.

The Botswana Nurses and Midwives Act number 61.03 of 1995 (Republic of Botswana 1995c:5) states that a nurse shall not attend a patient where the required attention falls outside the scope of such the nurse's registration – except in an emergency when a correctly qualified person is not available. When nurses provide patients with care in such cases, the nurse concerned is required to report the relevant facts and conditions of the case to the council in writing as soon as possible after the event.

1.3 STATEMENT OF THE RESEARCH PROBLEM

From the background information, it is evident that in Botswana, nurses are the mainstay of the national health care system. Optimal care for patients during emergency situation such as cardiac arrest is ensured by the provision of CPR. Positive outcome during CPR cannot be expected when there is a lack of awareness of patient's needs

and characteristics, and resource availability to treat the cardiac emergencies. The AACN Synergy Model for Patient Care draws on both resources of the patient and family, and the nurse to match the patient's needs and characteristics with the nurse's competencies to enhance positive clinical outcomes. The healthcare environment acts as a facilitator to support patient needs and has the power to nurture the professional practice environment of the nurse.

The two referral hospitals in Botswana have been upgraded and modern equipment have been acquired for the close monitoring of patients (Republic of Botswana 1997:17). This development has created a situation in which at least all the nurses who work in these hospitals should be equipped with the necessary knowledge, skills and abilities to identify barriers and to deal with situations during resuscitation. But the reality of the situation is that necessary equipment such as defibrillators, ventilators and ambu bags have not been recently replenished in critical care units as required (Republic of Botswana 2005b). According to Laws (2001:77), the lack of or poor quality of equipment creates stressful situations that might very well affect the effectiveness of resuscitation efforts.

It is quite probable that nurses may be receiving most of their training in the early stages of their educational programme alone. The ICN points out that because access to continuing education is critical for nurses, all suitable means and facilities should be utilised to make continuing education available to all nurses on a regular basis (ICN 2007a:1). This point of view is supported by Bullock (2000:139), who suggests that educators should be involved in curriculum design for resuscitation teaching. He also suggests that educators should be responsible for undertaking audits and research in order to establish the effectiveness of their teaching methods. The training programme for nurses in Botswana needs to address the theory and practice of CPR so as to enable nurses to provide effective CPR as and when they need to do so.

Members of the public have become more assertive about their expectations on the competence of health care providers as well the consequences of such health care providers should face in cases of incompetence. Various changes in the global economy have led the public to entertain far greater expectations when it comes to the productivity and efficiency of professionals. These changes all require modifications in policies, post descriptions and the evaluation of the skills of health care personnel.

Competent practice is now regarded as not only necessary but also as routinely essential as all stakeholders now expect professional workers to be more skilled than they were in the past (Lenburg 1999:3). Such expectations also prevail in Botswana. Competency in CPR is now also regarded as a non-negotiable necessity for health care providers in Botswana. It is especially important in Botswana, where nurses comprise the majority of health care providers, for nurses to be competent in CPR so that they will be in a position to save patients' lives in emergencies.

The researcher's interest in BLS and CPR developed from her critical care experience in a ICU and from her academic experience as a nurse educator. The researcher also identified various forms of incompetence, incapability and ignorance in the provision of CPR as she accompanied student nurses in clinical conditions even though most of the wards in the referral hospital in Gaborone were equipped with the necessary emergency trolleys to deal with emergencies such as CPR.

1.4 SIGNIFICANCE OF THE RESEARCH

Healthcare institutions in the modern world have an obligation to provide effective resuscitation services. They are also duty-bound to ensure that their staff members receive adequate training and regular updates for maintaining a kind of competence that is appropriate to the position occupied by each individual. Such a level of preparedness necessitates acquiring of whatever resuscitation equipment is necessary and taking a pro-active stance with regard to financial planning, and a performing continual reappraisals of the standards that have been set and the results that are achieved after CPR training (Gabbot, Smith, Mitchell, Colquhoun, Nolan, Soar, Pitcher, Perkins, Philips, King & Spearpoint 2005:171).

All registered nurses play a vital role in the provision of CPR. Making appropriate decisions during cardiac arrest is crucial in the process of saving a client's life, and it is also one of what patients have a right to expect (Kavari & Keshtkaran 2005:2). Equipping registered nurses with advanced life support skills and competencies will help them overcome whatever barriers prevent the rendering of effective CPR both in hospitals and in pre-hospital settings. This kind of preparedness will undoubtedly reduce the mortality and morbidity rates that are currently reflected in physical trauma and medical emergencies in Botswana.

The results of this study will improve the current level of practice in the provision of BLS and ACLS in the two referral hospitals in Botswana, which may contribute to reduce mortality and morbidity caused by trauma and cardiac emergency conditions. Assessing the characteristics and support present in the health care system, assessing the competencies of the registered nurses and understanding the patient characteristics during the provision of CPR help in providing a synergistic care between the patient, nurse and the system thus improving the emergency care, reducing the mortality and morbidity, and improving the patient outcomes.

This study also addresses the need for establishing formal training programmes and periodic recertification in CPR practice for nurses in Botswana. It is therefore anticipated that the information gained from this study will enhance training programmes in CPR for nurses in Botswana.

1.5 PURPOSE OF THE RESEARCH

The overall purpose of this research is to describe and explore the perceptions, barriers and needs that are perceived by nurses in Botswana when they are required to provide CPR, and to provide recommendations for enhancing the CPR knowledge and skills of nurses so that they will be in a position to save the lives of clients during medical emergencies.

1.6 RESEARCH OBJECTIVES

The following research objectives were formulated in terms of the background discussed above and in terms of the relevance of the AACN Synergy Model for Patient Care to this research. The research objectives of this study were therefore to:

- conduct an audit of the availability of equipment used in the performance of CPR in the departments that provide emergency care services in the two referral hospitals in Botswana, an audit of the policy manual and in-service education records, and a retrospective audit of the death records
- evaluate the current knowledge and skills of nurses who perform CPR in the two referral hospitals in Botswana

- determine and identify the perceptions and barriers experienced by nurses and senior managers who perform CPR in the two referral hospitals in Botswana
- make recommendations based on the findings of the research that will serve to enhance the knowledge and skills that nurses have of CPR

1.7 PHASES OF THE RESEARCH

The research was conducted in the following four phases in an attempt to accomplish the stated objectives. Because the researcher was following the guidelines of the AACN Synergy Model for Patient Care, she placed a particular emphasis on the efficiency of the system and the way in which the competencies of the nurses in the sample impacted on patient outcomes.

1.7.1 Phase 1: Audit phase

The system acts to facilitate support of the patient's needs and has the capacity to maintain the professional practice environment of the nurse. During phase 1, an audit was performed to analyse the facilities provided by the system. Phase 1 therefore:

- investigated existing facilities for conducting CPR in all units of the two referral hospitals in Botswana by means of a predetermined checklist
- identified the number and outcomes of CPRs performed in male and female medical wards, ICUs, accident and emergency wards during the period 2005-2006 in the two referral hospitals
- checked and evaluated the existing policies of the two referral hospitals with regard to CPR
- audited the in-service education records to verify the number of times the classes on CPR had been conducted, the number of registered nurses who attended and whether or not any continued education credits were obtained by these registered nurses

1.7.2 Phase 2: Evaluation phase

The AACN Synergy Model for Patient Care maintains that nursing care reflects an integration of the knowledge, skills, experience and attitudes that are needed to meet

the needs of patients and families (Kaplow & Reed 2008:19). During phase 2 of this research, the researcher therefore evaluated the existing knowledge and skills of registered nurses during their performance of CPR in the two referral hospitals in Botswana.

1.7.3 Phase 3: Discussion phase

The AACN Synergy Model for Patient Care asserts that the success of nursing care outcomes depends on the relationships that nurses have with the organisation in which they work and with other health care professionals. True synergy can only be achieved on the basis of shared leadership, an environment that is conducive to learning, collaborative practice, and the necessary resources to support the evidence-based practice. Phases 3 and 4 were concerned with these particular aspects of the study. During phase 3 of the research, the researcher:

- conducted focus group interviews with registered nurses to identify their perceptions of CPR
- identified the needs that registered nurses perceived when they performed CPR
- identified the barriers perceived by the registered nurses during the performance of CPR
- conducted individual interviews with the nurse managers of the two referral hospitals in order to identify the nurses' perceptions of the needs and barriers that they experienced when performing CPR, and possible solutions to these problems

1.7.4 Phase 4: Recommendation phase

During phase 4 of this research, the researcher suggested recommendations for the provision of CPR in Botswana with regard to the system, the nurses and the patients. (These three elements constitute the three components of the AACN Synergy Model for Patient Care.)

1.8 RESEARCH QUESTIONS

While attempting to explore and describe the perceptions, needs and barriers experienced by the nurses during CPR, the following questions guided the study:

1.8.1 Phase 1: Quantitative research design (health care system)

Objective 1: To observe existing facilities, the outcomes of CPR performed, existing policies and the policies on in-service education (in all units of two participating referral hospitals in Botswana).

Question 1 What existing facilities are available for the conduct of CPR in the two referral hospitals in Botswana?

Question 2 What were the numbers and outcomes of the CPRs performed in male and female medical wards, male and female surgical wards, accident and emergency wards, and ICUs, during the calendar years 2005-2006 in the two referral hospitals in Botswana?

Question 3 Are there any existing policies that regulate CPR in the two referral hospitals in Botswana?

Question 4 According to the in-service education records, were periodic in-service CPR training sessions offered to nurses in the two referral hospitals in Botswana, how many nurses attended these sessions and did they receive continued education credits?

1.8.2 Phase 2: Quantitative research design (nurse)

Objective 2: To conduct quasi-experimental research evaluating existing knowledge and skills of registered nurses in the two referral hospitals in Botswana.

Question 5 What existing knowledge and skills did registered nurses have about CPR, during their performance of CPR, in the two referral hospitals in Botswana?

1.8.3 Phase 3: Qualitative research design (nurse, system and patient)

Objective 3: To conduct focus group interviews with registered nurses to identify the perceptions, needs and barriers as experienced by nurses when performing CPR in the two referral hospitals in Botswana.

Question 6 What are the perceptions that nurses have about CPR, and what needs and barriers do they experience during the performance of CPR?

Objective 4: To conduct individual semi-structured interviews with senior nurse managers to identify the needs and barriers that nurses perceive in performing CPR,

and possible solutions to their problems in this regard in the two referral hospitals in Botswana.

Question 7 What are the perceptions about CPR among registered nurses, according to the nurse managers' views?

Question 8 What barriers affect the functions of nurses during CPR, according to the nurse managers?

Question 9 How can the registered nurses be helped to overcome these barriers, according to the nurse managers?

Question 10 What resources can registered nurses call upon to empower themselves to perform effective CPR, according to the nurse managers?

1.8.4 Phase 4: Recommendation phase (nurse, system and patient)

Objective 5: To suggest recommendations in the provision of CPR in Botswana with regard to the system, nurses and patients that constitutes the three components of the AACN Synergy Model for Patient Care.

1.9 DEFINITIONS OF KEY TERMS

For the purpose of this study, the following terms have been used in the sense defined below:

1.9.1 Conceptual and operational definitions

- **Cardiac arrest**

Cardiac arrest is defined as the sudden cessation of breathing and the inadequate circulation of blood by the heart. It may occur at any time or in any setting (Lewis, Heitkemper, Dirksen, O'Brien & Bucher 2007:879).

According to Jacobs and Nadkarni (2004:3387), cardiac arrest is the cessation of cardiac mechanical activity, and it is confirmed by the absence of any signs of circulation.

In this study, cardiac arrest is defined as the sudden cessation of mechanical and electrical activity in the heart.

- **Resuscitation**

Resuscitation is defined as an act of attempting to maintain or restore life by the clearing of the airways, breathing and circulation by means of CPR, defibrillation and other related emergency care techniques (Jacobs & Nadkarni 2004:3388).

In this research, resuscitation is defined as the restoration of breathing and circulation by providing BLS.

- **Cardio-pulmonary resuscitation (CPR)**

CPR is the process of externally supporting the circulation and respiration of a person who has suffered a cardiac arrest (Lewis et al 2007:879). In addition, Jacobs and Nadkarni (2004:3386) refer to CPR as an attempt to restore spontaneous circulation by performing chest compressions with or without ventilation.

CPR is the restoration of cardiac output and pulmonary ventilation following cardiac arrest and apnoea by using artificial respiration and manual closed chest compressions or open cardiac massage (*Stedman's Concise Medical and Allied Health Dictionary* 1997:760).

For the purposes of this research, CPR is defined as an emergency procedure that is performed in the two referral hospitals in Botswana by registered nurses to resuscitate a client whose heart has stopped beating. It involves the clearing of the airways, and the alternation of chest compressions with artificial respirations.

- **Advanced Cardiac Life Support (ACLS)**

Advanced Cardiac Life Support (ACLS) is the use of sophisticated methods and equipment to treat cardio-pulmonary arrest. ACLS includes the use of specialised equipment to maintain airway patency, early defibrillation and pharmacological therapy (*Merriam Webster's Online Medical Dictionary* 2006:[1]).

The AHA (2005:243) defines ACLS as the interventions that are used to treat and stabilise adult victims in the midst of life-threatening emergencies and attempts to resuscitate victims of cardiac arrest. These interventions, according to the AHA, include CPR, basic and advanced airway management, endotracheal intubation, the administration of medications, electrical therapy, and intravenous access (AHA 2005:243).

For the purposes of this research, ACLS refers to as an emergency medical procedure in which the basic life support efforts of CPR are augmented by the establishment of an intra-venous line, drug administration, possible defibrillation, endotracheal intubation, and the control of cardiac arrhythmias that are performed in the two referral hospitals in Botswana.

- **Code**

A “code” is an indicator in the form of a message that is used in messages and communications in a hospital, especially when the information is broadcast over a public address system. For example, “code blue” or “code 9” could indicate a particular type of emergency to an emergency care team (*Taber’s Cyclopaedic Medical Dictionary* 1997:445).

Hospital emergency codes are used in hospitals throughout the world to denote various kinds of emergencies. Although they are usually coded by colour, these colour codes denote different events in different hospitals and are not universal. “Code blue”, for example, is a declaration of a state of medical emergency and a call for medical personnel and equipment in an attempt to resuscitate a patient, especially patients in cardiac arrest or patients suffering from respiratory distress or failure (*Merriam Webster’s Online Medical Dictionary* 2009).

For the purpose of this research, a “code” is defined as the notification of a medical emergency that needs immediate medical attention by medical professionals in order to resuscitate a patient during cardio-pulmonary arrest in the two referral hospitals in Botswana.

- **Perception**

A “perception” is the process by means of which information about the world that is received by the senses and analysed by an individual is made meaningful (*Oxford Concise Medical Dictionary* 2002:518).

Perception has been defined as a way of regarding, understanding, interpreting, experiencing or conceptualising something. It is the conscious recognition and interpretation of sensory stimuli through unconscious associations (and especially through memory) that serves as a basis for understanding, learning, knowing or the motivation of a particular action or reaction (Grice, Picton & Deakin 2003:821).

For the purpose of this research, a perception is defined to as the positive or negative beliefs, opinions, experiences or feelings of nurses with regard to CPR. Perceptions are also reflections of how registered nurses understand, conceptualise and interpret the performance of CPR.

- **Need**

A need is something that is required or essential. Certain things are essential for the physical and mental health and maintenance of human beings (*Tabers' Cyclopaedic Medical Dictionary* 1997:1423). According to Maslow (1999:33), human beings have certain needs of varying importance that must be fulfilled for healthy and creative living. These needs motivate people to act in the way that they do, and, in particular, in ways that satisfy needs that are not yet fulfilled. Not all needs are equally important. They exist in a hierarchy with the most important survival needs at the bottom of the pyramid of needs that is widely known because of the works of Maslow.

For the purpose of this research, needs are defined as those essential requirements that enhance the performance of CPR as it is performed by nurses in the two referral hospitals.

- **Barrier**

A barrier has been referred to as something that bars, keeps out and/or obstructs progress or that prevents encroachment (*Webster's Comprehensive Dictionary* 2000:116).

A barrier has also been described as something immaterial that obstructs or impedes behaviour (*Free Dictionary* 2008[2]).

For the purpose of this research, a barrier is defined as one of those factors and elements that block or obstruct or hinder proficiency in CPR and the effective performance of CPR by nurses.

- **Registered nurse**

A registered nurse is a trained nurse who has been licensed by a state authority after passing qualifying examinations for registration (*Merriam Webster's Online Medical Dictionary* 2009).

A registered nurse is someone who has completed a basic and general nursing education and who has passed such examinations in the practice of nursing as have been determined by the Nursing and Midwifery Council of Botswana, and who has subsequently been registered in the register of general nurses of the Nursing and Midwifery Council of Botswana (Republic of Botswana 1995c:2). The length of the nurse training programme in Botswana is three years.

For the purpose of this study, "a registered nurse" is defined as a health professional (male or female) who has completed a diploma or degree in nursing, registered with the Nursing and Midwifery Council of Botswana, and who has been deployed in one of the two referral hospitals in Botswana.

1.10 CONCEPTUAL FRAMEWORK

This study was guided by the conceptual framework of the AACN Synergy Model for Patient Care developed by the American Association of Critical Care Nurses (Curley1998:66). Nursing care reflects an integration of the knowledge, skills, experience and attitudes that are needed to meet the needs of patients and families. The focus of this study is on the characteristics of the registered nurses and the perceptions they have on CPR, their needs and the barriers they experience in the performance of CPR. The nurse characteristics that are delineated by this model can be considered as competencies that are essential for providing care to the critically ill. This study also identifies the availability of resources and the facilities that are provided by the system.

Since the characteristics of cardio-pulmonary arrest patients who require CPR are always very similar without variations that warrant any kind of deeper analysis, this study focuses only on the nurse's characteristics and competencies and the functions of the health care system and the contributions that it makes.

The AACN Synergy Model for Patient Care is an excellent framework to use while meeting the needs of patients during emergencies. The AACN Synergy Model for Patient Care defines the following three elements of the model: the patient, the nurse and the system. Any patient has eight characteristics that have to be understood and accommodated. For nurses, there are eight dimensions of nursing practice that have to be applied in patient care. The system provides support for optimising patient outcomes.

The assumptions, application and significance of the conceptual framework that is contextualised in this study, will be discussed in more detail in chapter 2.

1.11 ASSUMPTIONS

Assumptions are statements that are taken for granted or considered to be true by individuals, even though they have not been scientifically tested (Burns & Grove 2005:728). The researcher has made the following assumptions in this study.

1.11.1 Theoretical (conceptual) assumptions

- The CPR is an emergency that can occur in any setting such as a home, a workplace, the roadside or in a hospital. All registered nurses, regardless of their area of speciality, should therefore be in a position to provide CPR because emergency nursing has to be practised in any setting, and nurses are expected to be able to provide CPR in all emergency situations.
- Equipping nurses with adequate knowledge, skills and competencies with regard to CPR will increase the patients' chances of survival after a cardio-pulmonary arrest because a nurse is usually the first person to undertake the initial treatment and stabilisation of a patient before a doctor's arrival. According to the AACN Synergy Model for Patient Care, the possible outcomes for a patient are optimal when the competencies of a nurse and the characteristics of patients are in a state of correspondence and synergy.
- The experiences that the participants share with the researcher will enhance the researcher's understanding of the phenomenon that is being studied.
- The application of the AACN Synergy Model for Patient Care (to acute and critical care units especially) will make a positive impact on the care of the patients and on the outcomes achieved by health care organisations.
- A careful study of the perceptions, barriers and needs articulated by registered nurses with regard to their provision of CPR will produce beneficial results for the education and practice of the registered nurses in the health service delivery in Botswana. It will also assist health care administrators to develop informed policies about the necessity for mandatory CPR training for registered nurses in Botswana.

1.11.2 Methodological assumptions

- Since perceptions, feelings and opinions are human behaviours that are not quantifiable they are best studied within the context of the qualitative research design.
- Utilising a quasi-experimental, interrupted-time-series research design will assist the researcher to observe the retention of knowledge and skills of nurses and their retention rates after an interval of three months.

- The focus group discussions and semi-structured interviews are appropriate as methods of data collection and as a means for gathering narrative data in a qualitative study.
- The non-probability sampling method that utilises the technique of purposive and convenience sampling will assist the researcher to identify participants who meet the inclusive criteria and who will be able to participate in the research and share their opinions and perceptions about the provision of CPR.
- The retrospective auditing of the records and emergency trolleys as a method of data collection is an acceptable and appropriate means for gathering useful numerical data that supplements the qualitative data in a mainly qualitative study.

1.12 THE RESEARCH DESIGN AND METHODOLOGY

The section that follows describes the methods that the researcher used to collect and analyse the data during the study. This chapter describes the research methodology, the research design, the kind of sampling, the data collection, the data analysis methods and the procedures that were chosen by the researcher to guide this research process.

1.12.1 The procedure adopted for conducting the research

The researcher utilised the following steps to conduct a systematic investigation:

- The preparation of a research proposal after a review of the literature to support and inform the rationale of the study.
- The designing of the data collection tools.
- The review of the data collection tool by the promoters, a statistician and nursing peers.
- The submission of the proposal to UNISA.
- The application for permission to conduct the study, and the submission of a copy of the research proposals to the Research Unit of the Ministry of Health, the Institutional Review Board, the two referral hospitals – a hospital in Gaborone (*hereinafter referred to as hospital A*) and a hospital in Francistown (*hereinafter referred to as hospital B*).

- The pre-testing of the tool on potential participants who were excluded from participating in the actual study.
- The collection of the data in the different phases.
- The analysis of the data that was collected by using Microsoft Excel and Version 15 of the Statistical Package for Social Sciences (SPSS).
- The writing of the final research report.

1.12.2 Research design

The researcher used both an exploratory and descriptive research design in this study. She made use of both quantitative and qualitative approaches to identify the facilities that were available for the performance of CPR, to explore and describe the current state of the knowledge and skills of nurses about CPR, and to determine and identify the perceptions and barriers that nurses and nurse managers experienced when they conducted CPR in the two referral hospitals in Botswana. Quantitative studies aim at collecting and analysing variables and describing the relationships that these variables indicate. Since this approach incorporates deductive logical reasoning, the researcher examined the data that she had collected and made various generalisations on the basis of the data. The researcher also used qualitative approaches to generate data that is indicative of the meanings that the nurses attributed to CPR and the various experiences that it generated (Burns & Grove 2005:28).

Descriptive studies are often extremely accurate in what they describe because they describe what exists, the frequency with which it occurs, the meanings that people assign to phenomena, and a great deal of data that can be organised into categories. Descriptive studies have as their main objective the accurate and sympathetic portrayal of that which is being studied, whether they be persons, situations or groups (Burns & Grove 2005:30).

Exploratory studies are designed to increase a researcher's knowledge in a specific field of study. They are usually conducted in those cases where little previous research has been conducted. This study has been divided into four phases, and the table that follows below indicates the details of the phases, the research design, the population and sample, the process of sampling, the data collection method, and the way in which the data was analysed. The course of this research is illustrated in a figure that occurs

later in this text (see figure 4.1: A schematic representation of the research methodology). Table 1.6 provides a brief and systematic overview of the research methodology that was followed in each phase of this study.

Table 1.6 A systematic summary of the research methodology (in four phases)

Phase1 (the audit phase): an explorative, descriptive design that uses a quantitative methodology to describe the healthcare system				
Research aim	Data collection	Population and sample	Validity and reliability	Data analysis Software
To conduct audits pertaining to the availability of equipment, policies on CPR, procedure manuals, in-service education on CPR, and a retrospective auditing of the patients records	Auditing of the emergency trolley, patients' records, procedure manuals, and the in-service education records of the two referral hospitals by means of a structured checklist	Emergency trolleys, patients' records, the procedure manuals, and the in-service education records from the following departments: Accident & Emergency unit (A&E), Intensive Care Unit (ICU), Male medical ward (MMW), Female medical ward (FMW), Male surgical ward (MSW), Female surgical ward (FSW), Male orthopaedic ward (MOW), Gynaecological ward (GYN) and Maternity ward (MAT). Methods of sampling: Convenience sampling in which inclusive criteria are stipulated	Pre-testing performed. Content validity is ensured by a literature review. The use of promoters and a statistician to ensure face validity. A covering letter that is designed to avoid misunderstandings or misinterpretations of the research	Microsoft Excel SPSS (Version 15)

Phase 2 (the evaluation phase): an explorative, descriptive design that uses a quantitative methodology and a quasi-experimental design (nurse)				
Research aim	Data collection sequence	Population and sample	Validity and reliability	Data analysis
To evaluate the existing knowledge and skills of registered nurses in performing CPR in the two referral hospitals in Botswana	Pre-test, intervention, post-test, re-test after three months	Registered nurses in the two referral hospitals who have nursing experience of more than one year. Sampling: Convenience sampling with the inclusive criteria stipulated	This will be discussed in detail in chapter 4.	SPSS (Version 15). The chi-square test, The McNemar test The Mann-Whitney U test, The Wilcoxon matched-pairs signed rank test
Phase 3 (the discussion phase): an explorative, descriptive design that uses a qualitative research methodology and focus group discussions (registered nurses), and semi-structured interviews (nurse managers) (nurse, healthcare system, patient)				
Research aim	Data collection	Population and sample	Trustworthiness	Data analysis
To identify the perceptions, barriers and needs that are experienced by the registered nurses who perform CPR in the two referral hospitals	Two focus group interviews were conducted. The first one was at hospital A while the second one was held at hospital B. Twelve nurses participated in each interview.	The registered nurses from the two referral hospitals who participated in the quasi-experimental study during phase 2. Convenience sampling with the inclusive criteria stipulated.	The establishment of trustworthiness was based on Guba's model of trustworthiness that uses the four strategies of: Credibility Dependability Confirmability Transferability	The data was audio-taped then transcribed and verified. Field notes were taken. Content analysis was Used. The content was examined, categorised, tabulated and reorganised. Themes were formulated.
To conduct individual interviews with nurse managers of the two referral hospitals to identify nurses' perceived needs and barriers in performing CPR and make recommendations	Two semi-structured interviews were conducted with nurse managers. The first interview had twelve participants at hospital A while ten participated in the second interview held at hospital B.	Senior nurse managers in the two referral hospitals Purposive sampling; Inclusive criteria stipulated.	Based on Guba's model of trustworthiness using four strategies: Credibility Dependability Confirmability Transferability	The data was audio-taped and then transcribed. Field notes were taken. SPSS (Version 15). Tesch open-coding method. The data was analysed and categorised until a point of saturation had been reached.
Phase 4 (the recommendation phase): an analysis of the observations made in the study in order to formulate recommendations				
Patient	Nurses		System	
To make recommendations with regard to the patient	To make recommendations with regard to the nurses		To make recommendations with regard to the system	

1.12.3 Reliability and validity for phases 1 and 2 of the study

The validity and reliability of phase 1 and 2 will be discussed in detail in chapter 4 of this study.

1.12.4 Trustworthiness of the data obtained in phases 3 and 4 of the study

The truth-value of phases 3 and 4 data was measured against the four constructs which had been described by Lincoln and Guba (1985) and that are regarded as benchmark criteria against which the trustworthiness of a study can be measured. The four constructs, namely, credibility, transferability, dependability and confirmability, are discussed in detail in chapter 4 of this thesis.

1.13 ETHICAL CONSIDERATIONS

The upholding of ethical guidelines refers to whether a researcher demonstrates competency, maintains honesty in the management of the resources, acknowledges sources and the input of supporters during the study, and presents an accurate report of the findings. The researcher observed the following ethical protocols:

- She requested and obtained permission to conduct the study from the Research unit in the Ministry of Health of the Government of Botswana.
- She requested and obtained permission from the institutional research boards in the two referral hospitals in accordance with the guidelines for conducting ethical research in Botswana.
- The informed consent of the participants was assured by explaining to them the purpose of the study, the methods of data collection and the significance of the study. In order to maintain the anonymity of the participants, the research asked them to provide her with their written consent although they were not requested to indicate their names on the consent forms. Throughout the research, the researcher used code numbers to indicate the identity of the two referral hospitals and of the individual participants. In this way, the researcher preserves the anonymity of the hospitals and institutions concerned as well as the human participants in the research.

- The researcher did not require participants to provide any form of personal identification. This was another means used for preserving confidentiality.
- The researcher informed the participants that there would be no payment for their participation in the study.
- No harm was caused because the subjects were not manipulated in any way.
- The researcher was guided by a promoter and joint promoter (who are both experienced in the field of nursing research), and was assisted by a statistician.
- The results obtained from the study assisted the researcher to recommend the need for establishing a training programme and a compulsory periodic CPR certification for practising nurses in Botswana.

1.13.1 The scope and limitations of this study

“Scope” refers to the degree to which the findings of a study can be generalised to other settings (Van Eeden & Terre Blanche 2000:135). “Limitations” are restrictions in a study that may decrease the generalisability of the findings. Such findings may be either theoretical or methodological (Burns & Grove 2005:741).

1.13.2 Methodological limitations

- The researcher recognises that the restrictions in this study that may limit the credibility of the findings and restrict the population to which the findings can be legitimately generalised.
- The sample might not be representative of the population under study because registered nurses are also deployed in district hospitals, primary hospitals, clinics and in a variety of health care posts throughout Botswana.
- The non-probability sampling approach might increase the risk of bias.
- A study undertaken in Botswana might not be generalisable to other countries.
- This study did not include the other health facilities in which registered nurses also deal with medical emergencies, such as district hospitals and primary hospitals. The research focused only on two referral hospital in Botswana.

1.13.3 Theoretical limitations

- The researcher recognises that there might be some deficiencies in the conceptual and operational definitions that could restrict the generalisability of the findings.
- It has been suggested that the AACN Synergy Model for Patient Care might not be entirely appropriate for the systematic examination of cardiac arrest settings because of the absence of leadership in these settings. It has been pointed out that teamwork and the sharing of experiences and responsibilities are assumed by this model. It is undeniable that in the generally chaotic situation that prevails during the provision of CPR, the patient comes first and not much attention is paid to the dignity and importance of the leadership that nurses routinely acknowledge in most of the other conditions of their profession (Kirsch, Van Sell & Grant 2002:1). But even in the generally chaotic situations that prevail during CPR, there is usually one person who is in charge of the resuscitation event although all the participants in the event are very strongly focused on the progress of the resuscitation rather than on the rank and importance of the person in charge. One may therefore say that the AACN Synergy Model for Patient Care is in fact highly appropriate for research into all the factors and elements that characterise a resuscitation incident, which is, after all, notable for the intense and symbiotic cooperation that occurs between all those who are trying to revive the patient. The AACN Synergy Model for Patient Care is therefore an appropriate theoretical model on which to base this research.

1.14 DIVISION OF CHAPTERS

This dissertation will be presented in the following sequence:

Chapter 1	Introduction and overview of the study.
Chapter 2	Conceptual framework.
Chapter 3	Literature review.
Chapter 4	Research design and methodology.
Chapter 5	Data analysis and discussion: phase 1. Findings of the observational audit of the emergency trolley and the auditing of the hospital policies on CPR, the auditing of the in-service registers, the retrospective auditing of the CPR performed for the period between January 2005 and December 2006.
Chapter 6	Data analysis and discussion: phase 2. Quasi-experimental research conducted among the registered nurses in the two referral hospitals

Chapter 7 (a)	Data analysis and discussion: phase 3. Focus group discussions with registered nurses.
Chapter 7 (b)	Data analysis and discussion: phase 4. Semi-structured interviews conducted with nurse managers.
Chapter 8	Conclusions, limitations and recommendations.
Annexures	All the annexure that are attached to this study.

1.15 CONCLUSION

This chapter provided an overview of the research problem and how the researcher planned to approach and investigate the problem. The importance of this research for nursing practice in general, for nurse education, and its significance for the health care system of Botswana and other countries, were presented. This chapter discussed the importance of CPR as a uniquely important patient-rescue technique in contemporary health care throughout the world and in Botswana in particular. The manner in which nurses are the mainstay of the health care system and in which they nearly always become the first health care professionals on the scene, and the functions that they perform for clients from various medical, surgical and trauma emergencies, were also described and discussed. The equipment of nurses with the necessary knowledge, skills and competencies to deal with these emergencies was considered as a means of reducing patient mortality and morbidity rates in Botswana. Further discussions focused on the perceptions, barriers and needs that are experienced by nurses in Botswana when they perform CPR. An outline of the organisation of the research in this study was presented towards the end of the chapter. This chapter included a brief and systematic introduction to the conceptual framework of the researcher utilised, as well as an outline of the organisation of the chapters.

Chapter 2 will discuss the AACN Synergy Model for Patient Care as the conceptual framework that the researcher used in this study.

CHAPTER 2

CONCEPTUAL FRAMEWORK: THE SYNERGY MODEL FOR PATIENT CARE OF THE AMERICAN ASSOCIATION OF CRITICAL CARE NURSES

2.1 INTRODUCTION

A conceptual model is a set of highly abstract but related constructs that reveal the connections between all the most prominent elements and assumptions of a model in such a way that the philosophical foundations of the model are clearly revealed (Burns & Grove 2005:128). According to Polit and Beck (2006:115), a conceptual framework or conceptual model represents a less formal method of organising phenomena than a theory.

In nursing science, conceptual models enable one to decrease extraneous variations among nurses and to decrease the number of plausible interventions that are available as they strive to improve patient outcomes. Conceptual models that guide nursing practice function to keep the nurses in an organisation focused on the paths that are indicated in their mission statement about care giving (Kerfoot, Lavandero, Cox, Triola, Pacini & Hanson 2006:21). Such conceptual frameworks or models tend to reinforce safe, high-quality care, treatment and services. Consistency in nursing practice can only be developed and maintained when orientation, continuing education, performance evaluation, specialty certification, career advancement and future planning are all directly related to the provisions of the mission statement and the work that must be performed before successful patient outcomes can be achieved (Kerfoot 2005:335).

Demarrais and Lapan (2003:55), Finlay and Gough (2003:470), and Munhall and Chenail (2007:8) agree that a conceptual framework serves the following purposes in research:

- It enables the most important concepts to be integrated in a logical manner.
- It provides a schematic description of relationships among independent, dependent, moderator, control and extraneous variables.

- It identifies and sets out the assumptions that underlie the study.
- It demonstrates the links that exist between research results and research objectives.

2.1.1 The American Association of Critical Care Nurse Certification Synergy Model for Patient Care

The researcher decided to use the AACN Synergy Model for Patient Care to guide this study because the patient is always the focal point and centre of nursing practice and because this particular model is applicable to all patients in all settings. This particular model also indicates the links between practice and outcomes. The AACN (2003) points out that the core concept of the AACN Synergy Model for Patient Care is the way in which the needs and characteristics of patients and their families influence and determine the competencies that nurses require if they are to perform their jobs efficiently and effectively (Kaplow & Reed 2008:25). Another advantage of the AACN Synergy Model for Patient Care for this research is that it is readily adaptable to the acute and critical care setting where patients are critically ill and where the competencies and skills of nurses need to be practised in the context of their patients' personal characteristics and idiosyncrasy (Hardin & Hussey 2003:73).

2.2 HISTORICAL BACKGROUND

The AACN Synergy Model for Patient Care has become widely accepted as a viable model for professional nursing practice in the 21st century (Reed, Cline & Kerfoot 2007:3).

According to Curley (1998:64) the AACN specifically undertook to design a model that would describe nursing practice in terms of the needs and characteristics of patients and the demands of the health care environment that will become universally prevalent in this 21st century. When a perfect match emerges from interactions that occur when characteristics of patients who come into contact with the professional competencies and abilities of nurses, a creative and energetic synergy emerges that maximises desirable patient outcomes. Optimal outcomes are evaluated on the basis of those that are derived from the patient, the nurse and the health care system. This model is therefore known as the "Synergy Model" (Curley 1998:64).

Although the AACN Synergy Model for Patient Care is used as a basis for the certification of acute and critical care nurses, this model can also help to situate the nursing profession within the current health care environment – especially as it relates to CPR (Curley 1998:65).

2.3 THE AACN SYNERGY MODEL FOR PATIENT CARE

The term *synergy* may be defined as a mutually advantageous conjunction or compatibility of completely separate agents, participants or elements (such as resources or efforts) (*Merriam Webster's Online Medical Dictionary 2007*). Synergy is an evolving phenomenon that occurs when individuals or groups work together to incorporate the benefits of innovative, grounded and holistic thinking towards the realisation of a common goal (Curley 1998:64).

The AACN Synergy Model for Patient Care was specifically developed to provide a rational method for linking practice to patient outcomes. It therefore reflects how nursing care that integrates knowledge, skills, experiences and attitudes are able to meet the needs of patients and their families (Ecklund & Stamps 2002:60). The AACN Synergy Model for Patient Care enables a researcher or administrator to clearly identify the unique needs of patients and to describe how these can be met by particular competencies, qualities, skills and abilities in environments in which nurses have to practice. It stands to reason that an absence of synergy between the needs of a patient and the abilities of a nurse will result in unsafe and unsatisfactory standards of care. An absence of synergy therefore also implies that health care professionals such as nurses can no longer ensure that optimal standards of care in nursing in a variety of situations in which patients find themselves. The AACN Synergy Model for Patient Care can also be extended to describe the various aspects of nurse-patient, nurse-nurse and nurse-system relationships that constitute the contemporary health care environment (Curley 2004:64). The AACN Synergy Model for Patient Care describes three kinds of outcomes: (1) those derived from the patient, (2) those derived from the nurse, and (3) those derived from the health care system (see Figure 2.1). These three outcomes are discussed in detail in the following chapters.

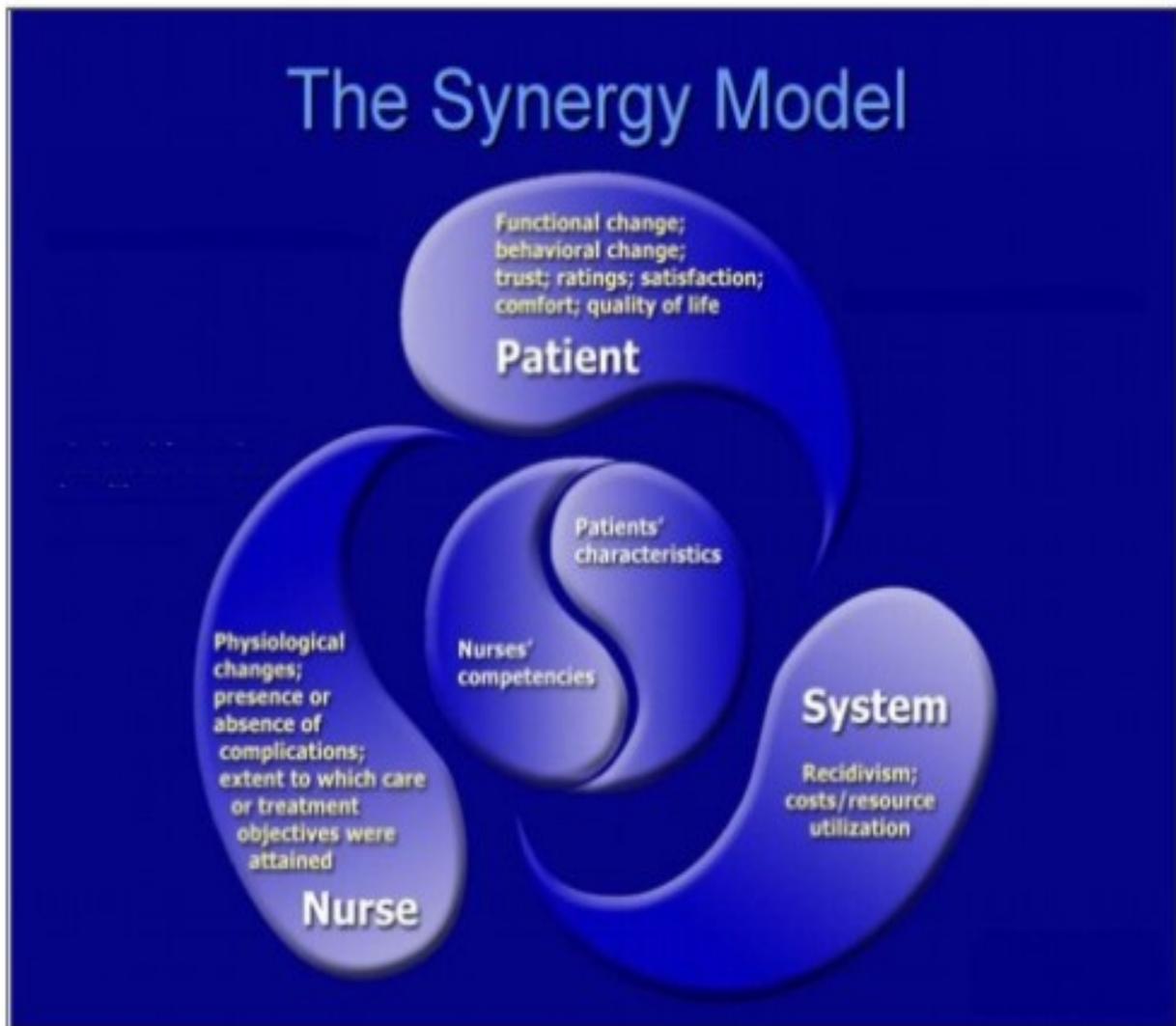


Figure 2.1: AACN Synergy Model for Patient care (Source: Curley 1998:69)

2.3.1 The major tenets of the AACN Synergy Model for Patient Care

In what follows, the AACN Synergy Model for Patient Care will be discussed in detail. Since the AACN Synergy Model for Patient Care establishes the patient as the centre and focus of all health care efforts, it describes how the needs of patients and the skills and abilities of nurses need to interact in order to optimise the outcomes of patient care (Curley 1998:66). The three components of the model (namely, *patient characteristics*, *nurse competencies* and *the health care system*) are all indispensable for a comprehensive model of professional practice (Kaplow & Reed 2008:21). These three components are

discussed in detail in the following sections: 2.3.3, 2.3.5 and 2.3.7. The AACN Synergy Model for Patient Care offers a framework for evaluating the outcomes for the patient, the nurse and the system (figure 2.1). The AACN Synergy Model for Patient Care also describes eight patient characteristics and eight nurse competencies that together create the environment in which all professional nursing takes place. This process is depicted in figure 2.2 and listed in table 2.1. The actual conditions that prevail in the health care environment provide the inputs that enable the AACN Synergy Model for Patient Care to determine whether or not the interactions between the competencies of the nurse and the characteristics of the patient will be successful or not (Kaplow & Reed 2008:23).

The basic premise of the model is that the needs of the patients and their families drive and determine the characteristics and competencies of nurses. Synergy occurs when the needs and characteristics of a patient, a clinical unit or a system are matched by a nurse's competencies (Curley 1998:66). The model is therefore relevant to all kinds of practice settings.

2.3.2 Assumptions that guide the AACN Synergy Model for Patient Care

The AACN Synergy Model for Patient Care is based on nine different assumptions. The first five were identified in 2000 (AACN 2000), and the last four were added by the AACN Certification Corporation four years later (Muenzen, Greenburg & Pirrol 2004). Most of these assumptions relate to the patient and the nurse, although the hospital system can be addressed both directly and indirectly by the same assumptions (Alspach 2006:11). The AACN Synergy Model for Patient Care is constructed on the foundations of the following nine assumptions (each of these assumptions is expressed in terms of a declaration or assertions):

- Patients are biological, psychological, social and spiritual entities who present at a particular developmental stage. The whole patient (body, mind and spirit) must be considered.
- The patient, family, and community all contribute to providing a context for the nurse-patient relationship

- Patients can be described by a number of characteristics. All characteristics are connected and contribute to each other. Characteristics cannot be looked at in isolation.
- Similarly, nurses can be described on a number of dimensions. The interrelated dimensions paint a profile of the nurse.
- A goal of nursing is to restore a patient to an optimal level of wellness as defined by the patient. Death can be an acceptable outcome, in which the goal of nursing care is to move a patient toward a peaceful death.
- The nurse creates the environment for the care of the patient. The environment of care also affects what the nurse can do.
- There is interrelatedness between impact areas, which may change as the experience, situation, and setting change.
- The nurse may work to optimise outcomes of patients, families, healthcare providers, and the healthcare system.
- The nurse brings his or her background to each situation, including various levels of education/knowledge and skills/experience.

The goal of nursing is always to restore a patient to an optimal level of wellness in good health as defined by the patient. There are eight nursing competencies that contribute towards the complete picture of the professional nursing. These eight competencies are:

- clinical judgement
- advocacy/moral agency
- caring practices
- collaboration
- systems thinking
- responses to diversity
- facilitation of learning
- clinical inquiry.

While these characteristics are discussed in some detail in section 2.3.5, patient characteristics will not be discussed in much detail in this study because this study confines itself to an investigation of the characteristics of the nurse and the health care system.

It was stated above that the goal of nursing is to restore a patient to an optimal level of wellness *as defined by the patient himself/herself*. Because of this qualification, death may well be an acceptable outcome to a patient. Although a nurse creates the environment in which the care of the patient will take place, the environment thus created will either impede or enable what a nurse is able to accomplish (AACN 2003:4). The different aspects of the environment that a nurse creates are all related to one another through the agency of the nurse as a facilitator of care. The way in which the elements of the environment change may be regarded as a function of the experience of the caregivers, the condition of the patients and the setting itself (Muenzen et al 2004). The nurse therefore enjoys the unique advantage in being able to optimise outcomes for patients, families, health care providers and the health care system or organisation itself. All nurses bring the totality of their life skills, knowledge, wisdom, experience, understanding and moral qualities to every professional situation in which they are involved (Curley 1998:64).

The author (Curley 1998:64) is of the opinion that these assumptions constitute the foundations on which the framework of the AACN Synergy Model for Patient Care may be understood and developed. The AACN Synergy Model for Patient Care is a conceptual framework for designing practice and for developing the competencies that are required for units in personnel that specialise in the care of critically ill patients (Hardin & Kaplow 2005:9).

The patient characteristics, the nurse competencies and the resultant outcomes from the interactions that occur between the patient, the nurse and the system are listed in table 2.1. Among the many characteristics that are present, 8 are consistently seen in patients who experience critical events. These 8 characteristics are consistently assessed by nurses in variable levels given each patient situation (Hardin & Kaplow 2005:8).

Table 2.1 Patient characteristics, nurse competencies and the outcomes that are generated by the synergy between patients, nurses and the system

Patient characteristics	Nurse competencies	Outcomes		
		Patient	Nurse	System
Resiliency Vulnerability Stability Complexity Resource availability Participation in care Participation in decision-making Predictability	Clinical judgement Advocacy/moral agency Caring practices Collaboration Systems thinking Response to diversity Facilitator of learning Clinical inquiry	Degree of patient satisfaction with care Levels of trust Functional change Behavioural change Comfort Quality of life	Management of physiological change Presence or absence of complications The extent to which care objectives are met	Recidivism Cost and resource utilisation

From table 2.1 it can be seen that each patient brings a set of unique characteristics to the healthcare situation. These characteristics, as well as other patterns that are unique to each patient’s circumstances, should be assessed in every patient. These characteristics are discussed in section 2.3.3.

The nurse characteristics can be considered competencies that are essential for those providing care to the critically ill. All eight competencies may reflect an integration of knowledge, skills and experience of the nurse. Outcomes derived from the patient include functional changes, behavioural changes, trust, satisfaction, comfort and quality of life. Outcomes derived from nursing competencies include physiological changes, the presence or absence of complications and the extent treatment objectives were obtained (Curley 1998:65). These are discussed in detail in section 2.3.5.

Outcome data derived from the healthcare system include recidivism, cost utilisation per case. These are discussed in detail in section 2.3.7.

2.3.3 Patient characteristics as described in the AACN Synergy Model for Patient Care

The AACN Synergy Model for Patient Care explains how each patient brings a unique cluster of personal characteristics to any health care situation. The AACN Synergy Model for Patient Care also enables us to understand how patient characteristics can refer to the vulnerabilities and personal difficulties with which patients may present during the course of their illness or their contacts with health care personnel. In order to broaden her

understanding of the model, the researcher has incorporated the insights contained in Curley (1998:64), Kaplow and Hardin (2007:5), Hardin and Kaplow (2005:7) and Kerfoot et al (2006:23). Each patient and family are unique and every family and individual manifest different degrees of health and fitness and different vulnerabilities to illness and dysfunction. An individual's capacity for health is mediated by his/her genetic inheritance and biological conformations, and is also influenced by a variety of different factors such as exercise, stress reduction techniques, the institutions of the community in which the individual resides, and the community perceptions and social organisations that surround an individual (Curley 1998:64).

All these elements influence the kind of nursing care that is required by a particular patient and the patient's family. The AACN Synergy Model for Patient Care describes how nursing practice is based on eight patient characteristics that cover the whole health-illness continuum (AACN 2006).

The eight patient characteristics defined by the AACN Synergy Model for Patient Care are (2.3.3.1) *resiliency*, (2.3.3.2) *vulnerability*, (2.3.3.3) *stability*, (2.3.3.4) *complexity*, (2.3.3.5) *resource availability*, (2.3.3.6) *participation in care*, (2.3.3.7) *participation in decision making* and (2.3.3.8) *predictability*. In the sections that follow, these patient characteristics are described and discussed.

These characteristics vary in terms of the level of need manifested by each patient. The patients characteristics is assessed using a 5 point Likert scale, ranging from 1 (the worst patient state) to 5 (the best patient state). These levels range from *worse* through *moderate* to *best* on a scale of 1-3-5 (see tables 2.2.1 till 2.2.8). Level 1 means that the patient's characteristic is not adequate enough to assist in the provision of healthcare; level 3 means that the characteristic is moderately adequate to assist; and level 5 indicates total adequacy of that character in the patient.

2.3.3.1 Resiliency

Resiliency has been defined (Felten & Hall 2001:50) as the ability to achieve, retain or regain a level of physical or emotional health after the impact of a devastating illness, disappointment or loss. The definition of resiliency supplied by the AACN Synergy Model

for Patient Care read that “the patient’s capacity to return to a restorative level of functioning by using compensatory and coping mechanisms; the ability to bounce back quickly after an insult” (Curley 1998:65).

Table 2.2 Resiliency

Level 1	Level 3	Level 5
Minimally resilient Unable to mount a response Failure of compensatory mechanism Minimal reserves Observable brittleness	Moderately resilient Able to mount a moderate response Able to initiate some degree of compensation Moderate reserves	Highly resilient Able to mount and maintain a good response Intact compensatory and coping mechanisms Strong reserves and endurance

Source: AACN Certification Corporation (2006b:2)

The person with low level resiliency may have less compensatory mechanism whereas a person with high resiliency may have strong coping mechanism and able to maintain the equilibrium. During cardiac arrest, the level of resiliency or coping capability is influenced by the co-morbid conditions like hypertension, diabetes and by various kinds of health behaviours like diet, exercise, stress, alcoholism and smoking. Higher resilience in the patient’s characteristic assists in the provision of healthcare.

2.3.3.2 Vulnerability

Vulnerability is defined (Malone 2000:1) as “the susceptibility to particular harmful agents, conditions, or events at particular times”. Vulnerability is considered to be something that needs to be avoided and resisted The definition of vulnerability provided by the AACN Synergy Model for Patient Care is “the susceptibility to actual or potential stressors that may adversely affect patient outcomes” (Curley 1998:65).

Table 2.3 Vulnerability

Level 1	Level 3	Level 5
Highly vulnerable Susceptible Unprotected Fragile	Moderately vulnerable Somewhat susceptible Somewhat protected	Minimally vulnerable Safe/“Out of the woods” Protected Not fragile

Source: AACN Certification Corporation (2006b:2)

A highly vulnerable patient is more susceptible to stressors and a minimally vulnerable patient is less susceptible to stressors. In a cardiac arrest situation, the degree with which the patient possesses the risk factors to cardiac arrest determines the vulnerability of the patient. Minimal vulnerability in the patient’s characteristic assists in the provision of healthcare.

2.3.3.3 Stability

The definition of stability provided by the AACN Synergy Model for Patient Care is “the ability to maintain a steady state of equilibrium” (Curley 1998:65). Stability can be used to describe any vacillating phenomena that impact nursing care-physiological stability, psychological stability, and family or social stability (Curley 2007:49).

Table 2.4 Stability

Level 1	Level 3	Level 5
Labile/unstable Unresponsive to therapies High probability that patient will die	Moderately stable Able to maintain a steady state for limited period of time Some responsiveness to therapies	Highly stable Constant vital signs Responsive to therapies Low probability that patient will die

Source: AACN Certification Corporation (2006b:2)

During the provision of CPR, although the patient is in a critical condition, the stability of the patient varies due to the pre-condition of the patient, the early identification of the risk factors and timely intervention in the provision of CPR. A minimal stable patient is unsteady and is not responding to therapy, while a highly stable patient is responsive to the therapy with good prognosis.

2.3.3.4 Complexity

Complexity has been defined as “the intricate entanglement of two or more systems (such as body, family, therapies)” (Curley 1998:65). These characteristics include multiple systems and/ or therapies- body systems, family and social systems and/or therapeutic interventions (Curley 2007:49).

Table 2.5 Complexity

Level 1	Level 3	Level 5
Highly complex Intricate Complex patient and family dynamics Ambiguous or vague Atypical presentation	Moderately complex Moderately complex patient and family dynamics	Minimally complex Uncomplicated Clear-cut presentation Routine family dynamics

Source: AACN Certification Corporation (2006b:2)

A highly complex patient has vague family dynamics with atypical presentation. The minimal complex patient is simple, uncomplicated and has a clear presentation with good family dynamics. During cardiac arrest and CPR, the complexity of factors poses a threat to a patient outcome. Factors such as a patient's condition, his/her family system and therapies are considered to have an impact on the patient's outcome.

2.3.3.5 Resource availability

The AACN Synergy Model for Patient Care defines *resource availability* as the extent of the resources (personal, financial, social, psychological and technical) that the patient, family and community bring to the current situation (AACN 2003; Curley 1998). Resources may be technical, fiscal, personal, psychological, social and supportive (Smith 2006:41).

Table 2.6 Resource availability

Level 1	Level 3	Level 5
Few resources Necessary knowledge and skills are not available Necessary financial support is not available Minimal personal and psychological resources Few social resources	Moderate resources Limited knowledge and skills available Limited financial support available Limited personal and psychological resources Limited social resources	Numerous resources Access to extensive knowledge and skills Financial resources readily available Strong personal and psychological resources Strong social resources

Source: AACN Certification Corporation (2006b:2)

The resource availability implies the resources that the patient, the family and the community may bring to the healthcare institution. The patient with a low level resource has low knowledge and less financial support, while the patient with a high level resource has extensive knowledge, skills and readily available financial resources. During the

management of cardiac arrest, the limited availability of resources can constrain a person’s recovery from a critical illness or an event.

2.3.3.6 Participation in care

The participation of patients in their own care is considered to be extremely valuable and beneficial for the overall well-being of patients. Patient participation in care is enhanced by a number of factors such as good health, access to information, assertiveness, high-quality interactions with nurses and physicians, and specific encouragement from healthcare providers for patients to participate in their own care (Sainio, Lauri & Eriksson 2001:100). Factors that impede the participation of patients in their own care include poor health, ignorance, anxiety, age, healthcare staff who are overwhelmed by time schedules, a lack of sufficient time on the part of all concerned, continuously high staff turnover rates and poor interactive relationships between patients and healthcare providers and others (Sainio et al. 2001:100).

The AACN Synergy Model for Patient Care’s definition of *participation in patient care* is the extent to which a patient and the patient’s family are equipped, willing and able to contribute to patient care (Curley 1998:66).

Table 2.7 Participation in care

Level 1	Level 3	Level 5
No participation Both the patient and the patient’s family are unable and/or unwilling to participate in care.	Moderate level of participation The patient and the patient’s family will need assistance to enable them to provide care.	Full participation Both the patient and the patient’s family are able and willing to participate in the patient’s care

Source: AACN Certification Corporation (2006b:2)

Participation in care is the extent to which a patient and his/her family engage in aspects of care. A level 1 patient and family have no participation in care and a level 5 patient and family fully participate in care and are able to make decisions for themselves. In a cardiac arrest situation, early access to the treatment and providing consent to the medical procedures on behalf of the patient enhance the optimal patient outcomes.

2.3.3.7 Participation in decision making

Patients are encouraged to participate in decision making because healthcare decisions about patients always have a variety of economic, social, legal and ethical implications (Henderson & Shum 2003:97). A patient's willingness to participate actively in decision making varies according to cultural background and the clinical situation. Most patients, however, want to be informed about the relative merits of treatment options in most situations (Kravitz & Melnikov 2001:585).

The AACN Synergy Model for Patient Care defines the participation of patients in decision making as the "extent to which the patient and the patient's family engage in decision making in respect of care" (Curley 1998:65).

Table 2.8 Participation in decision making

Level 1	Level 3	Level 5
No participation Patient and family have no capacity for decision making The patient and the patient's family require surrogacy and advocacy.	Moderate level of participation The patient and the patient's family have a limited capacity and willingness to make their own decisions. The patient and the patient's family need input and advice from others in order to cope with decision making.	Full participation The patient and the patient's family have the capacity and willingness to make their own decisions

Source: AACN Certification Corporation (2006b:2)

Patients and families with limited capacity in decision making are those who may require healthcare providers to make decisions on their behalf while patients and families that have full capacity and willingness to make decisions can make their own decisions. In an emergency event like cardiac arrest, early detection and seeking timely medical assistance by family members increase the chances of survival of the patients.

2.3.3.8 Predictability

According to the AACN Synergy Model for Patient Care, predictability (a summative characteristic) is the extent to which one may reasonably expect that a particular series of events will occur or that an illness will follow a particular course (AACN 2003; Curley 1998:66). For example, nurses are frequently asked to anticipate the needs of a critically ill patient and to provide information about acuity. Such data helps caregivers to predict the number of nurses who will be needed for an upcoming shift (Hardin & Kaplow 2005:49).

Table 2.9 Predictability

Level 1	Level 3	Level 5
Not predictable Uncertain The illness and its clinical course are unknown. The illness does not follow a critical pathway. No critical pathway for this illness has been described.	Moderately predictable Wavering The illness has occasionally been described in patients. The critical course of the illness has been incompletely described.	Highly predictable The illness normally follows a well-known and well-described critical pathway.

Source: AACN Certification Corporation (2006b:2)

An uncertain patient has no critical pathway for predicting his/her condition whereas a highly predictable patient follows a critical pathway. In a cardiac arrest situation, such predictability in the patient's condition increases the chances of survival and enables healthcare providers to initiate BLS and ACLS.

2.3.4 Outcomes derived from the patient

The outcomes that are derived from the patient include functional change, behavioural change, trust, satisfaction, ratings, comfort and an improved quality of life.

2.3.4.1 Functional and behavioural changes

While knowledge itself is not an outcome, changes in the health-related behaviour of a patient that are derived from knowledge, are an outcome. As patients and their families acquire a much better understanding of what health is and how to maintain and promote it, they gradually assume greater responsibility for maintaining their own health (Curley 1998:63). These forms of behaviour represent functional and behavioural changes that

result in better outcomes. Functional and behavioural changes become evident once a patient has recovered from an acute illness. In the aftermath of CPR or after having recovered from an acute illness, the ability of a patient to resume the normal everyday activities of his or her life without special assistance is an example of a kind of functional change that is an outcome of treatment (Curley 2007:34).

2.3.4.2 Trust

From the point of view of a patient, trust, satisfaction and comfort are a direct consequence of the clinical competence and interventions of the nursing staff during the process of caring for a patient (Kaplow & Reed 2008:24). Trust is one of the consequences of a nurse's knowledge of the patient and a patient's knowledge of the nurse. Trust is therefore a product of a nurse's clinical competence and moral agency. A sincere and intelligent interest in the concerns of patients, the empowerment of their families and the coaching they require are all outcomes of moral agency. Caring practices create a compassionate and therapeutic environment that is designed to promote comfort and prevent unnecessary suffering. The extent of a patient's experience of comfort is an outcome of the quality of the care that the patient receives (Kaplow & Reed 2008:21).

2.3.4.3 Ratings

Ratings include the assessment of individuals about levels of overall health provided or how long patients have had to wait for services. These measures of the patient satisfaction include assessments of technical-professional factors, the level of trust attained in relationships and the quality of educative experiences (Curley 1998:65).

2.3.4.4 Satisfaction and comfort

Satisfaction of patients and their families are expressed in ratings they provide to querying individuals and are subjective measures. Measures of patient satisfaction with nursing typically include technical-professional factors, trusting relationship and education experiences. The nurse's provision of a feeling of safety and unburdening of the load from the caregiver creates satisfaction and comfort (Curley & Hayes 2003).

2.3.4.5 Quality of life

Improved quality of life may be defined as the beneficial outcomes that a patient enjoys after CPR and the subsequent care that he or she receives (Curley 1998:64).

This study does not focus in detail on patient characteristics or patient outcomes after CPR because it is the *nurse's* characteristics and competencies and a critical investigation of how well the system functions and contributes to optimal outcomes that are the main focus of this study.

2.3.5 Nurse competencies in the light of the AACN Synergy Model for Patient Care

The AACN Synergy Model for Patient Care defines the following 8 dimensions of nursing practice: clinical judgement, advocacy/moral agency, caring practices, collaboration, systems thinking, response to diversity, facilitation of learning and clinical inquiry. The continuum of assessment has 3 ranges namely 1, 3 and 5 where 1 means a *novice*, 3 means *competent* and 5 means *expert* (AACN 2006b). Each individual nurse may be stronger in 1 or more particular competencies. The specific nurse competencies that are of concern to patients are set out in the tables below. The discussions of each of these dimensions of nursing practice are tabulated below.

2.3.5.1 Clinical judgement

Hardin and Kaplow (2005:57) explain that clinical judgement is central to nursing practice because nurses are both responsible and accountable for making the right decisions at the right moments in good time to ensure optimal patient and family outcomes and a safe passage through the health care system for patients. AACN (2002) defines clinical judgement as the use of clinical reasoning. Clinical reasoning in this definition is understood to include decision making, critical thinking, an ability to grasp the global significance of a specific clinical situation, and the battery of nursing skills and competencies that a nurse has acquired through being able to integrate her/his education, experimental knowledge and evidenced-based guidelines. A nurse's clinical judgement is the product of her/his accumulated knowledge and experience and her/his ability to differentiate between the expected and unexpected responses of a patient after nursing

and medical interventions have already taken place (AACN: 2003). An ability to integrate knowledge and understand the impact of multisystem influences on a patient and the patient's family is central to clinical judgement (Hardin & Kaplow 2005:61). According to Harmon (1999:101), clinical judgement is honed by the experience that a nurse gains during practice. An experienced nurse is able to synthesise, interpret and makes decisions on the basis of complex and sometimes conflicting arrays of data they have all been collected from the patient (Harmon 1999:101).

The following table describes the continuum levels of those nurse competencies that are a matter of concern to patients, clinical units and systems.

Table 2.10 Clinical judgment

Level 1	Level 3	Level 5
<p>The nurse collects all basic level data, follows algorithms, decision trees and protocols with all populations and is uncomfortable when deviating from them.</p> <p>The nurse compares formal knowledge with clinical events before making decisions.</p> <p>The nurse questions the limits of her/his ability to make clinical decisions and delegates decision making to other clinicians.</p> <p>The nurse includes extraneous details.</p>	<p>The nurse collects and interprets complex patient data.</p> <p>The nurse makes clinical judgments based on an immediate grasp of the global picture of routine patient populations.</p> <p>The nurse recognises limits and seeks appropriate help.</p> <p>The nurse focuses on the key elements of the case, while simultaneously sorting out the extraneous variables.</p>	<p>The nurse synthesises and interprets the multiple (and sometimes conflicting) sources of data.</p> <p>The nurse makes judgments based on an immediate grasp of the global picture unless working with new patient populations.</p> <p>The nurse helps patients and their families, sees the big picture, recognises the limits of clinical judgment and seeks multidisciplinary collaboration and consultation.</p> <p>The nurse recognises and responds to the dynamic situation.</p>

Source: AACN Certification Corporation (2006 b: 4)

The clinical judgement can range from deliberate conscious decision making that is a characteristic of nurse at the competent stage of skill acquisition to a more holistic understanding and mastering of the technical skills.

Nurses at level 1 are capable of collecting and interpreting basic level data. However, a new nurse's knowledge in clinical decisions is limited. Level 3 nurses have mastered technical skills and able to manage complicated clinical situations. At level 5 the nurse understands the unique needs of the patient and family, responding to the situation in a seamless fashion which is the hall mark of an expert nurse practitioner. During CPR, the complex nature of the situation demands a collaborative care by nurses in different levels to ensure optimum outcome from the patient.

2.3.5.2 Advocacy/moral agency

The American Heritage Dictionary of the English Language (2006) defines advocacy as “pleading, arguing in favour of something such as cause, idea or policy”. The AACN (2003) defines advocacy as respecting and supporting the basic values, rights and benefits of a critically ill patients. The AACN (2003:26) further defines advocacy as “working on another’s behalf and representing the concerns of the patient”. Advocacy means serving and acting as a moral agent in order to identify and help to resolve ethical and clinical concerns within and outside of the clinical setting (AACN 2003).

Table 2.11 Advocacy and moral agency

Level 1	Level 3	Level 5
<p>The nurse works on behalf of patient.</p> <p>The nurse assesses personal values herself.</p> <p>The nurse is aware of the ethical conflicts and issues that may surface in any clinical setting.</p> <p>The nurse makes ethical and moral decisions on the basis of predetermined rules.</p> <p>The nurse represents a patient when a patient cannot represent herself/himself.</p> <p>The nurse is aware of the rights of the patient.</p>	<p>The nurse works on behalf of the patient and the patient’s family.</p> <p>The nurse considers the values of the patient and incorporates them into care, even when they differ from her/his personal values.</p> <p>The nurse supports colleagues in ethical and clinical issues.</p> <p>The nurse allows family members to speak and represent themselves wherever possible.</p> <p>The nurse is aware of the rights of patients and their families.</p>	<p>The nurse works on behalf of the patient, the patient’s family and the community.</p> <p>The nurse advocates from a patient/family perspective. The nurse arbitrates in ethical conflicts and issues from the perspective of the patient and the patient’s family.</p> <p>The nurse empowers the patient and family to speak for themselves.</p> <p>The nurse encourages mutuality in patient and professional relationships.</p>

Source: AACN Certification Corporation (2006b: 4)

Level 1 nurses attempt to manage patient care according to the specified orders, begin to self assess the personal values and make ethical decisions based on the guidelines. Level 3 nurses have acquired skills to plan according to the clinical priorities and will incorporate patients’ values into the care even if the values differ from their own. Level 5 nurses are capable of advocating for the patient, family and community, and are able to use the internal and external resources to resolve the ethical conflicts. While providing CPR, the nurses at different levels act as advocates in all settings.

2.3.5.3 Caring practices

Caring practices are the constellation of nursing activities that are responsive to the uniqueness of the needs of the patient and family. Creating a compassionate and therapeutic environment for promoting comfort and preventing suffering are the purpose of caring practices (AACN 2002).

Hardin and Kaplow (2005:71) cite Roach's (1992) description of the following five "C"s in caring:

- Compassion
- Competence
- Confidence
- Conscience
- Commitment

These five aspects of caring can be applied with equal validity to evaluate the quality of care in critical care nursing. *Compassion* is a quality of presence that allows the nurse to participate in the experience of the patient. *Competence* means the possession of knowledge, judgement, and skill, and the ability to implement them when necessary (Hardin & Kaplow 2005:71). Competence also means being able to anticipate hazards and to promote safety, care and comfort throughout the transitions that characterise the health care continuum (AACN 2003). *Confidence* is the quality of self-assurance that arises out of proven professional skill and ability confidence. It is a necessary condition for establishing and maintaining a trusting relationship between the nurse and the patient and his/her family (AACN 2003). *Conscience* is a moral awareness of what is ethical and unethical. It manifests as the desire that a nurse has to do what is right and necessary during the course of professional services rendered to others (Hardin & Kaplow 2005:71). *Commitment* is the determination of a nurse to act in the best possible ways to meet the needs of patients in specific situations (Hoover 2002:80). According to Hoover (2002:80), a nurse needs the moral courage to question the efficacy and appropriateness of care that is delivered when staffs are inadequate and resources are poor and unequal to the task.

Table 2.12 Caring practices

Level 1	Level 2	Level 3
<p>The nurse focuses only on the most obvious and customary needs of the patient.</p> <p>The nurse does not anticipate future needs.</p> <p>The nurse bases care on standards and protocols. The nurse maintains a safe physical environment. The nurse acknowledges that the patient's death may be a future outcome.</p>	<p>The nurse responds to subtle changes in patients and their families.</p> <p>The nurse regards every patient's situation as unique and treats it with due compassion.</p> <p>The nurse recognises the individuality of the patient and the patient's family and acknowledges this individuality in care giving.</p> <p>The nurse recognises that death may be an acceptable outcome for the patient.</p>	<p>The nurse is sufficiently astute and aware to anticipate changes and needs in the patient and the patient's family.</p> <p>The nurse adjusts her/his caring practices in accordance with the leads provided by the patient and the patient's family.</p> <p>By anticipating hazards and forestalling them, the nurse maintains the safety, dignity and integrity of the patient and the patient's family along the path of the health care continuum.</p> <p>The nurse organises the conditions that ensure the comfort of the patient and the patient's family as she/he addresses the issues and concerns that are encountered in the death and dying process.</p>

Source: AACN Certification Corporation (2006 b: 4)

Level 1 nurses focus on the basic needs of the patient and provide care based on standards and protocols. Level 3 nurses provide care according to the individual needs of the patient and family, and responds to the subtle changes in a compassionate manner. A level 5 nurse is capable of fully engaging all resources in patient care and can react optimally to any situation thus providing total quality care to the patient.

2.3.5.4 Collaboration

The AACN (2002) defines collaboration as the ability to work effectively with others such as physicians, families and a variety of health care providers in ways that promote and encourage each person's contribution towards the achievement of optimal and realistic patient goals. All the members of a team share the responsibility of providing holistic and safe care for patients (AACN 2003).

According to Hardin and Kaplow (2005:75), collaboration is more important than ever before in a health care environment where resources are dwindling while demands and expectations are increasing. In such circumstances, the ability to create and maintain effective collaborative relationships exerts a crucial impact on the quality of patient care. One of the keys to collaboration is effective communication and disciplined team work

(Hardin & Kaplow 2005:76). Collaboration also means that the nurse is able to work with colleagues in intra-disciplinary and interdisciplinary situations (Curley 1998:66).

Table 2.13 Collaboration

Level 1	Level 3	Level 5
<p>The nurse is willing to be taught, coached, and mentored.</p> <p>The nurse participates in team meetings and discussions about patient care and practice issues.</p> <p>The nurse is open to the contributions offered by various team members.</p>	<p>The nurse actively seeks opportunities to be taught, coached and mentored.</p> <p>The nurse initiates and participates in team meetings and discussions about patient care and practice issues.</p> <p>The nurse recognises and suggests a variety of ways in which other team members can participate.</p>	<p>The nurse seeks opportunities to teach, coach and mentor and to be taught, coached and mentored.</p> <p>The nurse facilitates active involvement and complementary contributions from others in the context of team meetings and discussions about patient care and practice.</p> <p>The nurse involves and recruits personnel with diverse resources (where appropriate) in order to optimise a patient's outcomes.</p>

Source: AACN Certification Corporation (2006 b: 4)

At level 1, the nurse participates in team meetings and seeks clarifications and enhances her understanding of the best practice in the delivery of the care to the patient. The level 3 nurse identifies the client's problems that require a level of specialised expertise for the outcomes of the patient. Level 5 nurse, through prior experience, collaborates with other team members to solve the problems and teach, coach and mentor other nurses during problem solving processes or team meetings. During CPR, the collaborative care by the different levels of nurses is required due to the complex nature of the patient care.

2.3.5.5 Systems thinking

Systems thinking is a method of viewing and understanding the world by looking at the structures, patterns, and events inherent in an issue rather than just the issue itself (Hardin & Kaplow 2005:83). An ability to understand how one decision can impact on the whole system is integral to systems thinking (Hardin & Kaplow 2005:6).

The AACN (2002) defines systems thinking as a body of knowledge and tools that empower the nurse to manage environmental and system resources for the benefit of the patient, the patient's family and the care-giving staff within or across health care and non-health care systems. The nurse should develop, integrate, and apply a variety of strategies that are predicated on the needs of patients and their families. The utilisation of proven

strategies and the development of creative strategies are skills that make a fundamental contribution to establishing the soundness of systems thinking (AACN 2003). The nurse draws on hers/his ability to see events from a global point of view in clinical decision making and she/he has the ability to negotiate the needs of the patient and family through the health care system. Recognition of the holistic interrelationships that exist within and across the health care system is an example of systems thinking (AACN 2003).

Table 2.14 Systems thinking

Level 1	Level 3	Level 5
<p>The nurse uses a limited array of strategies. The nurse does not recognise or identify an alternative. The nurse only sees the patient and the patient's family within the isolated context and environment of the unit. The nurse regards her/his self as the key resource.</p>	<p>The nurse develops strategies that are based on the needs and strengths of the patient and the patient's family. The nurse is able to identify connections between the component parts of a system. The nurse is able to recognise opportunities that may have no resources or strategies to exploit them. The nurse recognises how to access resources beyond her/his self.</p>	<p>The nurse develops, integrates and applies a variety of strategies that are driven by the needs and strengths of the patient and the patient's family. The nurse knows when and how to navigate the system on behalf of the patients and the patient's family. The nurse utilises untapped and alternative resources whenever necessary.</p>

Source: AACN Certification Corporation (2006 b: 4)

Nurses at level 1 apply limited strategies while meeting the patients' needs. Level 3 nurses have the ability to recognise and react to the patients' needs as they move through the health care system. At level 5, nurses utilise a variety of resources, anticipate the needs of the patients, navigate through the system and use the system-thinking on behalf of the clients to ensure safe passage.

While providing CPR, nurses at all levels should recognise the holistic inter-relationships that exist across the healthcare system to maximise the optimum outcome.

2.3.5.6 Response to diversity

A response to diversity is the ability of a nurse to recognise, appreciate and incorporate unfamiliar conditions and processes into the provision of effective care (AACN 2002). Hardin and Kaplow (2005:6) point out that nurse need to be able to recognise the individuality of each patient while observing how each patient responds individually to nursing interventions. Individual differences are specifically related to individuality, cultural

differences, spiritual beliefs, ethnicity, family configurations, life styles, socioeconomic status, and values and beliefs about the health care system (AACN 2003).

Dennis and Small (2003:20) suggest that *diversity* is a concept that embraces not only ethnic groups and people of colour but also other groups of marginal and vulnerable people in society. According to Narayanasamy (2003:186), health care providers need to regard their patients as partners in the health care process because mutual respect and rapport are enhanced by means of cultural sensitivity, the negotiation of differences and the willingness to compromise in order to indicate respect for the individuality of people who are essentially different from the majority of the other members of the society.

Table 2.15 Response to diversity

Level 1	Level 3	Level 5
<p>The nurse assesses cultural diversity.</p> <p>The nurse provides care on the basis of his/her own belief systems.</p> <p>The nurse becomes familiar with the variables in the culture of the health care environment.</p>	<p>The nurse enquires about cultural differences and considers their impact on care.</p> <p>The nurse accommodates personal and professional differences in health care plans.</p> <p>The nurse helps a patient and a patient's family to understand the culture of the health care system.</p>	<p>The nurse responds to, anticipates and integrates cultural differences into the care of the patient and the patient's family.</p> <p>The nurse incorporates alternative therapies into care.</p> <p>The nurse tailors health care provision wherever possible to accommodate the diverse needs, attitudes and customs of the patient and the patient's family.</p>

Source: AACN Certification Corporation (2006 b: 4)

At level 1, the nurse provides care on the basis of personal values and is in the process of learning about the culture of the healthcare environment. Level 3 nurse actively inquires about the cultural differences and considers the individuality of the patient in the plan of care. The level 5 nurse responds to, anticipates and integrates cultural differences into the care of patient and patient's family. While providing CPR, the nurses at all levels should recognise the cultural differences, spiritual beliefs, life style, values and norms, and incorporate them in the provision of care.

2.3.5.7 Clinical inquiry

Clinical inquiry is the ongoing process of questioning and evaluating practice, and of instituting effective practice and innovations that are identified in research and during the process of experiential learning (AACN 2003).

Clinical enquiry evolves as the nurse graduates from being a novice to becoming a professional expert who has learned a great deal from personal experience and education. At the level of the expert, a nurse improves, deviates from, and/or individualises standards and guidelines so that they will meet the needs of the patient (Hardin & Kaplow 2005:6). According to the AACN (2003), the nurse should be competent in clinical inquiry and able to display:

- knowledge-seeking behaviours
- an openness to advice
- an appreciation of life-long learning
- competence in identifying clinical problems
- competence in participating in research processes

The most significant step in clinical inquiry is when a nurse becomes able to identify questions that must be answered to increase the professional understanding of patient care issues. Nurses are expected to be able to ask questions that reflect sensitivity to the needs of patients and an understanding and appreciation of different kinds of contexts, health care problems, and patient characteristics (Hardin & Kaplow 2005:98).

Table 2.16 Clinical inquiry

Level 1	Level 2	Level 3
<p>The nurse follows standardised guidelines.</p> <p>The nurse implements clinical changes and research-based practices that had been developed by others.</p> <p>The nurse recognises the need for further learning to improve patient care. The nurse recognises obvious changes in a patient's situation (changes such as deterioration and crisis). The nurse needs and seeks help to identify patient problems.</p>	<p>The nurse questions the appropriateness of policies and guidelines.</p> <p>The nurse interrogates the utility and effectiveness of current practice.</p> <p>The nurse seeks advice, resources and information that will result in improved patient care.</p> <p>The nurse compares and contrasts possible alternative outcomes.</p>	<p>The nurse improves, deviates from or individualises standards and guidelines for particular patient situations and populations.</p> <p>The nurse questions or evaluates current practice on the basis of the patient's responses.</p> <p>The nurse periodically reviews literature, research and educational contributions to the profession.</p> <p>The nurse acquires whatever new knowledge and skills are needed to address the questions that arise in practice and attempts to improve patient care. (The domains of clinical judgment and clinical inquiry converge at the expert level.)</p>

Source: AACN Certification Corporation (2006b: 4)

The nurse at level 1 follows standards, guidelines and clinical changes that are implemented by incorporating research-based practices. At level 3, the nurse questions the current practices and patient care, and improves patient care through seeking advice and information. The nurse at level 5 improves the current practice and standards by acquiring new knowledge and skills, and applying them appropriately to particular patient situations or populations.

The nurses at different levels engage in ongoing process of questioning and evaluating practice, provide evidence based practice, and become innovative through research and experiential learning.

2.3.5.8 Facilitation of learning

The facilitation of learning is defined by the AACN (2003) as the ability to facilitate patient and family teaching. Nurses should be able to conduct a thorough needs assessment prior to the facilitation of any kind of structured education. As a facilitator of learning, the nurse should be sufficiently skilful to offer formal and informal intra- and interdisciplinary education with the intention of improving patient outcomes (AACN 2003). The nurse facilitates learning for patients, families, colleagues, physicians and other health care professionals and communities through both the formal and informal facilitation of learning (Hardin & Kaplow 2005:6). The education thus provided should be based on the individual strengths and weaknesses of the patient and the patient's family.

Issues that relate to in-service education and policies are addressed in phases 1, 3 and 4 of this study.

Table 2.17 Facilitation of learning

Level 1	Level 3	Level 5
<p>The nurse follows planned educational programmes.</p> <p>The nurse regards patient and family education as a task that is separate from the delivery of care.</p> <p>The nurse possesses limited knowledge about how educational needs can be met.</p> <p>The nurse focuses on situations solely from a nurse's perspective.</p> <p>The nurse regards the patient as</p>	<p>The nurse adapts planned educational programmes.</p> <p>The nurse begins to recognise and integrate different modes of teaching into the delivery of care.</p> <p>The nurse incorporates the understanding of the patient into practice.</p> <p>The nurse begins to realise that a patient can make valid contributions to health care goals.</p>	<p>The nurse creatively modifies at or develops patient and family education programmes.</p> <p>The nurse integrates patient and family education through the delivery of care.</p> <p>The nurse sets patient-driven goals for education.</p> <p>The nurse is able to appreciate that patient and their families are able to make valid choices and</p>

a mute and passive recipient of health care measures and interventions.	The nurse begins to understand and appreciate the individuality of different patients.	understand the consequences that are negotiated in efforts to provide education.
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Source: AACN Certification Corporation (2006b: 4)

During the facilitation of learning, the level 1 nurse views the patient as a passive recipient of the information and provides education without assessing the patient's readiness to learn. The level 3 nurse recognises the different methods of teaching that are unique to the needs of the patient and develops educational goals applicable to the individualistic needs of care. At level 5, the nurse works with the patient, his/her family and with the other health care disciplines to ensure that all the educational needs of the patient are met.

The nurses at all levels, within their capacity, act as facilitators of learning to the patients, colleagues and to the community for the purposes of optimal functioning and improved self-care management.

2.3.5.9 Summary of nurse competencies

All the above-mentioned competencies converge in a dynamic integration of the knowledge, skills, experience and attitudes that are needed to meet the needs of patients and to optimise patient outcomes. Patients who are more compromised have more pressing and complex needs. This in turn compels the nurse to rise to a higher level of knowledge and skill in the associated continuum (Curley 1998:66). The AACN Synergy Model for Patient Care incorporates the conviction that nursing knowledge and skills are unique to the professional practice of each individual (AACN 2003). It emphasises the ability of a nurse to clearly differentiate between various levels of expertise including competency, proficiency, expert clinical practice and leadership (Kerfoot & Cox 2005:110).

Even though, in the opinion of Curley (1998:66), all eight competencies are essential for contemporary nursing practice, each of them assumes a greater or lesser importance in the context of the patient's needs, characteristics and individuality. Synergy occurs when a patient's needs and characteristics are symmetrically matched by the competencies and natural talents and endowments of the nurse.

2.3.6 Outcomes derived from the nurse

Outcomes pertaining to the nurse include the management of physiological changes, the management of complications and the provision of care and treatment (see figure 2.1). Each of these requirements will now be reviewed and discussed.

2.3.6.1 The management of physiological changes

The outcomes that are derived from nursing competencies include the management of physiological changes, the management of complications (if any), and the extent to which the treatment objectives were obtained (Curley 1998). For example, the monitoring and management of critically ill patients and the recording and assessment of their physiological changes such as blood pressure, changes in level of consciousness, and decreases in the level of oxygen saturation, all help a nurse to plan ahead and to intervene appropriately whenever complications arise during CPR.

2.3.6.2 The management and prevention of the presence and absence of complications

Outcomes are derived from actual or potential problems (AACN 2005b:16). In order to attain desirable outcomes during CPR, the nurse adheres to various universal principles of health care such as instituting measures for the control of infection, the adoption of universally accepted precautions during resuscitation (such as the use of protective devices, goggles and gloves) in order to prevent the transmission of infection to the patient and health care workers. Such measures help to prevent complications in health care provision. If the recognised standards, guidelines and techniques are implemented during CPR, this helps to avoid complications.

2.3.6.3 Extent of care and treatment objectives attained

The extent to which care and treatment objectives are attained within the predicted time period also serves as an outcome variable. Maximum collaboration and focused interactions between nurses and physicians help to reduce the mortality rate and result in a high degree of patient satisfaction with the care that is provided and low rates of hospital-

transmitted infections. All of these factors contribute to improved outcomes for both the patient and the system (Curley 1998:66). In order to achieve these outcomes, nurses should make sure that their vigilance, clinical judgement, clinical inquiry and collaboration are of such a nature that they contribute toward a healing environment that creates a safe passage for vulnerable patients and their families (Hardin & Hussey 2003:73). “A safe passage” refers to the outcome of a high-quality synergistic relationship that helps the patient and the patient’s family toward greater self-awareness, self-understanding, competence and health, and that furnishes them with the both the inner and outer resources that they need to enable them to navigate stressful events and death and dying process (Curley 2004:8).

2.3.7 The healthcare system according to the AACN Synergy Model for Patient Care

The third component of the model is the health care environment or system. In any healthcare environment, the system acts facilitates the achievement of a patient’s needs and the nurse’s professional practice environment (Reed, Cline & Kerfoot 2005:4) (see figure 2.1).

Kerfoot et al. (2006:24) assert that unhealthy and inadequate work environments contribute to medical errors and ineffective delivery and increase the levels of conflict and stress among health professionals. Successful outcomes for the patient and the nurse depend on the characteristics of the healthcare system and the nurse’s ability to create and support the characteristic features of an efficient system (Reed et al 2007:4). The AACN (2003) recognises that there is an indisputable logical connection between excellent nursing practice, the quality of the work environment and acceptable levels of patient care. The essential characteristics of such a system include a patient-centred philosophy, shared decision making, professional development opportunities, sound interdisciplinary relationships, the recognition, rewarding and valuing the individual contributions of professionals, the evaluation of outcomes and constant concern for patient safety and well-being (Kaplow & Reed 2008:23).

2.3.8 Outcomes derived from the system

The goal of any health care system is to provide the best quality care at a moderate cost for the greatest possible number of people.

2.3.8.1 Recidivism

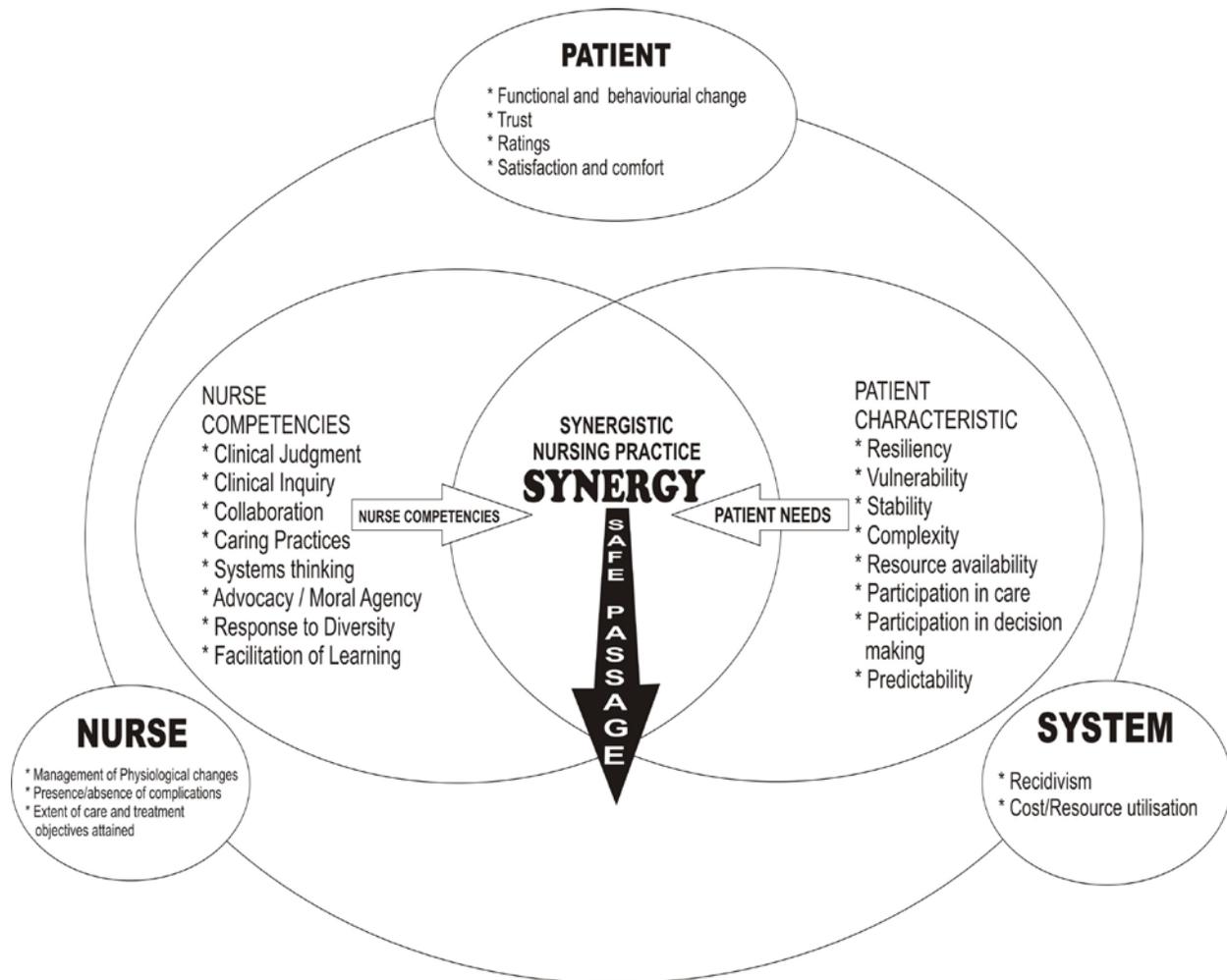
Recidivism (which here means readmission to hospital or treatment) represents a duplication of effort that adds further weight to the system's already heavy responsibilities to provide a high level of health care. The desired outcomes from the point of view of the system include the minimisation of recidivism, the prevention of complications, the proactive planning of patient discharge and the efficient utilisation of resources. Nurses can decrease the length of the patient's stay in a hospital by coordinating schedules for treatment and care and by utilising available resources as efficiently and intelligently as possible (Curley 1998). Continuity in care and clinical judgement serve to stabilise the availability of care within chaotic environments. The system can contribute to better outcomes by providing optimum facilities and resources to health care providers. The system can also operate to strengthen the effectiveness of a health care team with improvised policies that cater for the exceptional needs and demands of a society in unpredictable circumstances (Kerfoot 2002:126).

2.3.8.2 Cost and resource utilisation

In order to survive economically, health care systems need to tighten and restrict resources while maintaining the highest possible levels of quality care – care that is defined collaboratively by both the users and providers of the system. It is better for all concerned if patients assess all the desired outcomes from one episode of care and treatment. If hospital administrators can reduce the average length of hospital stays, the rate of rehospitalisation episodes, and the number of acute care visits, this will help to prevent escalations in costs. The facilitation of an optimum utilisation of all resources is one of the most important contributions that health care system can make to improve patient outcomes (Curley 2004:9).

2.4 APPLICATION OF THE AACN SYNERGY MODEL FOR PATIENT CARE DURING CPR

In the following section, a brief description is given as to the application of AACN Synergy Model for Patient Care in clinical practice with specific reference to CPR as relevant to the study. In figure 2.2, the patient characteristics, nurse competencies and outcomes for the three components – patient, nurse and the system – are illustrated.



Application of the AACN Synergy Model for Patient Care during CPR
Based on the work from Baylor University Medical Centre

Figure 2.2: Application of the AACN Synergy Model for Patient Care during CPR
(Source: Adopted from Baylor University Medical Centre)

2.4.1 Patients' characteristics and nurses' competencies during CPR

Cardiopulmonary arrest can occur as a result of a particular trauma such as a head injury or a thoracic injury, or as a result of myocardial infarction, an electric shock, drowning, a drug overdose, an electrolyte imbalance (hyperkalemia), congestive cardiac failure, chronic obstructive pulmonary disease, or cardio-genic and hypovolemic shock – either inside or outside a hospital. Patients who have been afflicted by cardiac arrest are in a highly vulnerable and highly complex state and their stability and equilibrium are dangerously out of balance because of their compromised cardiopulmonary system.

When they are attending to patients experiencing disequilibrium in their health status, nurses must apply a holistic approach to patient care because they (nurses) are often the first and only health care provider to witness the cardiac arrest or to arrive on the scene shortly after cardiac arrest has occurred.

The AACN Synergy Model for Patient Care describes the patient characteristics that span the continuum of health and illness. Each characteristic exists in its own place on the continuum. The knowledgeable assessment of each of these characteristics enables the nurse to draw important conclusions about how vulnerable a particular patient may be. The ability to recognise and understand these characteristics and how they change in tandem with an improvement or deterioration in the patient's condition or situation, is one of the main nurse competencies that contribute to optimal patient outcomes (Hardin & Hussey 2003:75).

2.4.2 Patient characteristics during CPR

During cardiac arrest, a patient is in a highly complex and vulnerable state because of his or her compromised cardiopulmonary system. The stability of a patient decreases if blood pressure is unrecordable and if there is an absence of a carotid pulse and poor oxygenation. In addition to these clinical symptoms, patients tend to become ever more unstable and unpredictable because of the decreasing stability and complexity of their conditions. Such patients might have little or no resiliency because of the altered levels of their consciousness. Since they are unable to participate in their own care or make decisions for themselves, such patients need to be stabilised as quickly as possible.

Because CPR is an emergency event, it requires a number of rapid and discrete actions on the part of the nurse to resuscitate the patient. Because of the complexities that prevail during cardiac arrest, a nurse should attempt to intervene and enact a number of emergency measures within three to five minutes of the episode in order to prevent irreversible brain damage or the death of the patient.

2.4.3 Nurse characteristics in CPR

In order to achieve synergy in nursing practice, a patient's characteristics have to be matched with a nurse's abilities and characteristics (AACN 2000). There are eight of these characteristics that exist along a continuum. While each of these competencies is essential for providing the correct care to the patient, some of the competencies are more important and crucial for desirable outcomes than others (Cox 2003:328). During CPR, the most crucial characteristics are clinical judgement, clinical inquiry, collaboration, caring practices, systems-thinking, advocacy/moral agency, response to diversity and facilitation of learning. Each of these characteristics will be dealt with below.

2.4.3.1 *Clinical judgment*

The clinical judgment of a nurse consists of the kind of clinical reasoning that involves clinical decision making, critical thinking and a grasp of a situation together with those nursing skills that a nurse has acquired through the process of integrating his/her formal and experiential knowledge (Hardin & Stannard 2005:58). The application of clinical judgment is necessary for identifying how vulnerable a client is who is in the complex and unstable condition that follows cardiopulmonary arrest. The ability to identify the need for CPR and the ability to negotiate the obstacles in the way of providing CPR depends on how well nurses have equipped themselves with the necessary knowledge, skills and attitudes (Curley 1998:64). In such situations, a nurse should be able to bring all previous knowledge and experience to bear on an emergency situation. While doing this, a nurse uses the clinical judgement that he/she has acquired by synthesising, interpreting and making decisions, to make an initial assessment of the patient's condition. After a cardiac arrest, the nurse demonstrates timely decision-making skills by assessing the patient's airway, breathing and circulation and by deciding whether defibrillation is advisable.

A nurse should be in a position to intervene appropriately by making decisions that are based on her/his knowledge, skills, critical thinking, observation, intuition and understanding of the nature of emergency situations. Good clinical judgement skills allow a nurse to make a rapid and accurate assessment of an emergency situation, to seek whatever help may be needed, and to provide ACLS if necessary (Reilly & Humbrecht 2007:23). Since nurses are usually the first persons to observe a cardiac arrest, they are responsible and accountable for making the right decisions about the provision of CPR at the right moment to ensure optimal patient and family outcomes. According to the AACN (2003), clinical judgement is a product of years of experience and an accumulation of clinical and theoretical knowledge as well as the ability of a nurse to differentiate normal and predictable responses from unusual or unexpected responses on the part of the patient who requires nursing and medical interventions. While providing CPR, the nurse operates on an advanced level and uses past experience to anticipate potential problems and unexpected outcomes. Such a nurse understands and accepts the need for collaboration with all the members of a multidisciplinary team members and the need to design a carefully considered plan of optimising patient outcomes. The soundness of a nurse's clinical judgment is the most reliable predictor of whether or not a patient is likely to survive an acute critical episode such as cardiac arrest (Reilly & Humbrecht 2007:23).

2.4.3.2 Clinical inquiry

Excellence in clinical inquiry means the ability to observe, question, listen to, smell and intuitively sense the significance of everything that occurs in health care situations, and then to integrate and synthesise all the data that one has derived from these sources in order to make clinical decisions that will function for the benefit of the patient (Harmon 1999:101). A well-trained and capable nurse uses clinical inquiry to constantly re-evaluate the effectiveness of particular interventions (Cox 2003:329). While a nurse ensures that all the interventions that are applied are appropriate for the situation during CPR, he/she is simultaneously and continuously re-assessing the situation until others who are in a position to supply advanced life support measures arrive on the scene. Among the interventions that the nurse will immediately establish are, for example, the correct number or rate of compressions and ventilations and the appropriate depth for compressions (all of which are outlined in the guidelines for resuscitation). Clinical enquiry enables a nurse to

be constantly on the lookout for how better patient outcomes can be achieved by improvements to the protocols and procedures that guide CPR practice.

According to the AACN (2002), the quality of patient care improves because nurses accept that it is their responsibility to obtain advice, to improve resources, and to critique established practices and policies.

2.4.3.3 Collaboration

Collaboration during the performance of CPR enables a nurse to draw on all the benefits of a multi-disciplinary team approach to resuscitation after cardiac arrest. There is no doubt that well-balanced collaborative care during resuscitation can enhance the success rate of emergency measures. Most of the developed countries of the world (such as the UK, the USA and Australia) have formed emergency medical teams that are dedicated to the management of challenging situations such as cardiac arrests (Hardin & Kaplow 2005:77). A nurse also has to collaborate with others in order to obtain vital resources. A nurse will, for example, collaborate with anaesthetists, surgeons, physicians and other nurses in order to resuscitate a patient. In order to achieve this, a nurse has to utilise whatever resources are immediately available to ensure the best possible outcome in the circumstances.

2.4.3.4 Caring practices

Caring is another constituent characteristic of nursing. The nurse who cares and the person who is being cared for are both transformed during the process of caring (Watson 2001). Caring practices within the Synergy Model “create a compassionate and therapeutic environment while promoting comfort and prevent suffering” (AACN 2002). In an emergency situation such as CPR, the nurse provides an environment that is conducive to survival and recovery, to the provision and maintenance of safety and to the privacy and dignity of the patient. In effect, nurses also should be able to respond to subtle changes in the patient’s condition in a compassionate manner. It is vital that the nurse should be able to demonstrate competence, confidence, courage, commitment and compassion in a CPR situation while resuscitating a patient. During such a process in nurse will also prevent unnecessary and extraneous suffering and promote the maximum amount of comfort that is possible for a patient in an emergency condition.

But caring practice can also be defined by the extent to which a nurse is able to be vigilant, competent and completely focused and attentive while making use of all prior experience, skills and knowledge in the CPR situation. Caring procedures also require the maintenance of a safe environment and the prevention of the transmission of infection in clinical situations. It is also a nurse's responsibility to ensure that the communication with the family members of a patient is appropriate and reassuring. It is up to the nurse to promote the dignity and integrity of patients as a primary caring practice.

2.4.3.5 Systems thinking

The systems thinking in the AACN Synergy Model for Patient Care illustrates how nursing has an independent clinical knowledge base and promotes holistic approach to patient care (AACN 2002; Curley 1998:68). Systems thinking is a method of explaining and understanding the world by analysing the structures, patterns, and events that relate to an issue rather just the issue itself in isolation from its context (Hardin & Kaplow 2005:83).

A nurse who administers CPR should be in a position to identify the strengths and weaknesses of the members of the team and the availability of resources and should be able to apply whatever strategies are necessary to minimise the deficiencies inherent in the situation and thereby to ensure the best possible outcome of the CPR process. A nurse can make use of systems thinking to develop proactive strategies such as periodically checking the emergency trolley and keeping it ready for use at any time and by alerting team members to the availability of resources during emergency situations such as cardiac arrests. The ability to recognise the holistic inter-relationships that exist within and across a health care system is an example of systems thinking (AACN 2003).

2.4.3.6 Advocacy/moral agency

Advocacy/moral agency has been one of the most important characteristics of nursing practice since the very earliest days of the profession. Nurses in acute and critical care units are confronted on a daily basis by situations that require them to act on behalf of their patients (Hardin & Stannard 2005:63). A nurse is placed in the best possible position to act as an advocate of the patient's interests and welfare during CPR – and to act in a similar

way on behalf of the patient's family. Critically ill patients are frequently highly vulnerable and incapacitated and most family members are unaccustomed or unable to speaking on behalf of themselves or their loved ones in critical circumstances. In such situations, a nurse has to treat the members of the patient's family with dignity and discretion, and has to respect their opinions and wishes with regard to terminal care decisions.

The nurse provides whatever information about a patient's condition may be needed by family members to allow them to make autonomous decisions. While all nurses are expected to act ethically and legally and in the best interests of the patient, the nurse also needs to recognise and respect the right of the patient and the patient's family members to resolve the ethical dilemmas that arise during CPR. Synergy is optimised when the needs and characteristics of a particular patient and family are matched by the nurses' characteristics (Hardin & Stannard 2005:64). A nurse is also expected to be able to support and advocate reasonable resolutions for the patient, the patient's family and for her/his colleagues when confronted by ethical dilemmas and other clinical issues (AACN 2003).

2.4.3.7 Response to diversity

Being able to respond to diversity means being able to recognise and make due allowances for cultural and ethnic differences in the provision of care (Doble, Curley, Leband, Marino & Shaw 2000:87). The diverse needs of patients and their family members all need to be taken into account when clinical decisions are made and appropriate alternatives should be presented for the consideration of family members (AACN 2003). The nurse must support the cultural and religious beliefs of patients and their family members when conducting CPR, and should allow them to honour their value system and independence as far as is humanly possible within the framework of the law and the ethical codes of health care provision.

2.4.3.8 Facilitation of learning

Another nurse characteristic from the AACN Synergy Model for Patient Care is the facilitation of patient and family learning. Because of the highly charged emotional circumstances and varying degrees of panic that sometimes surround the provision of CPR, a nurse should be capable of educating (or facilitating learning for) family members in

a kindly, compassionate, firm but purposeful manner. More information can be given to family members once the patient has recovered from a critical condition and that information should concentrate on enabling and empowering family members to manage and treat the patient with a maximum effect in the context of home care.

2.5 APPLICATION OF THE AACN SYNERGY MODEL FOR PATIENT CARE IN VARIOUS SETTINGS

The validity of the AACN Synergy Model for Patient Care in actual practice situations has been well documented and the model has been utilised in a variety of clinical settings (Sechrist, Berlin & Beil 2000:85). There are number of descriptive reports and case studies that explain how the model has been used to guide and implement the clinical care of acute and critically ill patients (Hardin & Hussey 2003:74; Smith 2006:41). The articles listed below explain how the AACN Synergy Model for Patient Care has been utilised in various clinical settings.

Table 2.18 Application of the AACN Synergy Model for Patient Care in various settings

Topic	Journal and author	Description
The AACN Synergy Model for Patient Care: a nursing model as a “force of magnetism”	Kaplow and Reed (2008:17) Nursing Economics	In this article, Kaplow and Reed offer descriptions of the “force of magnetism” and the requirements for a health care organisation. One of the conditions for accomplishing this is that a health care organisation should adopt a professional model of care and that it should apply the model meticulously to all aspects of the health care system. According to Kaplow and Reed, the AACN Synergy Model for Patient Care provides a framework for a professional model of care and satisfies the criteria outlined in the magnet designation programme.
Fostering synergy: a nurse-managed remote telemetry model	Reilly and Humbrecht (2007:22) Critical Care Nurse	Reilly and Humbrecht summarise the development, successful implementation and nurse management of a remote telemetry service by applying the Synergy Model as the guiding framework. By applying nurse competencies such as clinical judgement, systems thinking, collaboration with patients who are vulnerable and unpredictable and who have different emotional and spiritual needs, health care professionals will be able to create a mutually beneficial synergy between the nurse and her/his patients.
Using the Synergy Model to provide spiritual nursing care in critical care setting.	Smith (2006:41) Critical Care Nurse	In this article, Smith articulates how the Synergy Model was applied to the provision of spiritual care for critically ill patients. Patients in critical care units need physiological, psychosocial and spiritual care. By assessing the spiritual needs of patients and by applying nursing competencies such as caring practices, responses to diversity and an

Topic	Journal and author	Description
		advocacy role, nurses can provide a quality of spiritual care that will make all the difference that will make all the difference to the patient and the patient's family. The author concludes that by supporting resiliency and identifying resource availability, the Synergy Model can help a nurse to create a humane and healing environment.
Extending the Synergy Model to preceptorship	Alspach (2006:10) Critical Care Nurse	This article explains how the Synergy Model's assumptions can be transferred from a nurse to a preceptor and from a patient to a preceptee. Alspach explains that when the preceptee's characteristics (which are expressed as needs) are matched by the preceptor's characteristics (expressed as competencies), an optimal orientation of the preceptee can be achieved.
Applying the Synergy Model to nurse education	Kaplow (2004:77) Critical Care Nurse	This article explains how the nurse educator can facilitate caring practices by using the Synergy Model in a critical care unit. According to Kaplow, the most important competencies for a nurse educator in a critical care unit are collaboration, the facilitation of learning, caring practices, clinical judgment, clinical enquiry and advocacy or moral agency. A nurse educator plans and develops an education programme to suit the needs of staff development. Since patients in critical care units are beset by a multiplicity of problems that affect all aspects of their lives, a nurse educator is in the best position to mentor the staff so that they will be able to deliver quality care that meticulously takes into account the needs of patients, their families and their significant others.
AACN Synergy Model for Patient Care: case study of a congestive heart failure (CHF) patient	Hardin and Hussey (2003:73) Critical Care Nurse	Hardin and Hussey explain how the AACN Synergy Model for Patient Care can be applied in ambulatory clinics by using the case exemplar of a patient with CHF. In this case study, Hardin and Hussey elaborate on how the Synergy Model enables the nurse to identify a patient's characteristics and so establish the particular vulnerabilities of each individual patient. Because the nurses are able to use the Synergy Model to identify such characteristics, she/he is able to make best use of her/his competencies to achieve optimal outcomes. Such nursing competencies co-exist in a symbiotic state with the characteristics of each patient and determine the level of priority that should be accorded to each competency.
The Synergy Model in practice	Ecklund and Stamps (2002:60) Critical Care Nurse	Ecklund and Stamps explain how they used the Synergy Model in a progressive care unit (PCU). The PCU had been assigned the difficult task of caring for intermediate critical care patients who presented with a number of complex disease processes. The authors identify a number of successful strategies that advanced practice nurses can incorporate when they use the Synergy Model. Such strategies include ensuring the appropriate implementation of the model, being willing to act as a role model and the provision of coaching and clinical consultation.
The Synergy Model and the role of Clinical Nurse Specialist in a multi-hospital system	Cohen, Crego, Cuming and Smith (2002:436). American Journal of Critical care	Cohen, Crego, Cuming and Smith describe how a group of clinical nurse specialists successfully applied the Synergy Model to the process of changing unit-based practice to multisystem practice. By applying the Synergy Model nursing competencies such as clinical inquiry, collaboration, the facilitation of learning, clinical judgment, systems thinking, caring practices and advocacy/moral agency, the CNS were able to change a traditional unit-based practice to a contemporary multisystem practice.

In the table 2.18, the most recent examples of studies that apply to nursing are given. From this table it is evident that AACN Synergy Model for Patient Care can be utilised in various clinical settings to attain optimal patient outcomes. The AACN Synergy Model for Patient Care has also been implemented by educators both in the academic settings and in the clinical areas.

2.6 CONCLUSION

This chapter provided a detailed discussion of the AACN Synergy Model for Patient Care. The background to the development of the model was followed by a discussion of each of the major tenets of the model.

The AACN Synergy Model for Patient Care is able to guide nurses in their performance of assessments and in the management of patients during the CPR process. The three major components of the AACN Synergy Model for Patient Care (namely, patients' characteristics, nurse competencies and the health care system) were discussed in detail. Being the main theme of this study, the application of this model to CPR was considered and discussed. The findings of various researchers who have used this model in their studies have also been discussed. Chapter 3 will present a review of the literature.

It is configured in such a way that, when the bellows on sternum resuscitation is attached to an endotracheal tube or to another similar device, a *single* rescuer can deliver ventilations followed by multiple chest compressions without moving or changing his or her position vis-à-vis the victim (Wigginton et al 2005:220). A study that undertook an assessment of the BSR device on a manikin found that it performed as effectively with one operator as could two people performing standard CPR with regard to all measured and calculated variables including tidal volume, compression depth and ventilation rate (Suner et al 2002:336).

3.12.2.5 The LUCAS™ chest compression device

Figure 3.14 explains about Lucas chest compression device with a swine model.



Figure 3.14: LUCAS™ chest compression device with a swine model

(Source: Steen, Liao, Pierre, Paskevicius & Sjoberg 2002:285).

The LUCAS™ is a chest compression device that utilises a gas-driven mechanism to provide automated active compression-decompression CPR. Its main component is a plunger device similar to that of the cardio-pump. This pump, which is driven by a two-legged pneumatic cylinder that is anchored at two points on a stiff back plate, is preset to deliver 100 compressions per minute. Spontaneous circulation was observed to return to one patient after three minutes of continuous LUCAS™ CPR resuscitation measures (Steen et al 2002:285).

3.12.2.6 CPREzy™

In figure 3.15 the CPREzy™ re-usable portable device for CPR is depicted.

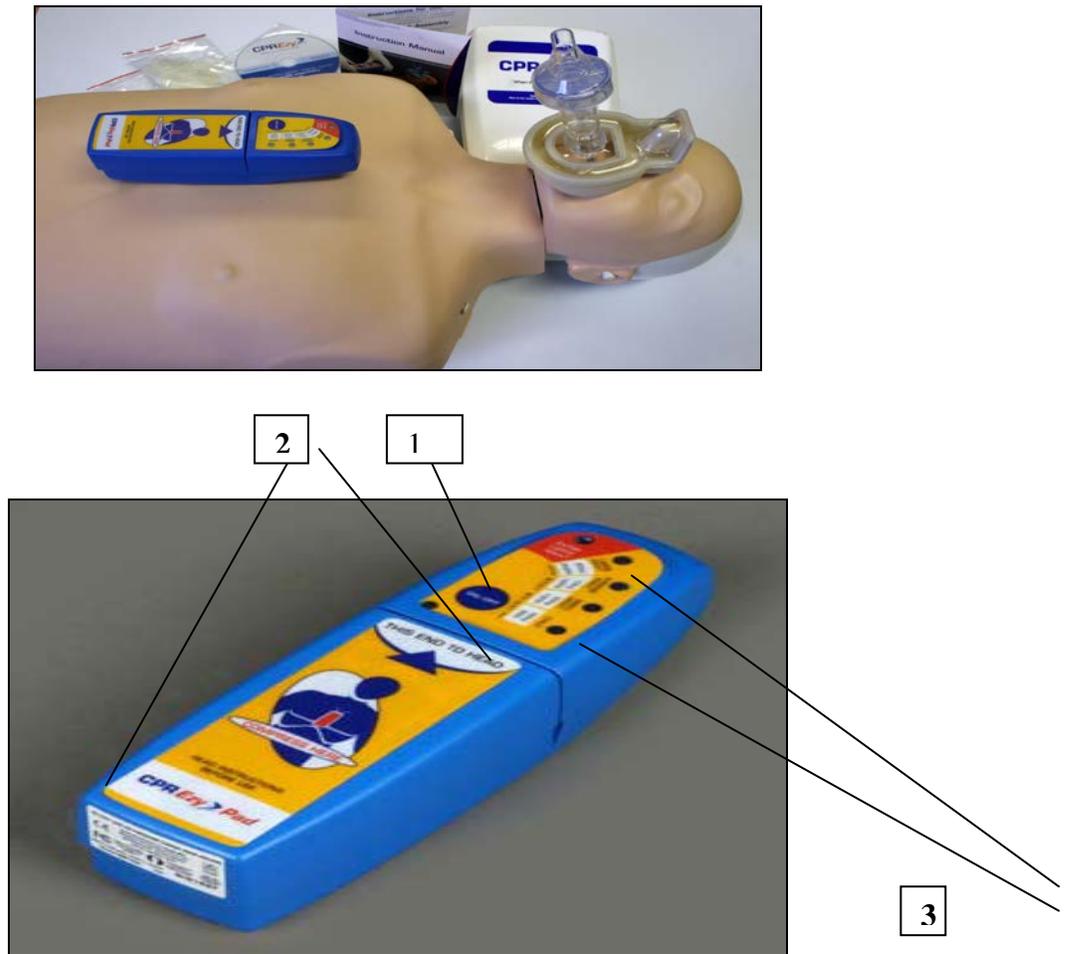


Figure 3.15: CPREzy re-usable portable device for CPR

(Source:Beckers, Skorning, Fries, Bickenbach, Beuerlein, Derwall, Kulhen & Rossaint 2007:100).

Keys:

1. The on/off button on the CPREzy™ controls
2. The length of the instrument that delivers compressions
3. The series of five lights that indicates the weight of the compressions

The CPREzy™ is a re-usable, portable device that is designed to improve the performance of rescuers who deliver external cardiac compressions during CPR. It consists of a solid plastic exterior shell weighing only 260gms. The external dimensions of this device are 55 mm x 180 mm x 50 mm, and it is powered by a nine-volt battery. When the device has been switched on and is operative, a series of lights in the upper part light up with each compression and then switch off after the pressure has been adequately released. The number of lights that light up depends upon the amount of force generated by each compression. The number of lights that light up relate to the weight of each compression in the following way:

- A pressure of 23 kg illuminates one light and is suitable for a child.
- A pressure of 32 kg illuminates two lights and is suitable for a small adult.
- A pressure of 41 kg illuminates three lights and is suitable for an average adult.
- A pressure of 50 kg illuminates four lights and is suitable for a large adult.

A pressure of 54 kg illuminates five lights are (the heaviest weight of compression that can be delivered by this device (Beckers et al 2007:101).

The CPREzy™ contains a metronome and five lights for different patient weights which light up consecutively as the appropriate pressure for each compression is applied (Van Berkomp, Noodergraaf, Scheffer & Noodergraaf 2008:66). Studies that were conducted by Beckers et al (2007:101) and Van Berkomp, Noodergraaf, Scheffer & Noodergraaf (2008:66) demonstrated that the CPREzy™ induced far less fatigue in rescuers and greatly improves the quality of external cardiac compressions.

Defibrillators with real-time CPR sensing and feedback and free-standing CPR sensors that can give rescuers both audio and/or visual feedback have been developed to improve the quality of CPR. A number of investigatory reviews have shown that these devices are capable of increasing the quality of chest compressions and other resuscitation measurements (Abella, Edelson, Kim, Retzer, Myklebust, Barry, O'Hearn, Hoek & Becker 2007:54; Becker et al 2007:100; Johansen, Myklebust, Wik, Fellows, Svennson, Sorebo & Steen 2006:283).

The use of chest compression alone as an alternative load of delivering standard CPR is gaining wide acceptance. This mode of resuscitation is referred to either as *hands-only CPR* or as *compression-only CPR* (and these two terms are used interchangeably). A statement issued by the AHA recommends that bystanders who witness the sudden collapse of an adult should administer only chest compressions without ventilations. This recommendation was motivated by the belief that the public should realise that any CPR is better than no CPR (Sayre, Berg, Cave, Page, Potts & White 2008:2162). But in the same year, the ERC issued a statement that confirmed that CPR should consist of alternating 30 compressions with two ventilations at a rate of 100 per minute because there is as yet insufficient evidence to justify such radical changes in the guidelines at this time (ERC 2008:2).

In spite of this, a recent study noted that ventilation might well be eliminated from future recommendations and guidelines. An observational study by the SOS-Kantso study group (2007:920) reported that out of 4068 patients who had been witnessed succumbed to out-of-hospital cardiac arrest, 11% received cardiac resuscitation without ventilation, 18% received conventional CPR, and 72% received no resuscitation. This study compared cardiac resuscitation without ventilation with conventional CPR and noted favourable neurologic outcomes in patients with apnoea. These findings have been interpreted to mean that cardiac resuscitation without ventilation should be the preferred method of CPR for the treatment of out-of-hospital cardiac arrest.

The ILCOR study (Nolan, Morley, Vanden Hoek & Hickey 2003:231) recommends the use of 12 to 24 hours of mild hypothermia (at temperatures of between 32°C and 34°C) for adults who had experienced out-of-hospital cardiac arrest – together with an initial rhythm of ventricular fibrillation for those whose circulation had spontaneously returned but who were still unconscious upon admission to hospital. These recommendations are based on findings from two randomised controlled trials by Bernard, Gray, Buist, Jones, Silvester, Gutteridge and Smith (2002:557) and the Hypothermia after cardiac arrest study group (2002:549). These researchers compared the maintenance of normothermia with cooling to between 32°C and 34°C for 12 to 24 hours within hours to minutes after the return of spontaneous circulation in adults who had regained hemodynamic stability but who continued to remain comatose after out-of-hospital ventricular fibrillation cardiac arrest. The study provided evidence that the use of mild hypothermia reduced mortality and improved

neurological outcomes. The Resuscitation Council of the United Kingdom (2005) defines *hypothermia* as a condition in which the core temperature of the body is less than 35°C.

There are a number of methods that can be used to quickly achieve and then maintain a patient's body temperature within the desired range of 32°C to 34°C. One may, for example, use an intravenous infusion of a cold crystalloid preparation (Kliegel, Janata & Wandaller 2007:46) or apply external surface-cooling methods by means of water-circulating cooling blankets or pads, air-circulating cooling systems, and cold-water or alcohol sponge baths (Hoedemaekers, Ezzahti, Gerritsen & Van der Hoeven (2007:91). Regardless of the methods that are used to cool a patient after cardiac arrest, the effectiveness, advantages and disadvantages of each of these methods should be carefully considered when institutional guidelines are being developed (McQuillan 2009:75). It is only once hospitals have devised policies and adopted emergency methods that permit rapid and effective therapeutic hypothermia for post-cardiac arrest patients that noticeable benefits in neurological outcomes will be observed (Collins & Samworth 2008:145). But the role and effectiveness of hypothermia therapy after in-hospital cardiac arrest for patients across all age groups requires further research and definition because of there are a number of challenges that have to be met by emergency personnel before the practical application of therapeutic hypothermia can become universally effective. Further research is needed, for example, to identify the optimal methods of cooling and the timing that are likely to be most efficacious (Hazinski et al 2005:207).

CPR has therefore evolved from a relatively primitive hit-and-miss technique to one that has been immensely refined on the basis of evidence from medical studies and the evolution of various devices that are able to deliver CPR more efficiently and consistently than human beings. One may also expect that further advances in the practice of CPR will occur as a result of the development of even more efficient forms of technology that will deliver even better outcomes (Ramsay & Maxwell 2009:362).

3.13 THE CHARACTERISTICS OF CPR AND THE ROLE OF NURSES IN THE PROVISION OF CPR

Basic life support techniques are skills that all nurses should possess, whether they work in the community, in a pre-hospital emergency environment, in homes for the aged or homes

for children, in hospitals, in industry or in any other health-related environment. When an emergency situation arises in the community outside of a hospital, it is standard practice to call upon the skills and assistance of a nurse or other qualified health care practitioner (Finn & Jacobs 2003:470). These successful applications of CPR after in-hospital cardiac arrest and its subsequent effect on the quality of life of the person concerned depend on the availability and the correct and immediate application of basic and ALS systems, the ability to apply an AED immediately, and on the quality and consistency of the measures taken by the nurses. Nurses routinely deal with a variety of emergency situations that occur in trauma, obstetric, medical and surgical conditions in which CPR may be required immediately and at any time (Razzak & Kellermann 2002:3).

Modern nurses adopt a holistic approach to emergency situations. This means that nurses are required to play multiple roles and to perform a variety of activities during resuscitation. Many nurses acknowledge that they have a professional responsibility to maintain competence in CPR. This acknowledgement arises out of their perception that the performance of CPR is a necessary part of their clinical role and social responsibility (Finn 1996:32). It is not only in hospitals that nurses carry out CPR. They also perform CPR as part of their service to industries, communities and schools where they function to promote health and care for the community. The holistic care that is practised by nurses during resuscitation continues until the patient recovers, dies, is handed over to the other health care providers such as emergency health care professionals or is transferred to other facilities.

In a joint statement that deals with the topic of decision making in CPR, the British Medical Association and the Royal College of Nursing (UK) (2007:18) suggest that whenever CPR is initiated, it should be performed in conformity with accepted clinical guidelines and standards of competence. The basis of modern BLS CPR consists of a combination of expired-air-ventilation and chest compressions. The actions that have to be performed between the sudden occurrence of cardiac arrest and ultimate survival are called the “chain of survival”. This “chain of survival” includes an early and accurate recognition of the nature of the emergency, the immediate notification and activation of emergency services, the early, correct and immediate application of CPR, timely AED/defibrillation, and early ALS (ERC 2005:54).

As a link in the chain of patient survival, BLS is the recommended emergency treatment for any condition in which the brain suddenly fails to receive enough oxygen (Handley et al 2005:s8). If this “chain” is to be strengthened, the skills that are required for each link have to be taught, understood and mastered (Ranse 2006:26). The person who performs BLS is the one who has to be able to assess the airway, the breathing and the circulation of the patient. The purpose of the ALS skills is to offer the best possible treatment under the circumstances to patients who have suffered cardiopulmonary arrest or a life-threatening emergency that requires the use of monitors, defibrillators and other advanced airway techniques such as intubation. Competence in the use of the automated external defibrillator and/or skills in defibrillation extend beyond the task of being able to place paddles correctly onto a patient (Finn & Jacobs 2003:472). Like many other clinical procedures that are carried out by nurses, the practice of defibrillation is supported by a great deal of knowledge, skill and experience (Finn 1996:31). A statement issued by the Royal College of Nursing (2004:2) in Australia emphasises the role of nurses in the management of cardiopulmonary arrest by stating that all registered nurses should seek to extend their BLS skills to include defibrillation.

Finn and Jacobs (2003:472) assert that competence in defibrillation in Australia is well within the capability of the registered nurses, who regularly and competently perform other challenging and complex tasks during the fulfilment of their clinical roles. The Royal College of Nursing (2004:2) recommends, for example, that registered nurses should be competent to interpret electrocardiogram readings, administer intravenous epinephrine, lidocaine and atropine sulphate, and make a whole range of clinical decisions during the course of their duties. Since the curriculum for basic diploma in general nursing in Botswana (1995) does not include the principles and practice of applying an automated external defibrillator or other forms of defibrillation, Botswana nurses have yet to develop competency in the use of automated external defibrillator and to learn to apply defibrillation in practice. The inclusion of skills in the use of automated external defibrillator and defibrillation in general in the basic general nursing curriculum not only increases registered nurses’ skills; they would obviously also increase the survival rate of clients in Botswana who have suffered cardiopulmonary arrest (Dwyer, Williams & Mummery 2007:275).

3.14 THE ROLE OF INTERNATIONAL COMMITTEES

The International Liaison Committee on Resuscitation (ILCOR) was formed in 1993. It represents the world's major resuscitation organisations and consists of the American Heart Association (AHA), the Australian Resuscitation Council (ARC), the European Resuscitation Council (ERC), the Heart and Stroke Foundation of Canada (HSFC) and the Resuscitation Council of Southern Africa (RCSA). Its mission is to identify, review, access and distribute all international science and knowledge about the practice of CPR, and to reach a consensus about the various treatment recommendations that emanate from all parts of the globe. The six task forces of ILCOR include BLS, ALS, acute coronary syndromes, paediatric life support, neonatal life support and an interdisciplinary task force to address other overlapping topics such as CPR and other education (AHA 2005). All these advisory committees were formed so that member bodies could be apprised of whatever new knowledge and experience in the management of cardiac arrest would further improve patient treatment and outcomes. Although the resuscitation organisations that constitute ILCOR all publish their own individual resuscitation guidelines (each of which is consistent with the recommendations outlined in the consensus document), they also take into account the differences in geographical and economic conditions and the availability of medical devices and medications into consideration.

3.15 FACTORS THAT INFLUENCE THE PERFORMANCE OF CPR

The following factors influence nurses in the delivery of CPR:

- the education and training of nurses in the techniques and skills of providing effective CPR
- the role that nurse educators play in training nurses to perform CPR effectively
- the role of nurses in the provision of CPR and the use of AEDs and defibrillation techniques
- the role of policies and protocols that govern the application of CPR

3.15.1 The education and training of nurses in cardiopulmonary resuscitation

According to Pottle and Brant (2000:47), the Resuscitation Council of the UK was established in 1982 to improve CPR knowledge and skills. The Resuscitation Council of the

UK and the ERCI both promote standardised resuscitation training, and they also conduct internationally recognised accredited training courses both in BLS and ALS (Pottle & Brant 2000:47).

CPR competency is defined as having the cognitive knowledge, psychomotor skills and practical training that are necessary for the performance of CPR in cardiac arrest situations (Broomfield 1996:1016). The development of CPR knowledge and skills are an essential component of the professional development of nurses in nurse education programmes. The Nursing and Midwifery Council, (UK) uses the term “competency” to describe the skills and ability that are required to practise safely and effectively without the need for direct supervision (NMC, UK, 2002:2). Cooper and Libby (1997:6) note that “learning by trial and error is part of the basic building process of learning in nursing”. The more experience nurses have of particular events and procedures, the more quickly they gain the knowledge and psychomotor skills that are necessary for dealing successfully with any situation. Melby (2000:145) agrees that experiential learning has great potential for increasing the knowledge and practical skills of nurses. The competence of nurses is a key factor in clinical decision making, and it is squarely based on professional knowledge, skills and experience (Hajbaghery et al 2005:317). A directive from the Joint Commission on Accreditation of Healthcare Organizations (JCAHO 2001) encourages the relevant authorities to assess the theoretical and practical competence of all personnel who are required to be skilled in CPR. Direct observation of skills is also encouraged in actual patient care settings or in simulated conditions. The ability of a nurse to perform CPR competently can be accurately assessed when an individual delivers an interactive demonstration and is simultaneously evaluated by a qualified facilitator Joint Commission on Accreditation of Healthcare Organizations (JCAHO 2001). According to Perkins (2007:203), simulation is valuable because it provides learning opportunities for controlled clinical practice without putting any patient at risk. But while simulation is indeed an important learning tool, it cannot replicate the pressures and risks that are part of a real emergency situation and the administration of chest compressions. The experience of giving mouth-to-mouth ventilation to a teaching manikin is very different from attempting to resuscitate a cold and clammy real-life patient (Page & Meerabeau 1996:319).

Soar and McKay (1998:146) report that the efficacy of learning from experience depends on being able to collect accurate feedback from people and to use this feedback for

developing and refining skills. These researchers also point out that novice nurses gain a great deal of practical experience from being able to operate under the supervision of senior staff in clinical settings. The mastery of a skill depends on the adoption of a structured and systematic approach to education that enables clinical and therapeutic practices to be repeated in a safe environment is often as may be required (Knight 1998:446). While this may be the ideal, there are many nurses around the world who are not able to partake in experiential learning because of factors such as staff shortages, the absence of staff who are sufficiently skilled to train nurses in how to deal with emergencies, and a lack of proper procedures for obtaining feedback and performing debriefing. Meerabeau and Page (1999:34) point out that even the UK is deficient in the training of nurses in CPR in some hospitals and colleges. They note that, despite the various recommendations that CPR training should be compulsory for both student nurses and qualified nurses (by means of annual refresher courses), there is no legislation on CPR certification in the UK, and that it is still possible for anyone to qualify as a nurse without ever having witnessed a cardiac arrest or having been taught the necessary resuscitation skills.

Nurses in Botswana currently obtain their BLS experiences by what they learn from being exposed to emergency situations. Moore (2001:390) notes that *real* cardiac arrests are not ideal teaching situations for the learning of CPR skills and knowledge. The ideal way to train nurses in CPR is by means of a combination of repeated sessions of *simulated* practice and theory impartation so that students will have opportunities to correct their errors and to improve their improve their performance so that they can eventually become experts in this vitally important field without endangering human lives (Ericsson 2004:S72).

3.15.2 Role of nurse educators

The educator's role in nursing education is to impart knowledge and skills to students. But if the educators themselves are insufficiently prepared to teach whatever competencies and emergency life-management skills are necessary, it is obvious that their students cannot obtain the theoretical and clinical knowledge and practical skills that are indispensable for their practice as nursing professionals. It sometimes happen that nurse educators who are trained in emergency nursing care are utilised in other areas such as clinical practice or management positions because of the lack of skilled practitioners and

experts in the fields of critical care. The research undertaken by Moule and Knight (1997:99) in the UK revealed the extent of the problems that were experienced by nurse educators as they attempted to teach BLS skills and CPR to student nurses. Covell (2006:65) notes that educators should emphasise training strategies that encourage nurses to appreciate the importance of regular reviews and refresher courses in the practice and theory of CPR. Covell adds that it is the responsibility of the nurse educator to instil a positive and appreciative attitude toward BCLS in nurses so that they will be motivated to attend such refresher courses and to ensure that their knowledge remains current and up to date.

Dwyer and Williams (2002:85) explored the factors that are associated with nurse participation in CPR by applying the theory of reasoned action and planned behaviour in Australia. According to Dwyer and Williams (2002:85), it is the clinical credibility of the nurse educator, the teaching methods that the nurse educator uses and the regularity with which new developments in CPR are expounded by the nurse educator, that influence the attitudes of nurses towards learning about CPR. Dwyer and Williams (2002:89) have identified the fact that there is a distinct lack of nurses in the clinical area who can function as positive role models who can encourage student nurses and explain to them the vital role that is played by a resuscitation team. This absence of suitably qualified and enthusiastic role models results in the inability of some nurses to take the lead in providing CPR in actual cardiac arrest situations. The obverse of this is that properly qualified and experienced nurse educators and critical care nurses are unable to function as positive role models who encourage nurses to play a crucial role in the delivery of CPR. The educator who teaches the BLS and AED skills should bear in mind that the teaching of practical skills should be based on sound educational principles. Such teaching should therefore progress in a rational and measured manner from simple facts and practices to more complex theory and advanced skills (Xanthos, Ekmektzoglou, Bassiakou, Koudouna, Barouxis, Stroumpoulis, Demesthia, Marathias, Lacovidou & Papadimitriou 2009:225).

3.15.3 Role of nurses in CPR and defibrillation

Regardless of their specialty, nurses are perceived by the community as being ready, willing and able to provide immediate assistance and treatment if called upon in the event of cardiac arrest (Finn 1996:31). According to the Canadian Nurses Organisation (1999:4),

nurses have a professional responsibility to update their CPR skills by means of regular workshops and the acquisition of new knowledge and competencies. Appropriately trained nurses should play a central role in the effective management of in-hospital cardiac arrests. The resuscitation of a patient in the event of an in-hospital cardiac arrest implies that the nurse resuscitator has developed sound clinical judgment skills (as defined in the AACN Synergy Mode for Patient care). Nurses who are skilled in resuscitation procedures should be able to identify certain subtle changes in their patients and to intervene immediately and appropriately. They should, for example, be able to identify hypoxia following surgery, the characteristics of the arrhythmias that occur in patients with cardiac conditions, and the distinctive ways in which the mental status of patients change in life-threatening situations (Ashcraft 2004:212).

While competence in BLS is an essential component of resuscitation, it is ideal if nurses are trained to undertake advanced life support techniques such as the use of the AED and the application of defibrillation procedures because such technological aids offer a patient the best chance of survival after a cardiac arrest (Finn 1996:32). Nurse competencies in CPR are the most crucial determinant of uncompromised patient survival after cardiac arrest. The Royal College of Nursing in Australia (2004:2) emphasises that health agencies should develop strategies to facilitate the provision of safe and effective life-support techniques by nurses in emergencies, and that such a server should include provision for early defibrillation.

Another essential element in any nurse-patient relationship is a nurse's ability to recognise that a problem might exist and to recognise the distinctive symptoms of different problems. Accurate clinical pattern-recognition is critical skill for nurses because it allows a nurse to narrow down the search for diagnostic information that is indicative of clinical conditions. The ability to recognise trends and patterns makes decision making much easier. Once the problem has been recognised, resources must be mobilised to alleviate a deteriorating condition. Nurses should feel entitled to intervene early and not to wait for definitive symptoms such as the absence of a pulse or respirations. Early recognition and diagnosis make early treatment much more likely to succeed and the need for CPR correspondingly less likely (Cummins & Hazinski 2000:431). It is the AACN Synergy Model for Patient Care that asserts that such qualities enhance a nurse's clinical judgement as the nurse assesses the patient's participation in decision making and the predictability and prognosis of the

condition. Good clinical judgement enables a nurse to anticipate the unexpected, to recognise the ramifications of a problem and the patterns that indicate disease and disorder, and to intervene before it is too late (Ashcraft 2004:212).

3.15.4 Role of policies and protocols on CPR

Patients with compromised respiratory, cardiovascular and neurological conditions are at risk of developing cardiopulmonary arrest (Nolan 2005:S40). The development of policies and protocols to identify at-risk patients in a hospital reduce the incidence of in-hospital cardiac arrests. Nurses are therefore encouraged to learn how to identify changes in patients who are at risk (Parr 2001:13). Introduction of an “*Early Warning Score*” system in a hospital enables staff to track physiological changes in individual patients that warn of impending clinical developments of a serious nature (Nolan, Deakin, Soar, Bottiger & Smith 2005:S40). Since nurses are nearly always the first ones to be present at the scene of a cardiac arrest, all registered nurses should receive appropriate and adequate training in CPR and should, in addition, have convenient access to automated external defibrillator or defibrillators (Spearpoint 2008:52). If nurses are taught about the *Early Warning Score* system, they will be in a better position to identify those patients who are at risk of cardiac arrest. The prevention of cardiac arrest features prominently in all the most recent in-hospital resuscitation guidelines (Spearpoint 2008:52).

Nursing education and practice in most countries are regulated by the legislative nursing acts of those countries under the supervision of nursing regulatory bodies such as nursing councils. The lack of regulatory mechanisms for nursing practice and education severely compromises the status and development of the profession, and negatively affects the quality and consistency of service and training including the design and prescription of curriculum standards. The scope and parameters of practice prescribed by nursing regulatory bodies therefore also influence the experience and level of expertise of nurses who are qualified to provide CPR during emergencies, and exercise a direct effect on the standardisation (or otherwise) of CPR training (Shuriquie, While & Fitzpatrick 2007:145).

Section 6.2 on the scope of professional practice of the Nursing and Midwifery Council of the UK (NMC 2002) stipulates that the nurse must be satisfied that each aspect of practice is directed to meeting the needs and serving the interests of the patient or client, and that

the nurse must also endeavour to achieve, maintain and develop the necessary knowledge, skills and competence to meet those needs and satisfy those interests. The same code of professional conduct stipulates that nurses who find themselves in an emergency, whether within or outside their normal working conditions, must accept that they have a professional duty to provide care. This code specifies that the care provided would be judged against what could reasonably be expected from someone with such knowledge, skills and abilities when they find themselves in those particular circumstances (NMC 2002, clause 8.5).

In South Africa, the Nursing Act of 1978 (Act 50 number of 1978, as amended in 2005), specifies that the registered nurse who operates as an independent practitioner is responsible for all of her/his acts and omissions. During the resuscitation process, a registered nurse directs most interventions until more skilled help arrives. The scope of practice broadly describes a registered nurse's responsibility towards patients in terms of the nursing process. Ideally, a registered nurse should utilise the nursing process efficiently when acting during emergencies such as cardiac arrests.

The current Botswana Nurses and Midwives Act, (Act Number 1995 61-03 of 1995) does not contain any specific regulations about the nursing practice that should prevail during CPR. The ideal situation is that all nurses should be directed by their code of conduct to receive whatever training they need to safeguard the patient's life in the event of an emergency. The minimum standard in Australia is that all registered nurses who are deployed in hospitals and clinics are mandated to undergo training in BLS and to partake in periodic refresher and training workshops (Ranse 2006:26).

3.16 LITERATURE ON NURSES' PERCEPTIONS, BARRIERS AND NEEDS IN PROVIDING CPR

In this section, the researcher reviews and discusses what the literature has to say about the perceptions, barriers and needs of registered nurses with regard to the provision of CPR. The discussion that follows is likewise based on the AACN Synergy Model for Patient Care. The AACN Synergy Model for Patient Care states that when there is consilience between the characteristics of a patient and the competencies of a nurse, all patient outcomes are optimised (AACN 2003). The AACN Synergy Model for Patient Care

delineates three types of outcome: outcomes derived from the patient, outcomes derived from the nurse, and outcomes derived from the system. The goal of a healthcare system is to provide the highest quality of care by providing adequate resources, effective learning environment, synchronised team support, evaluation of outcomes by means of auditing, and maintenance of patient safety (Reed et al 2007:4).

Although there are numerous studies about the relationship between effective CPR and the knowledge and skills of the nurse resuscitator, an examination of the literature identified only a few studies on the topic of nurses' perceptions of CPR and the barriers and needs that characterise the provision of CPR. The researcher was able to identify the following researcher about the perceptions, barriers and needs that characterise the provision of CPR:

- nurses accounts of CPR (Page & Meerabeau 1996:317)
- nurses' reactions to participation in CPR (Pups Weyker & Rodger 1997:59-70)
- the effect of teamwork in the performance of CPR (Meerabeau & Page 1999:29)
- the nurses' perceptions of the barriers and needs that arise during CPR (Hemming, Hudson, Durham & Richuso 2003:254)
- barriers that prevent compliance with CPR procedures (Peterson et al 2004:41)
- the degrees of stress experienced by critical care nurses subsequent to in-hospital CPR (Laws:2001:76)

All other relevant studies into the knowledge and skills of nurses who perform CPR are presented in sections 2.5-2.5.3.

While a number of studies have investigated the knowledge and skills that nurses have about CPR, Knight (1998:441) and Hamilton (2005:289) undertook a literature review that identified research into extent to which nurses retain knowledge and skills over various intervals.

Knight (1998:443) reviews the empirical literature on the acquisition of psychomotor skills in nursing. Knight states that learning skills are not achieved simply through observation and apprenticeship but also in the context of a structured and systematic learning approach that allows for repeated clinical applications of practical skills in a safe environment. The

author also concludes that both registered nurses and student nurses require hands-on experience with up-to-date and properly functioning equipment and a thorough mastery of the use such equipment to reduce their levels of anxiety before they approach patients.

Hamilton's (2005:289) literature review describes those factors that enhance the retention of knowledge and skills during and after training CPR in order to identify the educational strategies that will optimise survival for patients presenting with cardiopulmonary arrest. Research conducted by other authors, namely Davies and Gould (2000:408), Moule and Gilchrist (2001:34), and Wik, Thowsen and Steen (2001:170), support the conclusion that knowledge and skills decline at different rates. They therefore concluded that the utilisation of various teaching strategies such as video-based self-instruction, computer-aided learning, peer tuition and the use of cardiac arrest simulations would improve performance skills (Hamilton 2005:294). The various teaching strategies that are used by different researchers are set out in table 3.11.

Table 3.11 Teaching strategies used by CPR researchers

Teaching strategy	Application
Video-based self-instruction (Batcheller, Brennan, Braslow, Urrutia & Kaye 2000:109)	This study evaluated the performance of a sample of people over 40 years of age who were randomly assigned to look knowledge and skills by means of video self-instruction or AHA instruction in the USA. It was noted that the video-based self-instruction resulted in more competent performance.
Self-instruction (Davies & Gould 2000:409)	Self-instruction was used in the CPR education of nurses in a quasi-experimental study of nurses in the UK. The results indicated that the subjects who received self-instruction with manikin practice in CPR were found to be able to demonstrate increased levels of competence.
Computer-aided learning of BLS by means of CD-ROM self instruction (Moule & Gilchrist 2001:32)	This study assessed a group of 26 diploma-course student nurses in the UK in order to evaluate a BLS instructional CD-ROM that was used to prepare student nurses for a BLS test. The CD-ROM was found to be an effective means of instruction because the entire sample passed the test.
Peer tuition (Perkins, Hulme & Bion 2002:699)	A group of first-year medical, dental, physiotherapy and nursing students were randomly selected to receive BLS tuition from second-year students or from experienced clinical staff in the UK. While CPR skills improved as a result of peer tuition, the quality of knowledge accessed remained the same across all the groups.
Voice-activated manikin (Wik et al 2002: 276)	This study tested 39 volunteers in order to assess the retention of CPR skills following training with a voice activated manikin in Norway. The study showed that although baseline skills were poor in the beginning, skills improved noticeably after 20 minutes of practice with the voice activated manikin.
Simulation (Hendricks et al 2001:175)	The study tested the knowledge and skills of CPR among members of the defence force in Australia. Hendricks and Ellis (2001:176) suggest that

	simulation training in resuscitation helps participants to increase their knowledge and familiarise themselves with equipment and procedures.
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Hamilton (2005:296) recommends that all CPR training should be based on guidelines that take into account all the latest medical and scientific findings about the outcomes of in-hospital CPR events and methods of recognising and treating cardiac arrest patients. Hamilton also recommends that CPR should be taught in the context of simulated cardiac arrest scenarios and that all resuscitators should be taught how to use whatever equipment and technology is available to them in hospitals or emergency services conditions (Hamilton 2005:295).

Hamilton (2005:297) further recommends that all those nurses who work in clinical areas where they seldom encounter cardiac arrests, should receive training in the use and application of AEDs. She further recommends that AEDs be made widely accessible so that delays in the initiation of resuscitation procedures can be minimised. It is also clear that the use of video self-instruction for remedial training in CPR will improve the quality of resuscitation training that nurses are currently being given. The core premise of the AACN Synergy Model for Patient Care is that the needs of patients and families drive the characteristics or competencies of the nurse. Synergy occurs when there is congruence between the needs and characteristics of the patient, the clinical unit or the system and the nurse's competencies (Curley 1998:66). The following literature review was undertaken to investigate selected topics about health care systems, and how the characteristics and competencies of nurses influence the outcomes of CPR. The literature review was guided by the headings set out in table 3.12.

Table 3.12 Literature review following the AACN Synergy Model for Patient Care

Health care system	Nurse
Inadequate resources and facilities	Clinical judgement and clinical inquiry
Policies on CPR	<ul style="list-style-type: none"> • Knowledge and skills • Perception
In-service education on CPR	<ul style="list-style-type: none"> • Barriers and stress • Needs
Outcomes of CPR	Collaboration and caring practices <ul style="list-style-type: none"> • Teamwork • Leadership • Attitude • Stress • Motivation Facilitator of learning and response to diversity <ul style="list-style-type: none"> • Innovative teaching • Simulation

	Advocacy and moral agency <ul style="list-style-type: none"> • Ethical issues • HIV/AIDS
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3.17 ROLE OF HEALTHCARE SYSTEM IN THE PERFORMANCE OF CPR

The third component of the AACN Synergy Model for Patient Care is the health care environment or system. A successful outcome for the patient and the nurse depend upon the availability of the resources, upon well-defined institutional policies and on an environment that is conducive to learning. The following studies explain the effect of facilities, policies, in-service education in the provision of CPR.

3.17.1 Inadequate resources and facilities provided by the healthcare system and their impact on the performance of CPR

The research conducted by Deakin (2005:686) summarises the latest and most up-to-date standards for the conduct and implementation of CPR. These new standards take cognisance of all previous regulations and amendments and specify that:

- all healthcare institutions need to have a resuscitation committee
- every institution must have at least one resuscitation officer who is responsible for teaching and the regular and periodic training of all staff in CPR
- all staff who come into regular contact with patients must participate in regular resuscitation training programmes that are adjusted to their particular needs, abilities and roles in the health care institution
- equipment for resuscitation should be readily available and accessible throughout the institution for clinical use and for training
- specific protocols that determine when staff should follow a “Do not attempt resuscitation” policy should be compiled and communicated to all relevant members of staff. These protocols should be strictly adhered to and regularly audited and revised when necessary.

Several retrospective studies (Hodgetts, Kenward, Vlackonikolis, Payne, Castle, Crouch, Neil & Loua 2002:121; Mcquillan, Pilkington, Allan, Taylor, Short, Morgan, Nielsen, Barrett & Smith 1998:1853) have provided evidence that cardiac arrests that occur in hospitals are

usually preceded by a recognisable signs of physiological deterioration. The main causes of sub-optimal care are the failure of hospitals to function to the optimal extent, a lack of necessary knowledge and skills on the part of qualified nursing staff, a failure to appreciate the clinical urgency that characterises cardiopulmonary procedures, the lack of proper supervision, and the failure of personnel to seek whatever advice they need in good time.

Deakin (2005:686) hopes that the guidelines that are based on the new standards for CPR will improve the early identification of cardiac arrest events and the provision of appropriate treatment and care for patients on whom resuscitation is being attempted.

Hajbaghery et al (2005:317) have evaluated the outcomes of in-hospital CPR measures in Iran by utilising a prospective and descriptive methodology. These researchers point out that many studies indicate that the prognosis for CPR patients in hospitals is poor because of pre-existing of clinical conditions in the patients themselves. Other studies have attributed low survival rates to factors such as the inadequacy of the knowledge and skills of responsible health care providers and the deficiencies in their formal life-support training. This study, which was conducted in four teaching hospitals in Iran, investigated the outcomes for all patients who received CPR during the first six months of 2002. The researchers compiled a check list that contained 11 questions. These questions supplied information about type of ward, age, sex, working shift, the underlying cause of the cardiac arrest, the time that elapsed between the cardiac arrest and the initiation of CPR, the time when the first defibrillation took place, the outcome and total duration of the CPR attempt, the presence or absence of a defibrillator at the time of arrest, and the amount of time that was lost because of the need to prime the defibrillator.

The researchers asked the head nurse and the nurses who were present during each CPR attempt to complete the check list and answer all questions. The data was analysed by means of SPSS 9 and ANOVA. A total number of 206 cases of CPR were undertaken during the research period. Out of these cases, 29% were performed during the morning shift, 31% during the evening shift, and 40% were performed during the night shift. One of the notable findings of this research was that the rate of survival among patients from the moment of cardiac arrest until discharge from hospital was nearly twice as great when the resuscitation attempts to place in the morning compared to the survival rate when the resuscitation attempts took place in the afternoons and evenings. The short-term survival

rate was 25, 16 and 19% in these shifts respectively. As many as 81.8% of patients who survived until hospital discharge were those who had been resuscitated within the first three minutes of arrest.

The availability of the defibrillator at the initiation of CPR was also a highly significant factor because 59.2% of cardiac arrest clients recovered after a defibrillator had been applied. The higher survival rate of CPR patients during the morning shift could perhaps be attributed to shorter response times. The results also seem to indicate that an early detection of cardiac arrest by nurses, the ability of nurses to quickly alert available physicians, and the presence of skilled staff in specialised units might also account for more favourable survival rates. The data from this study also supports the view that the viability and efficiency of the chain of links plays is crucial to the welfare and condition of patients after resuscitation. In a study undertaken by Hajbaghery et al (2005:317) it was revealed that the crucial fact that in 55% of those cases where defibrillation had been applied, the institution of defibrillation was delayed for more than 10 minutes. Hajbaghery et al (2005:317) are of the opinion that the non-availability of the defibrillator and the fact that nurses had not been trained to use defibrillators effectively contributed substantially to these negative outcomes. It is therefore necessary to drastically shorten the response time in order to increase the survival rate among in-hospital CPR patients. In order to achieve this, the following measures need to be taken:

- CPR management strategies need to be improved.
- Hospital wards need to be equipped with better facilities for CPR (and with readily accessible and properly maintained defibrillators in particular).
- Training programmes that educate personnel in basic and advanced life-support.

3.17.2 Outcomes derived from the auditing of CPR (Recidivism and cost and resource utilisation)

Patient safety is a vital component of quality care. Maintaining quality care ensures patient's safety and helps to prevent recidivism, and improve the resource utilisation. The main purposes of auditing are to maintain standards and to evaluate the quality care. In the following section the literature relevant to auditing of CPR are discussed.

Taber's *Cyclopedic Medical Dictionary* (1997:197) defines auditing in medical care facilities as "an official examination of the record of all aspects of patient care". The purpose of such audits is to evaluate the quality of the care that is provided against the best available standards of nursing and medical care in the world. The **Nursing and Midwifery Council of the UK**'s advice sheet on research and audit (2006:1) points out that audits seek to improve practice and treatment by reducing risk. Audits of this kind engage in a systematic review of the processes and outcomes of care and treatment through an evaluation of the records and other data about clinical governance. The studies conducted by Boyde and Wotton (2001:248); Desalu, Kushimo and Akinlaja (2006:517); Hudson (2004:113); Lambert and Heath (2000:30); Pottle and Brant (2000:46); Parr (2001:13); Suraseranivongse, Chawaruechai, Saengsung and Komoiltri (2006:188); all confirm the value and importance of auditing for effecting improvements in the quality of care during CPR.

A study conducted by Pottle and Brant (2000:46) undertook to investigate whether or not BLS and ALS training have an effect on the outcomes of cardiac arrest patients. The purpose of this study was to determine the extent to which the *total* amount of training in basic and ALS that nurses had received had any effect on the survival rates of cardiac arrest patients. The study was conducted in the Harefield Hospital in London in the UK, where the BLS training was first offered in 1990. In 1994, all the nurses and doctors who were in the first month of their employment in this hospital were compelled to participate in resuscitation training programmes. After 1994, all nurses were obliged to attend annual BLS training sessions.

The data in this research was collected from a four-year audit of the records of 367 in-hospital adult cardiac arrests had occurred between January 1993 and December 1996. The data collected during the course of the audit suggests that extent of training in resuscitation exerted a significant effect on the initial outcome in a systolic arrest and ventricular tachycardia. This effect was attributable to the training in defibrillation that had first been implemented in 1990. The researchers concluded that survival rates after cardiac arrest can be improved by the regular periodic training of staff, by making sure that all CPR-related equipment is regularly serviced and in good order, and by ensuring that all the equipment and resources that are necessary for CPR are easily available and accessible during emergencies.

Lambert and Heath (2000:30) evaluated the knowledge and skills of a sample of nurses who had participated in an ALS course and the impact that such participation made on the quality of their practice in an accident and emergency department. This research was conducted in the Milton Keynes Hospital in the UK. To reduce the costs and increase the number of staff who would be able to be trained in ALS, an ALS course was devised by the hospital itself and presented in the format of an eight-week rolling programme.

The researchers identified the nurses' self-perception of their ALS skills by means of a questionnaire that they sent to all qualified nurses working in the accident and emergency department both before and after they attended the course. Apart from that, all cardiac arrests that occurred between February 1999 and July 1999 in the accident and emergency department were audited and evaluated by means of a formal auditing tool and by asking all those nurses who had been involved in the cardiac arrests to complete a questionnaire. While the results of the study revealed that the nurses in the sample felt that there they were more competent in ALS skills after attending the courses, they also demonstrated that these skills were rarely used in any practice setting. Over the six month period of a study, 78% of cardiac arrests were managed by nurses who had been trained in ALS even though only 20% of these nurses used their ALS skills during CPR. Those nurses who were failing to use their skills justify their failure on the grounds of lack of confidence, insufficient experience and a fear of making mistakes. Lambert and Heath (2000:30) recommend that the chain of survival should always be the main focus during CPR events.

Parr (2001:13) offers various suggestions about how in-hospital resuscitation can be improved. Parr states that the quality of resuscitation attempts can be improved within any system by the more accurate identification of patients who are at risk of cardiac failure, by the implementation of preventative strategies, by the organisation of rapid and effective resuscitation team responses, by identifying the obstacles and barriers that diminish efficiency, and by the careful auditing of all resuscitation attempts. Since it is ward nurses who are the first to witness and respond to a cardiac arrest, their function and roles need to be expanded to produce the greatest possible benefits for their patients. Since it is nurses who are continuously present in the wards during the process of managing patients, it is they who are best positioned to identify those patients who are at risk. Parr also agrees

that that the regular measurement of physiological variables will help the nurses to preempt further deterioration. The implementation of such strategies implies the provision of more resources for monitoring, medical and nursing interventions – both in wards and in the critical care facilities of the hospital. Parr points out that nurses are professionally empowered when their resuscitation knowledge and skills are up to date and based on the best current available knowledge and techniques. The critical role that the ward nurse has to play during in-hospital resuscitation cannot therefore be overestimated (Soar & McKay 1998:145). Parr (2001:13) also notes that if in-hospital resuscitation rates are to be improved, suitable protocols for reporting and documenting should be meticulously observed. Collaborative long-term research into in-hospital CPR performances will give nurse educators the information they need to formulate other advanced resuscitation strategies.

Suraseranivongse (2006:188) conducted a study in a 2300-bed hospital in Bangkok, Thailand, to evaluate the outcome and quality of in-hospital CPR and the factors that affected these outcomes. In order to obtain their results, they undertook a one-year prospective audit in the Utstein style.

Out of the 639 cardiac arrests that were investigated during the course of the study, 536 (84%) were actually witnessed and 433 (67.3%) took place in wards of the hospital that were not under constant direct observation. Following CPR, 394 (61.7%) achieved spontaneous circulation and 44 (6.7%) survived until discharge. Although the initial survival rate was not associated with age, sex or the moment when ALS commenced, the survival rate was significantly related to whether or not the cardiac arrest occurred in a closely monitored critical care area that was under constant observation. Suraseranivongse et al (2006:188) therefore concluded that the availability of state-of-the-art equipment such as defibrillators and multi-professional training courses in the care of the acutely ill patients exerted a positive effect on the outcomes of resuscitation.

Boyde and Wotton (2001:248), who conducted their study in one of Australia's teaching hospitals, investigated the ability of nurses to initiate and maintain effective CPR in actual cardiac arrest situations. Since the research was based on judgments of perceived performance by participant observers, the researchers confirmed the validity of their research by incorporating triangulation into their methodology. They therefore collated self-

assessment from the first nurse to witness the incident, peer assessment on the part of the nurse in charge, and peer reviews from the coronary care unit in order to obtain detailed insights into the actual events that occurred during the cardiac arrest events. Their data was collected by means of convenience sampling over a period of nine months from 50 cardiac arrest incidents. After each incident of cardiac arrest, the participants filled in a survey form that contained both open-ended and closed-ended questions. Of the 50 cardiac arrests that were investigated, 70% occurred in medical wards and 30% occurred in surgical wards. Throughout the 24-hour period that framed a study, 48% of the arrests happened during the morning shift, 26% during the afternoon shift, and 26% during the night shift. These researchers also noted that resuscitations were more successful during the morning shift (46%) than during either the afternoon or the night shifts. This anomaly was attributed to the fact that morning arrests were immediately witnessed by the staff and not to the fact that the personnel who were on duty during afternoon and night shifts were more efficient or conscientious.

The qualitative data on perceived problems that was collected from the three groups of nurses revealed minimal concerns about the nurses' ability to perform CPR. The nurses did, however, make comments about administrative deficiencies such as the presence of too many junior nursing staff or an insufficient number of nurses being present during cardiac arrest incidents. A recurrent theme that emerged from the qualitative data was the fact that the respondents made strong appeals for debriefing sessions after cardiac arrest incidents.

Boyde and Wotton's (2001:248), study emphasised the importance of using theories that explain the transfer of learning in order to understand the difference between teaching and assessing in contextual and non-contextual settings. These differences can be enhanced by encouraging cognitive strategies such as rehearsal, elaboration, encoding, recall and metacognitive strategies such as planning and monitoring. The evaluation of such activities is essential if staffs are to function at their best during the complex conditions that prevail during cardiac arrest events.

Hudson (2004:113) reports on the small retrospective audit that was conducted in the Prince of Wales Hospital in the UK. He says that CPR methodology is sufficiently advanced to utilise physiological measures for the prediction of cardiac arrests and the initiation of

appropriate interventions. The retrospective audit on six predictive physiological variables (systolic blood pressure, heart rate, oxygen saturation, respiratory rate, conscious level and temperature) in **the 24 hours** preceding each cardiac arrest revealed the absence of comprehensive observations. Of the observations that were supposed to take place at four-hourly intervals, 62% had not been recorded every four hours. This lack of compliance rose to 70% between the hours of 10 p.m. and 6 a.m. A confidential questionnaire was compiled on the basis of this audit report and was sent to the nurses involved. The results were that while the majority (68%) felt that the necessary observations should be carried out as required, 29% were opposed to the recording of observations at night. It was also noticed that the participant nurses frequently overestimated the frequency of patient assessments. The explanation that was advanced for the poor rate of observation completion was the lack of staff and equipment. Many nurses also noted that frequent observations were not appreciated or valued by doctors.

These findings illustrate the need for an improvement in this aspect of the education of nurses and doctors. Assessment that takes place on a regular basis will improve the accuracy of observations of clinical deterioration and the need to institute immediate action. This is the first step that should be contemplated for the purpose of reducing the in-hospital rate of cardiac arrests.

Desalu et al (2006:517) retrospectively audited all the peri-operative cardiac arrests that occurred in Nigeria during a certain period of time. All cardiac arrests that occurred between the inductions of anaesthesia until discharge from the recovery room as well as those that occurred in the twenty-four-hour post-operative period in ICU were audited. Thirteen cardiac arrests occurred during 2147 operations (0.6%). The research attributed these arrests to deficits in:

- uniform access to the cardiac arrest trolley
- the resuscitation drugs that were used
- efficient time management
- the availability of the cardiac arrest team
- the implementation of the policy that defines the use of existing guidelines
- the use of educational resources such as manikins

- mandatory CPR certification and the availability of regular CPR refresher courses for all personnel within the health care sector

Desalu et al (2006:517) assert that there is a need for continuing training, organised simulation practice and the regular updating the resuscitation guidelines to keep health care personnel abreast of the most recent skills, knowledge and research in BLS and ACLS. Table 3.13 describes the most recent studies in the auditing of CPR.

Table 3.13 Summary of studies that have utilised the auditing of CPR

Authors	Methodology	Findings
Olasveengen et al (2009:407).	This research evaluated whether the quality of CPR performed by the Oslo Emergency Medical system improved after the implementation of the modified 2005 CPR guidelines. The research made use of retrospective observations of consecutive adult cardiac arrests treated during the two-year period preceding the implementation of the modified 2005 CPR guidelines (May 2003-April 2005) as well as the subsequent two-year period after the implementation of the modified 2005 CPR guidelines (January 2006-December 2007). Resuscitation was attempted on 435 patients before the implementation and on 481 patients after the implementation of the modified 2005 CPR guidelines. The data was analysed by means of Microsoft Excel and SPSS 15.0 version software.	The quality of CPR improved after the implementation of the modified 2005 guidelines because of a reduction in both pre-shock pauses and in the total amount of time during which no chest compressions took place. There was accompanied by a weak trend towards improved survival rates between the moment of cardiac arrest and hospital discharge.
Jones and Miles (2008:369)	This article describes the introduction of standardised cardiac arrest documentation in Auckland City Hospital, New Zealand, and it describes how the barriers to using the Utstein template were overcome. A retrospective audit of cardiac-arrest documentation for a three-year period following the introduction of a standard form of documentation was undertaken in all the departments. Statistical analyses were performed by using the Chi-square test and Fishers Exact tests where appropriate.	In the initial pilot period of the study, only 29% of forms were completed. In the subsequent years of the study, 88% and 77% of the forms were filled in. There were statistically significant differences in the rates of documentation between the time when CPR was initiated throughout the entire hospital and the time when CPR was terminated in the ED/CCU/ICU areas. None of the other differences were statistically significant. Jones and Miles (2008:369) suggest that the principles outlined in the standardised form could well be adapted to other settings with a view to accumulating a larger and more accurate quantity of data about cardiac arrests.
Smith, Kinross, Bailey, Aggarwal, Toresen and Vincent (2008:4)	This study retrospectively reviewed staff compliance with the checking policy on resuscitation trolleys in medical, surgical and paediatric wards in a large teaching hospital in the UK. The checklist forms located on each trolley were examined for	The study results showed that basic checking procedures were not being followed, and that the trolley was invariably unchecked and unprepared for emergency cardiopulmonary arrest events. The medical, surgical and paediatric units observed a mean checking

Authors	Methodology	Findings
	<p>the period between January and December 2005. The frequency of checking was compared with the arrest calls made within that period. Data analyses were performed by using Microsoft Excel.</p>	<p>rate of 72.2%, 68.8% and 65.5% respectively. The staff in the medical ward (which had the highest occurrence of cardiac arrests calls) failed to check the equipment on their trolleys for seven consecutive days during a one-month period of the study. The following recommendations were made on the basis of the research findings:</p> <ul style="list-style-type: none"> • The hospital should review its current policy for checking resuscitation trolleys. • Checklists should be standardised across the institution. • Any missing, faulty or expired equipment should be replaced immediately. • The protocols that determine the location and availability of the trolleys should be drastically simplified and standardised. <p>Smith et al (2008:6) further recommend that there is an urgent need to assess the impact of poor compliance on the outcomes of cardiac arrest emergencies.</p>

3.17.3 In-service education and its effects on nurses' competency in the performance of CPR

The American Nurses Association (ANA) (2000:24) define continuing nursing education as “systematic professional learning experiences designed to augment knowledge, skills and attitudes of nurses, and therefore enrich the nurses’ contributions to quality health care and their position of professional goals”. The Nursing and Midwifery Council of the UK (2004: section 6) exhorts nurses to comply with the requirements of their code of professional conduct by keeping their knowledge and skills up to date throughout the course of their working lives. By this they mean that nurses should be meticulous in their participation in whatever learning activities enable them to reinforce their competence and increase the efficiency of their performance. This principle is especially applicable to updating a nurse’s knowledge and skills of CPR because a one-off basic training in CPR cannot effectively meet the changing and complex demands of the modern health care situation. The studies discussed below all emphasise the importance of in-service education and the annual updating of CPR skills, information and practice.

Peterson and Berns (2004:41) outline how a particular organisation improved the level of CPR skills of their employees. This institution had adopted a policy that required all of their

employees who had any contact with patients to be properly certified in CPR practice. The University of Wisconsin Medical Foundation developed an innovative process to improve CPR compliance in this company by 20% within two years. According to Peterson and Berns (2004:42), the initial barriers in the path to compliance were identified as:

- a variety of expiration dates on the CPR certificates among the employees
- the company's high rate of staff turnover (some new employees had not yet been certified)
- the fact that some staff were prone to cancel their participation in CRP refresher workshops for which they had already signed up
- the unavailability of suitable reading and other tuition materials for use by staff
- an ingrained phobia among some people about participating in CPR training

In order to meet these challenges, Peterson and Berns (2004:42) devised an orientation interview for the new employees to discuss their CPR status, the time that would elapse before their next renewal period and the next training workshop that they were scheduled to attend. The researchers also agreed to set up a website devoted to CPR so that employers would be able to obtain whatever information they needed about CPR. They also helped those employees who had a phobia about attending CPR classes and by modifying the style and manner in which the CPR classes were presented and by introducing a non-threatening environment in which they would have more time for practice and for asking questions and dealing with their uncertainties and fears. Subsequent statistics reveal that these researchers managed to increase the CPR compliance of the organisation's employees to 97% during 2003 (the year in which they introduced their measures to improve compliance).

Covell (2006:63) describes how the Iowa Model of evidence-based practice was applied in order to promote the quality of care and to establish acceptable standards of practice for the certification of nurses in BCLS. This study, which was undertaken at the McGill University Health Centre in Montreal, Canada, dealt with a group of approximately 3000 registered nurses. The Iowa Model teaches health care personnel how to identify triggers, how to create feedback loops and working groups, how to recognise and use the best available evidence and how to work efficiently within a committee format. With the help of the model, the researchers identified three basic areas of concern as "triggers". These

were the current BCLS standards for practice, the methods of teaching that were being applied, the protocols for certification and recertification, and the degree to which vital cognitive and psychomotor skills were being lost and compromised between CPR refresher courses and workshops.

The researcher collected a great deal of base line data from the sample of registered nurses and reviewed the data to determine the type and amount of resources that would be needed to implement satisfactory standards. After they had done that, they devised evidence-based guidelines from the data that they had collected. According to these guidelines, all nurses in the health centre were expected to comply with the following conditions:

- They had to produce evidence of a current certification in BCLS.
- They had to demonstrate competency in CPR.
- They had to guarantee that they would take steps to be recertified as proficient in CPR on an annual basis.
- Critical care nurses would have to be certified in both ACLS and paediatric ACLS.
- They would have to be able to attest that they had taken steps to reinforce their CPR skills within six months after certification.
- Their CPR and BCLS courses would have to be taught by certified instructors.

Trained instructors were organising two courses per month for all staff members as part of the implementation of this plan, and the project itself was mostly favourably regarded by most of the nurses who were employed in the centre. It was noted that the great number of the nurses had voluntarily attended the workshops and taken the opportunity to refresh their skills in BCLS. This model continues to be used within the nursing department when other changes in current practice are needed and when other related educational projects need to be set up (Covell 2006:68).

3.18 NURSE CHARACTERISTICS AS COMPETENCIES

The AACN Synergy Model for Patient Care states that nurse characteristics (as defined) can be considered as essential competencies for nurses who specialise in care for the critically ill. These eight competencies have already been discussed in detail in chapter 2.

All eight competencies reflect an integration of the knowledge, skills, experience, attitudes, and the values that a nurse requires to meet patients' needs (Hardin & Kaplow 2005:5). In terms of this model, clinical judgment emerges as a competency that evolves from experience, practical intelligence, intuition, knowledge and skills.

The following literature review explains what knowledge and skills are needed for CPR and how they affect the performance of CPR.

3.18.1 Inadequate knowledge and skills and the effect of this on the performance of CPR

BLS techniques are skills that all nurses should possess, in whatever sphere they might work. The general public has a high regard for the CPR skills of nurses. When emergencies occur outside of a hospital and a qualified nurse is within immediate reach, the first instinct of those concerned is to call upon the nurse's skills (Badger & Rawstone 1998:231). The acquisition of necessary skills is an essential component of any nurse's professional training, and the success or otherwise of any CPR attempt will obviously be affected by a nurse's ability to apply CPR efficiently, swiftly and in accordance with best current practice (Bullock 2000:139).

Broomfield (1996:1019) takes note of the remark by Greaves (1987) that the word "knowledge" (as it is generally used in English) refers to "some sort of clear and mental perception that includes awareness and understanding of something". A health care worker possesses "knowledge" in this sense if he or she is familiar with all the information and skills that are needed for the correct or efficient performance of a particular task or function. Greaves also notes that knowledge and skills are functionally inseparable in a nursing context. Broomfield (1996:1010) conducted a quasi-experimental study in the UK to investigate the ability of qualified registered nurses to retain the skills and knowledge that are necessary for the performance of CPR. Nineteen registered nurses, who were selected by means of convenience sampling, participated in this study. The extent of their knowledge was tested by means of a questionnaire with 26 open-ended questions, and their skills were tested by making use of an observation sheet with eight open-ended questions. All of these subjects were tested for their knowledge and skills ten weeks after they had been involved in a CPR training session. The results of this research revealed that knowledge and skills retention quickly deteriorated after they had been acquired, and

the researchers used this information to justify the need for regularly updating CPR skills and knowledge by means of properly organised workshops and refresher programmes. Their findings suggest that the retention of skills and knowledge is largely dependent upon regular periodic practice in the techniques of CPR and the ability of resuscitators to recall *from memory* whatever information they might need to perform CPR effectively.

Inwood (1996:33) conducted an exploratory study in the UK, which was designed to investigate how much knowledge the nurses in the sample retained over a six month period following a resuscitation workshop. This study focused on nurses who were working as specialists in areas such as cardiac and intensive care units. All the subjects were selected by means of convenience sampling and questionnaires were used to collect data at three monthly intervals. The first questionnaire was distributed prior to the resuscitation workshop, the second questionnaire was administered three months after the resuscitation workshop, and the third questionnaire was administered six months after the resuscitation workshop. The results were analysed by means of descriptive statistics. The results from the questionnaire indicated that those nurses who had not participated in resuscitation workshops within the preceding six months were less confident than those nurses who had more recently participated in resuscitation practice. The results of the study indicated no significant difference between the results obtained in the second and third months after the workshop and no noticeable deterioration in the amount of knowledge retained. Inwood (1996:39) therefore recommended that best practice and education could best be served if the following measures were to be implemented:

- Nurses should be required to attend annual compulsory life support courses.
- Any nurse who works in critical care units should undergo a resuscitation workshop within the first month after employment.
- Both a manikin and a face mask should be made freely available for the practice resuscitation skills.
- All incidents of cardiac arrest and its outcomes should be retrospectively audited with a view to improving the long-term effectiveness of the resuscitation efforts.

In an experimental study that was conducted in the UK, Greig, Elliott, Parboteeah and Wilks (1996:28) investigated the acquisition and retention of the BLS skills in pre-registration student nurses during their three years of training. The two main areas on

which the research focused were teacher-student ratios and the effect of regular practice sessions on the quality of BLS performance. The research sample comprised 72 student nurses who were divided into experimental and control groups. The pre-test measurements of the cognitive and psychomotor skills of the student nurses were obtained from answers to multiple choice questions and from observation of practical sessions with a manikin. The students' practical competence in BLS skills was assessed again after six weeks of instruction had elapsed. While the teacher-student ratio for the small group was 1:6, the larger group of students was taught by means of a traditional method in which the teacher-student ratio was 1:20 (or more) students. The results obtained from the pre-assessment revealed that the majority of the nursing students in the sample had some basic knowledge of BLS theory. The results also showed that the small group performed better in every category as a result of the individual support and coaching that they had received. Since it is essential for a resuscitator to be able to perform BLS effectively in order to maintain cerebral and myocardial perfusion, it is absolutely necessary for students to master resuscitation techniques.

Ehrhardt and Glankler (1996:34) note that cardiac arrest incidents often occur in chaotic, circumstances and stressful and disturbing conditions. But since nurses already know this, they can prepare themselves beforehand and so cope with such conditions and maintain their own equanimity while contributing to the efficiency with which the team performs. Ehrhardt and Glankler suggest that the following practical measures and precautions all contribute in their own way to the effectiveness of resuscitation attempts:

- The practical CPR skills of everyone on the team should be completely up to date.
- All members of the team should be thoroughly conversant with the latest international basic life-support guidelines.
- All members of the team should know exactly where the emergency trolleys are located at all times. They should likewise be confident that all the equipment that is stored on these trolleys is reliable and in good working order.
- A thorough review of the actions taken and the nature and dosage of the drugs administered during cardiac arrest should be meticulously recorded.
- All members of the team should have a clear understanding of how the cardiac monitors operate and how to interpret the information that they provide (Ehrhardt & Glankler 1996:36)

If all these precautions are observed, the resuscitation team and the nurse in particular will be able to remain calm, focused and decisive during CPR.

Whelan (1997:107) set out to investigate and discuss all the CPR skills that emergency nurse practitioners (ENP) in the UK should possess. One of Whealan's findings was that emergency nurse practitioners work in isolation in A&E departments and in minor injury units. Since emergency nurse practitioners are therefore autonomous practitioners, they are expected to be able to operate confidently and efficiently within the guidelines that govern emergency procedures and to deal with effectively with cardiac arrest emergencies. The kind of CPR training that is required for emergency nurse practitioners is more detailed and thorough than that which is provided for registered nurses. Whelan (1997:109) is also of the opinion that the competence of ENPs should be maintained by compulsory biannual training and the refresher courses in BLS and defibrillation, and that participation in such periodic training workshops should be one of the essential job requirements of every emergency nurse practitioner. Effectiveness in skills such as the insertion of an intravenous canula, drug administration, intubation and ventilation should be a routine part of the training of all emergency nurse practitioners because such skills make an emergency nurse practitioner more efficient in dealing with the circumstances of cardiac arrest. Whealan therefore proposes that the national guidelines for practising emergency nurse practitioners should include a requirement for demonstrable competence in BLS and defibrillation.

The research of Cooper and Libby (1997:5) reviewed many of the variables that need to be borne in mind during the teaching of resuscitation. Their study identified many of the variables that affect the teaching and learning of CPR. Cooper and Libby (1997:5) produced evidence of correlations between the understanding and retention of CPR skills and knowledge and the age, gender, attitudes and certain other inherent abilities of those who learned CPR skills. The researchers noted that despite the fact that older nurses were far more likely to have been previously trained in CPR, the scores that they obtained in re-tests on CPR were lower than those obtained by younger nurses. Gender also appears to have played a significant role in the retention of CPR skills in that males scored better on re-testing than females. The "inherent abilities" that were taken into account in this research (such as the speed with which learners mastered certain skills and length of time

that they were able to remember key points), also differed from one person to another. They also pointed out that resuscitation training could often be carried out in the hospital wards in which the nurses worked rather than in special sessions with teaching manikins. One of the interesting findings of Cooper and Libby (1997) was that *imagining* or *visualising* a particular CPR skill that needed to be practised often contributed to the retention of that skill.

O'Steen, Kee and Minick (1996:66) investigated the retention of ACLS knowledge over time among registered nurses who were employed in critical care units in various hospitals in Georgia in the USA. They collected their data by means of questionnaires. The study came to the conclusion that the retention of CPR knowledge and skills correlated with several variables such as the failure to retain skills because of a lack of practice, the absence of in-service education, and inadequate and ineffectual teaching practices. These researchers therefore recommended that in-service educators should restructure the teaching methods of the ACLS courses, offer up-to-date ACLS simulation courses every six months, and present refresher courses on a routine basis.

Moule and Knight (1997:99) investigated the teaching of BLS and CPR skills by teachers responsible for the Diploma of Higher Education in Nursing Studies referred to as *Project 2000* and the retention of BLS skills by a select group of British student nurses. The study sample comprised 24 randomly selected term-one students. These students were firstly given a pre-test questionnaire that was based on the content of the **ERC BLS** guidelines, and they were then observed while they performed a variety of techniques on a practice manikin during a practice session. The competence and efficiency of the students were then immediately tested, and the competency levels were set at 70% (as recommended by the ERC CPR instructor's guide). The findings obtained by Moule and Knight (1997:104) revealed that although the theoretical knowledge of the students had improved, they had failed to achieve a uniformly high standard of CPR skills. It was clear that these students needed more practice sessions in which to improve their CPR skills. Moule and Knight (1997:105) concluded that more teachers needed BLS and ALS teaching skills because this would:

- raise the confidence of the teachers
- stimulate their creativity and make them more adventurous in presenting content

- enable them to be effective team leaders in a cardiac arrest simulations
- exemplify the qualities that are required for efficient teamwork
- contribute to the establishment of a safe and efficient environment and heightened standards of patient care
- enable the authorities to offer BLS skill courses to members of members for the wider public

Badger and Rawstone (1998:231) undertook a study related to the Project 2000 pre-registration diploma course in the UK, that described the performance of student nurses from the three branches of nursing in BLS skills (namely, the adult branch, the child branch, and the learning disability branch). Convenience sampling was used to select the 35 students who were then individually assessed by means of their individual performances on a Laerdal skillmeter Resusci-Anne manikin. The “Little Anne” manikin is a realistic, inexpensive, and lightweight adult CPR trainer with all the essential features that are required for adult CPR learning. The students were also assessed in terms of the guidelines of the ERC. The results revealed that, out of a sample of 35 students, only two were able to achieve the 75% requirement for compression and ventilation rates correctly. Badger and Rawstone (1998:231) suggested that there was an urgent need for the reassessment of the strategies that were being used for teaching resuscitation because these students were being licensed by the Nursing Council of the UK to practise with at least some degree of effectiveness in real-life situations once they had completed their training.

Kaye and Mancini (1998:177) offer various suggestions for improving cardiac arrest outcomes. They begun by a questioning the appropriateness and effectiveness of the current BLS programmes and then made concrete proposals for improving the effectiveness of the existing programmes. One of their findings was that the basic knowledge and skills that are necessary for CPR remained poor in whatever population they evaluated – whether the population concerned was the general public, medical staff or nursing personnel. They suggested that resuscitation education programmes could be significantly improved by:

- the teaching of CPR by means of peer training
- self-instruction delivered by means of video

- self-instruction that included practice with a manikin
- interactive computer-based video lessons

Kaye and Mancini (1998:177) recommend that the teaching of BLS and ACLS curriculum be simplified to include the minimum amount of knowledge and skills that are required for saving lives. They also suggest that the teaching strategies be simplified so that retention can be improved. It is also their opinion that the deficiencies of the initial training course be addressed in the syllabus content of the six-monthly post-training refresher courses that are offered to nurses after they have qualified.

The research undertaken by Kerridge, Pearson, Rolfe, Lovie and Mphoe (1999:239) investigated the extent of CPR knowledge and the attitudes towards CPR of a selection of health care personnel. It was the purpose of their research to determine the extent to which *written information* about CPR can improve the knowledge of participants and affect the quality of the choices that have to be made during emergencies. The sample of this study, which was undertaken in a tertiary care hospital in Australia, comprised 148 doctors, 312 nurses, 51 allied health professionals and 260 eligible patients. The researchers used a questionnaire and survey to collect the necessary data. Their results showed that 58% of patients in Australian teaching hospitals had a poor knowledge of CPR and that 64% of hospitals entertained unrealistic expectations about possible success rates. The study revealed that the health care professionals in the study vastly overestimated the success rates of CPR. Another finding was that patients and health professionals in the study demonstrated an increased preference for CPR during emergency situations after they had been exposed to a one-page information pamphlet about CPR. The researchers therefore concluded that if health care professionals were to make better informed autonomous judgements about CPR, they needed to be better educated about the risks and benefits of CPR.

The research of Delvin (1999:201) compared the BLS skills of nurses in an independent hospital to those of nurses employed in a public hospital in the UK. The researcher made use of an exploratory survey design to investigate the BLS skills of trained nurses from different grades. The sample consisted of 150 nurses. This figure included including 50 ward sisters, 50 staff nurses and 50 enrolled nurses selected in equal numbers from the medical and surgical wards of the hospital. The practical assessment of the BLS skills of

each participant lasted for two minutes (two minutes is regarded as an adequate time for the accurate assessment of competence in BLS). The results showed that *no subject was able to adequately perform all BLS skills* – and that the skill which was least adequately performed was chest compressions. The author recommended that nurses not only needed to be able to perform individual skills competently and in the right order, but also that they needed to be able to modify their performance in response to changes or the absence of changes in a patient's condition.

One of the points that Delvin (1999:201) noted was that there were no significant differences between the scores of those who had most recently experienced resuscitation training and those who had not experienced any resuscitation training within the previous twelve months. Delvin proposed that refresher courses should be spent in identifying and correcting skill deficits rather than in mechanically reproducing the content of the original training material. Delvin also suggests that the standard training syllabus should focus more strongly on the achievement and mastery of practical CPR skills.

Nyman and Sihvonen (2000:179) assessed the BLS skills of a selection of student nurses from southern Finland and Hungary. The study was conducted in university hospitals and the participants were nurses and student nurses who were working in medical wards, emergency wards and emergency polyclinics. The demographic data was collected from questionnaires and skills were assessed by requiring students to simulate resuscitation procedures for four minutes. The researchers assessed the CPR skills under the following headings:

- the assessment of responsiveness
- head-tilting and chin lifting techniques
- the checking of the pulse
- the correct placement of the hand
- the rate of compression
- depth, ventilation volume and rate

The results revealed that only 16% of nurses and 41% of student nurses were able to check for responsiveness correctly. The final analysis of the results also showed that there was no relationship between CPR training and skills. There was also no correlation

between length of experience in the treatment of cardiac arrest or seniority in the profession and the ability to demonstrate superior CPR skills. This research confirmed that BLS skills were generally poor among nurses. The researchers therefore suggested that training designed to review CPR skills and identify deficiencies should take place far more frequently. The researchers also noted that it was important to motivate staff to practise their CPR skills as often as possible and to educate them about the importance of updating their CPR skills.

The research conducted by Davies and Gould (2000:400) examined the extent to which self-instruction could increase the extent to which nurses acquired competence in CPR skills in the UK. The purpose of the study was to assess whether a session devoted to *retraining* nurses in CPR (during which they would be given opportunities to practise by making use of a self-instruction programme without any additional formal instruction) would improve the CPR knowledge and skills of the participants in the sample. A representative sample of 21 adult student nurses was approached to participate in the study, and the effect of self-instruction on how competently nurses would be able to perform BLS skills, was tested by making use of a quasi-experimental design. The experimental group of students underwent self-instructed retraining in CPR with manikin practice after a pre-test to determine their pre-experimental competence, and their competence was tested again 30 minutes after the intervention. While the members of Control Group A was given an opportunity briefly to reflect on and discuss their CPR performance with their peers immediately after the pre-test, they were given no further opportunities to practise before the administration of the post-test. The ability of the members of Control Group B to undertake CPR with the manikin was only tested once the self instructed re-training had been completed. This group was included to determine whether the pre-test itself might exert an influence on the outcome of retraining.

Non-parametric statistical tests were utilised because the data at the ordinal level was not normally distributed. The results were considered to be statistically significant at the 0.05 probability level. The qualitative data obtained from the questionnaire was analysed by means of content analysis.

Evaluation was performed on the three following three elements:

- self-instructed retraining
- the handout
- competence testing

Twelve of the 14 subjects responded positively to the self-instructed retraining. These 12 subjects expressed the opinion that self-instruction gave them sufficient time to practise and consolidate the skills and information that they had acquired earlier in the programme. All of their comments about the handout were positive. They described the handout as up to date and full of information. Some of the subjects found the competence testing stressful because they being watched by other participants.

The results indicated that the subjects, who had received self-instructed retraining in CPR with manikin practice, demonstrated increased levels of competence compared to those subjects who had not received any training. Self-instructed training and updating could therefore be the most effective way of learning for those staff that have already been trained in CPR techniques and have already demonstrated their competence. Although self-instruction should not replace formal CPR training, the availability of an appropriate CPR manikin would allow staff to practise their CPR skills regularly and this would prevent the well-documented decline in CPR skills that resuscitators experience.

Bullock (2000:139) explains how to acquire and/or develop skills in resuscitation. He agrees with other researchers that retention of both the cognitive knowledge and the psychomotor skills that are necessary for resuscitation become significantly weaker after 4-6 months. He also insists that the development of CPR skills is essential for maintaining this vitally important skill in the professional life of nurses. The author delineates the following four-stage approach to the development of best practice in CPR:

- a very rapid initial demonstration
- a repeat demonstration that is accompanied by a commentary that informs learners about the rationale behind the actions that they are observing
- another repeat demonstration that is guided by one of the learners
- another repeat demonstration by a learner, and the provision of a space in which all the learners can practise the skills they have observed

It is Bullock's opinion that the use of these four stages of skill augmentation will exert a beneficial outcome on the standards of patient care.

Bullock (2000:139) reflects most of the format that Turner (1987:80) recommended to improve the retention of skills and to make performance congruent with best practice. The format recommended by Turner suggests that teachers of CPR:

- progress from the simple to the complex in their teaching
- teach the skills in the order in which they will be used
- teach only one skill at a time
- make use of continual reinforcement
- emphasise the primacy of practice over purely theoretical learning
- design course in such a way that it integrates cognitive and psychomotor learning
- encourage their students to make confident use of the skills they have learned

The study of Moule (2000:273) compares the different resuscitation guidelines on basic life support performance. This study was carried out in the UK with a sample of 24 nursing degree students who were chosen by means of random sampling.

The pre-test/post-test design was used and the data was analysed by using T-tests and Chi-square tests. The effectiveness of the statements published by the ILCOR for the purpose of developing BLS skills was measured by making use of a sample of 24 nursing degree student nurses (Handley, Becker, Allen, Drenth, Kramer, Montgomery 1997:2174). The findings that emerged were compared with the results of earlier research undertaken by Moule and Knight (1997:99) which assessed the effectiveness of the ERC Guidelines with a sample of 24 nursing diploma student nurses. The degree students achieved significantly higher pre- and post-test scores and obtained higher scores for achieving expired air ventilation and external chest compressions than those achieved by the diploma students in the previous study. These findings about the 1997 ILCOR statements have been taken into account by health care professionals as they develop and design BLS skills courses.

Hammond, Saba, Smiles and Cross (2000:99) investigated the extent to which registered nurses who had successfully completed the two-day ALS course 18 months earlier were

able to retain their theoretical knowledge and clinical skills, and this information was used as a basis for establishing optimal retesting timeframes. The study was conducted in Australia and the study design repeated a post-test measure design. Forty registered critical care nurses participated in this study. The data was collected during ALS retesting by making use of the scores from the theoretical examination and from the measurement of four practical skills (BLS, airway management, defibrillation and code management). The data was then analysed by using the Wilcoxon test that compared the participants' original scores which had been obtained in the training programme. The findings demonstrated that the participants' theoretical knowledge remained unchanged over the intervening 18 months. Although 75% of participants passed the practical skills assessment test, 25% required a second attempt to pass. The authors suggested that additional research was required to determine the optimal timeframe for ALS re-testing and the educational strategies that would help to retain skills over time. These results were congruent with the findings of those of O'Steen et al (1996:66) in the USA.

The research of Young and King (2000:7) explored ALS skills and knowledge retention in a sample of registered nurses during the six to twelve weeks after an in-house ALS course. The study was conducted in the United Kingdom, the design used was quantitative and the data was collected by using a structured interview schedule and a structured observation tool that was based on the ALS course syllabus, in accordance with the guidelines set out by the Resuscitation Council of the UK. The sample comprised 10 registered nurses who had successfully completed the in-house ALS course and who were interviewed in the six to twelve weeks after the course. Data was collected by simulating the scenario on the skill meter Resusci Anne. Descriptive statistics such as percentages, frequencies, means and medians were utilised to compare the nurses' scores for theoretical knowledge and practical skills at six weeks and at twelve weeks. The results revealed that the ALS total scores declined to below 84% within the first six-week period following the completion of the ALS course for six of the ten subjects. The authors concluded that factors such as the duration of the ALS course, and the use and practice of resuscitation skills need to be considered as potential causes of this decline in ALS scores. The findings of this research also support the use of techniques that will allow nurses to utilise their skills more effectively by using automatic external defibrillators.

Nurses receive the same basic life support training as lay people. Leah (2001:42) is of the opinion that the guidelines that are used for resuscitating clients in the community are not appropriate for hospitals. Leah points out that a cardiac arrest that occurs in a hospital is different from one that occurs in a community in a number of ways. If a patient remains unresponsive in hospital, for example, nurses are, in most cases, the first people to respond to the emergency while another nurse is nearly always available to summon medical help. A cardiac arrest can also be more readily identified in a hospital and can therefore be immediately treated since most hospital patients remain under close observation and monitoring. Leah suggests that what is needed is a different algorithm that is tailored to the realities of the typical clinical situation. She also recommends a “tiered” approach to teach in-hospital resuscitation. The most advanced training tier (in this case) would be dedicated to senior nurses and junior doctors who are active in acute areas. The second tier would be designed for the remaining nurses. The last tier of training would be devoted to the training of paramedical and ancillary staff that would have to initiate a treatment response on those rare occasions when they witness a collapse in a non-clinical area of the hospital. The nurse educator must therefore be familiar with the activities and routines of each clinical area because this will help her/him to tailor the content of the course to the conditions that are typical of the clinical situation in which different trainees operate. This same issue of taking the realities of a particular clinical area into account was raised as a concern in the provision of CPR in a study that was conducted by Meerabeau and Page (1999:29) in the UK.

Nagashima, Takahata, Fujimoto, Suzuki and Iwasaki (2003:427) clarified a range of existing conditions and issues in the CPR education of nurses in Japan. They conducted their study in the Asahikawa Medical College Hospital in Japan with 304 participant nurses who supplied the raw data by completing carefully structured questionnaires. The results revealed that more than 80% of the nurses were “interested” in CPR. Most of these nurses had already been instructed in CPR when they were student nurses or after they had graduated. Surprisingly, however, only 40% of the nurses in this sample had witnessed any real-life cardiac arrest or any attempt to resuscitate a patient who had suffered cardiac arrest. Most of the nurses had never even heard of the guidelines for CPR and ECC in 2000. The study concluded that there was a need for nurses in Japan to be more thoroughly educated in the techniques and knowledge of CPR.

Barret and Squire (2004:39) assessed the frequency with which hospital staff of all disciplines used BLS skills. This study was carried out in the University Hospitals of Leicester in the UK. The hospital offers an extensive training programme in resuscitation by making use of both locally and nationally accredited BLS and ACLS courses. In addition to this, all staff members who come into contact with patients as part of their clinical duties are required to demonstrate, on an annual basis, a competency in resuscitation that is appropriate to their work area and function. The researchers developed a questionnaire to gather information about the BLS skills of the sample and whatever other information they needed about the treatment of cardiac arrest patients in the period prior to the research. They also compiled information about the most recent training session on CPR that members of the sample had attended and the BLS skills that they were using in their current positions – whether simply mouth-to-mouth respiration, or the use of a pocket mask or the use of a bag valve mask.

Out of 9 600 questionnaires that the researchers sent out, only 3 807 (40%) were returned. Among the nurses, 35% were qualified in BLS; 12% were unqualified in BLS; 9.4% were medical staff; 18.3% were allied health professionals, and 23% were administrative staff. Nearly half of all the respondents had never witnessed a cardiopulmonary arrest. The number of qualified nursing and medical staff who had attended CPR sessions and the median frequency of such events was less than one per year. Only 8.8% of the nurses and 24.7% of the doctors used chest compressions and ventilation techniques. The need for airway and ventilation management skills were highest among nurses (57.8%) and somewhat less so among doctors (47.7%). On the whole, however, 50% of the non-qualified nursing staff and 20% of the clerical staff perceived a need for airway and ventilation management skills.

In their discussion of the research results, Barret and Squire (2004:39) state that while most of the respondents had received resuscitation training (including training in mouth-to-mouth ventilation), the use of life support skills among the hospital staff in clinical practice varied greatly in practice. Of the 1270 patients who had suffered cardio-respiratory arrest between April 2001 and March 2002, only 2 (i.e. 0.17%) had received mouth-to-mouth ventilation. It should therefore be assumed that alternative methods of ventilation were available in the remaining cases. The study also revealed that while the use of BLS techniques was widespread among doctors and nurses, it was almost negligible among

clerical and allied health staff. The researchers recommended that far more attention should be paid to the ability of the organisation to respond to actual real-life emergency situations, and that the overriding emphasis should not simply be on the number of staff who have received teaching and theoretical training – a factor that has a little impact on favourable patient outcomes after cardiopulmonary arrest. The researchers therefore suggest that training should be directed mainly to the group of practitioners who have the greatest need of applying resuscitation skills in their clinical settings because this will make CPR training much more cost effective and will increase the number of patients who benefit from it.

Madden (2006:218) conducted a quasi-experimental study to investigate the extent to which Irish student nurses acquired and retained CPR cognitive knowledge and psychomotor skills in the aftermath of CPR training. This study was conducted in a general teaching hospital with 18 students who had been randomly selected. A quasi-experimental time series design was used together with pre- and post-testing within a single group.

CPR cognitive knowledge and psychomotor skills were assessed in this research on three different occasions. The CPR cognitive knowledge was assessed by means of a 21-item structured multiple-choice question that was based on the best practice and research accumulated by the AHA and the Irish Heart Association. The researchers assessed the psychomotor skills of the participants by structured observations of CPR performance on a Resusci-Anne Manikin. The accepted standard for a pass was set at 85%. The data were collected by administering a pre-test CPR training programme followed by a post-test. A re-test was then conducted after ten weeks had passed. During the pre-test, the students were subjected to a three-minute assessment of their psychomotor skills in the context of a simulation and the extent of their knowledge was tested by means of multiple-choice question tests. Descriptive and inferential statistics were then used to describe and elucidate the relationships in the data. The findings of this study were that the students in the sample were deficient in CPR cognitive knowledge in the pre-test phase despite having received CPR training only one year previously. A scoring system was developed for evaluating the CPR psychomotor skills of the students. The scoring system included penalty points for CPR skill errors.

Subsequent to the CPR training programme, the CPR cognitive knowledge of the students improved significantly – a finding that was consistent with findings from previous studies (Broomfield 1996:1016; Inwood 1996:33; Moule & Knight 1997:99). When it came to the CPR skills performance of the students, none of them was successful in achieving the pass standard (85%) in either the pre-test or in the re-test. It is also notable that skills such as ventilation volume and depth of chest compressions were poorly performed. The study also revealed that the students experienced a significant deterioration in their CPR cognitive knowledge in the ten weeks following their CPR training. This finding is similar to what was discovered in the research of Inwood (1996:33), Moule and Knight (1997:99).

Madden (2006:218) recommends that the acquisition and retention of CPR knowledge and skills depend on the training and frequency of CPR instruction. Madden is also of the opinion that nurse education should develop a model of best practice for CPR instruction and these structured programmes of BLS should occur on a regular and intermittent basis. Such continuing education will enable student nurses to become as competent and confident as they need to be in the event of cardiopulmonary emergencies. Madden (2006:218) also encourages all nurse educators to engage in a critical and ongoing analysis of all the current practices that comprise the CPR instruction that is offered to student nurses.

Strzyzewski (2006:10) has identified various barriers to CPR that have become evident when nurses attempt resuscitation. The main purpose of Strzyzewski's article was to encourage and assist nurses to become more competent in providing the interventions that patients need during the course of resuscitation. The plain fact is that cardiac arrests do not occur sufficiently regularly in real life for nurses to acquire the experience and confidence they need to perform these procedures with the utmost proficiency. Strzyzewski listed the following most frequently observed deficiencies during the administration of CPR:

- The failure to recognise a cardiopulmonary arrest when it occurs.
- The failure to act promptly and to call for help immediately.
- The failure to perform effective (correct) compressions and ventilations.
- The inability to anticipate what the next move should be.
- The failure to remain calm and focused.
- Not knowing where the necessary equipment is.
- The failure to keep skills and knowledge updated.

- The inability to recognise individuals' strengths and weaknesses.
- The omission of debriefing and problem analysis after CPR has occurred.

The studies set out in the table below are all recent contributions to research that describe, investigate and assess the knowledge and skills of practitioners of CPR.

Table3.1 Recent research studies that assess the knowledge and skills of practitioners of CPR

Authors and study	Methodology	Findings
Xanthos et al (2009:224).	<p>This research compares the resuscitation skills of two groups of nurses (comprising 108 nurses altogether) who participated in the study (BLS/AED course). While group A (n-54) consisted of nurses who were trained by doctors, group B (n-54) were trained by registered ERC nurse instructors. One month after the completion of training, all 108 nurses were re-evaluated by means of objective-structured clinical examinations.</p> <p>The participants were randomly divided into two groups and the data was analysed by means of the SPSS (Version 13).</p> <p>The Koimogorov-Smimov test and Fisher's exact test were used to analyse the categorical variables.</p>	<p>No statistically significant differences were found between the two groups in the written test. While the nurses in group A could easily identify a cardiac arrest incident, they experienced difficulties in carrying out the chest compressions and in using the AED properly. The nurses in group B were more focused in their performances. They used the AED more accurately and knowledgeably, and continued to perform CPR without delays. The nurse instructors proved to be more efficient than the doctors in transferring to nurses the competent practice skills that equipped them to provide dynamic, effective and adequate CPR.</p> <p>Xanthos et al (2009 224) therefore concluded that highly motivated and competent nurse trainers are quite capable of training nurses effectively in BLS.</p>
Edgren and Adamson (2009:e80).	<p>This research evaluated the performance of 32 student nurses (four nurses were assigned to each of 8 groups) in simulated CPR situations that made use of an AED and a VitalSim manikin in a video-equipped room 22 weeks after all the nurses in the sample had been officially certified as competent to administer CPR.</p>	<p>The researchers used a public access defibrillation tool to analyse the videos that showed how the nurses used AED in simulated crisis situations. They based their assessment tool on the lay CPR AHA-established guidelines. While all the groups correctly placed the AED on patients and were able to operate the AED correctly, none were able to perform the basic steps or the key component actions of effective CPR as defined by the AHA. About a quarter of all the nurses correctly initiated the chain of survival by calling a code.</p> <p>Edgren and Adamson (2009:e79) recommend, on the basis of the above findings, that all nurses be required to attend frequent CPR simulation scenarios as well as annual CPR refresher courses so that they will be able to maintain their mastery of the resuscitation skills and knowledge that are indispensable for successful CPR.</p>
Jensen, Lippert, Hesselstedt,	<p>This research set out to determine whether six months of clinical experience before</p>	<p>117 participants (76%) completed the study out of the 154 (64%) who had</p>

Authors and study	Methodology	Findings
Rasmussen, Mogensen, Jensen, Frost and Ringsted (2009:238)	participation in an ALS course would improve the immediate learning outcomes of newly graduated doctors and whether they would retain more of what they had learned in CPR training. The sample of recently graduated doctors was randomised into two groups. The control group participated in the ALS course immediately after graduation, and the intervention group participated in the ALS course between seven and eight months after graduation. All of the participants had gained some clinical experience through internship. The statistical analysis of results was performed by using SPSS (Version 13.0).	accepted (out of the original 240 who were invited). There were thus 61 newly graduated doctors in the intervention group and 56 in the control group. No statistical differences could be identified between the two groups with regard to the average grade obtained or the medical school attended or the situation of the training site. Likewise, no significant differences in ALS competency levels were detected. This study demonstrated that participation in a CPR course after six months of clinical experience exerted a definite effect on the retention of the participants' total amount of CPR knowledge and skills.
Verplancke, Paepe, Calle, Regge, Maele and Monseieurs (2008:76).	This research investigated the relationship between the quality of the BLS course and some of its potential determinants. 296 nurses from non-critical care wards completed questionnaires during a BLS refresher course and also supplied personal demographic data and a self-rated self-confidence score. The participants subsequently performed a BLS test on a manikin that was connected to a number of personal computers that were loaded with skills-reporting software. This software was able to record the number of ventilations per minute, the tidal volume, the number of compressions, as well as the rate and depth of compressions. Statistical analysis was performed by means of SPSS (Version 12.0). Chi-square tests and Fisher's tests were used on categorical variables and the Mann-Whitney test was used for continuous variables.	Forty three% of the nurses rated their confidence as "good" or "very good". Males were better in applying correct compression rates. Greater levels of self-confidence were significantly associated with better ventilation procedures and a sufficient number of compressions. The variables that were thus associated with a better quality of BLS were greater self-confidence, male gender, and recent participation in BLS and CPR training. Verplancke et al (2008:79) therefore also suggest that frequent refresher courses would serve to improve the self-confidence of CPR practitioners and enable them to provide better standards of BLS.
Regge, Calle, Paepe & Monsieirs (2008:283).	This research compared the performance of nurses who participated in <i>individualised</i> BLS refresher training courses (one instructor to one trainee – the IT group) with a group of nurses who participated in <i>group</i> BLS refresher training courses (one instructor or groups of six trainees – the GT group). All of these nurses came from non-critical care wards. A total of 120 nurses were randomly selected to participate in either individual training courses or group training courses. The CPR skills of each of the participants were assessed on three separate occasions, namely: (1) three minutes prior to the BLS training, (2) immediately after the training had occurred, and (3) ten months later. The researchers used a computerised manikin and analysed the data that they collected by means of SPSS (Version 16.0). Continuous variables were assessed by means of the Mann-Whitney U-test and categorical	No differences were detected in the overall skill acquisition and skill retention abilities of the participants in the IT group and GT group either immediately subsequent to the training course or 10 months after the training course in BLS had been completed. There was, however, a wide variability in the skills of the nurses before the refresher training was administered. It was also noted that individualised training reduced the training time of individual nurses to 20% of the time it required to train nurses in the group training.

Authors and study	Methodology	Findings
	variables by means of chi-square tests or Fisher's Exact test.	
Miotto, Couto, Goulart, Amaral and Moreira (2008:244)	<p>This research set out to determine whether or not the use of live actors to increase the reality and verisimilitude of the training scenario would improve the knowledge retention rates of the participants who had attended an ACLS course.</p> <p>19 ACLS courses were divided at random into two groups. While group A used conventional manikins <i>together with live actors</i>, group B only made use of conventional manikins in their training. A total of 435 healthcare providers from different specialities were allocated at random to either group A or B. The participants' theoretical knowledge was assessed before the course, immediately after the course, and six months later. The live actors performed various actions and vocalisations to create more humanly realistic scenarios.</p> <p>The data was analysed by means of descriptive statistics and the continuous variables were analysed by means of t-tests, ANOVA and the Kruskal-Wallis test.</p>	<p>The findings of this research were that the use of live actors exerted no effect on the knowledge retention rates of the participants in the two groups. The variables that were associated with the worst scores and the lowest levels of knowledge retention were age (older participants) and the length of the periods that had elapsed since the participants had graduated.</p>
Castle, Garton and Kenward (2007:664)	<p>This research compared the degree of BLS confidence in participants with the degree of competence displayed by a sample of qualified nurses, doctors-in-training and healthcare assistants subsequent to a structured CPR training. A structured questionnaire was used to gather data from 60 participants (namely, 20 doctors, 20 registered nurses, and 20 health care assistants) about the extent of their exposure to cardiac arrest events, and Likert scales were used to determine individual levels of confidence about the performance of BLS. The competence of all the participants was assessed by using the in-hospital BLS algorithm that is explained by the Resuscitation Council of the UK. The data was analysed by SPSS (Version 13.0). Categorical data was compared by making use of Pearson's chi-square test.</p>	<p>The use of a structured resuscitation training programme improved BLS skills – particularly those of doctors. The confidence and competence of registered nurses improved in proportion to the amount of regular training they received. It was noted that while health care assistants performed poorly, they were over-confident and failed to be able to perform the required skills effectively during assessment. Only doctors demonstrated both confidence and competence.</p> <p>Castle et al (2007:664) recommend specific changes in training programmes in order to address these anomalies.</p>
Spooner, Fallaha, Kocierz, Smith, Smith and Perkins (2007:417).	<p>This research assessed the effects of continuous feedback from a manikin and that delivered information about the quality of chest compressions and the performance of ventilation techniques. One of the assumptions of the research was that instructor - facilitated CPR improves the acquisition and retention of BLS skills. One hundred first- year healthcare students were randomly divided into a standard group and a feedback group for training. The standard group were taught by an instructor who made use of a conventional manikin to</p>	<p>The most important finding in this study was that when objective feedback was obtained from a skill-reporting manikin, this significantly improved the acquisition and retention of knowledge about how to perform correct chest compression. It was also observed that this knowledge remained intact until even six weeks after the initial training. A significant deterioration in the retention of knowledge was, however, observed in the period six weeks <i>after</i> the initial training. During that period, the ability to perform the correct</p>

Authors and study	Methodology	Findings
	<p>teach the necessary skills. The feedback group used a skill-reporting manikin which provided continuous feedback about ventilation volume, the depth of chest compressions and the rate of compressions. Whatever additional feedback was offered by the instructors was included in the data. The extent to which skills were acquired was tested immediately after training and again after six weeks.</p> <p>The data was analysed by means of SPSS (Version 12.0). Comparisons between the assessments of the groups were made by means of Fisher's exact test or Pearson's chi-square test.</p>	<p>compressions and ventilations (even on the part of those who had been trained in the manikin skill-reporting group) fell below 50%. The authors suggest that alternative teaching methods such as those that utilise CPREzy voice prompts and that provide real-time feedback, could enormously improve the quality of CPR training.</p>
<p>Nikandish, Jamshidi, Musavifard, Zebardast & Habibi (2007:321).</p>	<p>This research evaluated the ability of 140 nurses to perform BLS in Iran. The performance of the nurses was tested on a resuscitation manikin by two examiners trained in BLS.</p> <p>The data was analysed by means of Microsoft's Excel program.</p> <p>56% of the participants had attended CPR courses during the previous six months</p>	<p>The result of this research revealed that the nurses' skills in BLS were inadequate despite the fact that 56% of the participants had received CPR training in the six months prior to the research taking place. It was noted that the areas in which the participants were weakest were in the administration of chest compressions and mouth-to-mouth ventilation. The researchers recommended that the nurses be taught to insert the laryngeal mask airway so that the patient's breathing can be facilitated.</p>
<p>Gombotz et al (2006:416)</p>	<p>The study undertook a retrospective auditing of the first 500 in-hospital cardiac arrests in non-monitored areas that were initially treated by registered nurses who were trained only in the use of an AED. The research was undertaken in Austria between 2001 and 2004.</p> <p>Statistical analysis was carried out by means of the Kaplan-Meier log rank test and Cox proportional hazards regression tests.</p> <p>A total 439 (88%) cardiac arrests were evaluated by making use of the Utstein style of data collection. The nurses performed resuscitation and defibrillation before the arrival of the CPR team for 47% of the patients in the study.</p>	<p>The audit revealed that 58% of patients returned to spontaneous circulation, that 28% were eventually discharged from hospital, and that 22% were still alive six months after discharge.</p> <p>This observational study supports the assertion that first-responder resuscitation (performed by nurses in whatever place they happen to encounter the cardiac arrest patient in the hospital for the first time <i>before</i> the arrival of the CPR team) significantly improves the patient survival rate. Among resuscitated patients, the survival rate was higher among patients who had ventricular fibrillation and ventricular tachycardia than among patients who were defibrillated at a later stage.</p> <p>From this information, Gombotz et al (2006:416) draw the conclusion that many unnecessary patient deaths occur after sudden cardiac arrest events wherever proper in-hospital facilities and resuscitation programmes are not functioning smoothly and effectively.</p>

3.19 PERCEPTIONS OF CPR AMONG NURSES

Page and Meerabeau (1996:317) conducted a qualitative study in the UK that consisted of serial debriefing interviews with professional nurses following CPR episodes. The main purpose of this study was to illustrate and provide examples of the complexities that are involved in the provision of CPR. The researchers conducted debriefing sessions that ran for a maximum of 45 minutes each with staff nurses and student nurses who had very recently been involved in CPR episodes. The researchers collected the data over a period of six months. They derived the theory that guided their debriefing procedures from educational literature about experiential learning and reflective practice. The researchers could identify no relationship between the CPR that the nurses had been taught in workshops and other programs and the actual realities of practice that they encountered in real-life CPR attempts. The researchers also noted that all the participant nurses were exposed to high levels of stress and anxiety that were caused by the complexity, unpredictability and the exacting demands of the CPR procedures. The nurses were also of the opinion that because their knowledge, skills and experience were so rigorously tested by the demands of the CPR procedures, it was inevitable that these factors would impact heavily on patient outcomes. Page and Meerabeau (1996:317) came to the conclusion that the following factors are mainly responsible for undermining CPR outcomes:

- high levels of anxiety on the part of resuscitators
- nurses who are inadequately prepared to cope with the harshness and unpredictability of the real-life circumstances in which CPR is administered
- the inadequacy of the coping mechanisms of individuals who undertake CPR
- the extreme pressure on resuscitators to obtain a favourable result and so to save the patient from the possibility of imminent death

Page and Meerabeau (1996:317) therefore recommended that the extent of the emotional stress that has to be endured by nurses during CPR be specifically recognised in practice and in the design of CPR training classes. They also recommend that all nurses be required to attend debriefing sessions after CPR, and that teaching be explicitly contextualised to incorporate the harsh realities and uncertainties that nurses had to cope with during the administration of CPR in real-life situations. The recognition of these problems and dynamics would, in the opinion of the researchers, ultimately result in

improved CPR outcomes. The researchers also emphasised that if CPR and trainers failed to recognise the effect of emotional stress in the performance of CPR, the amount of stress and anxiety that has to be dealt with will increase in intensity and will ultimately compromise the ability of nurses to act efficiently and correctly, and that will distort their memory of what they have already learned. More contextualised teaching and clear examples from real-life experiences will, in their opinion, enable untrained nurses to learn vicariously from nurses who have already participated in resuscitation attempts.

Pups, Weyker, & Rodger (1997:59) explored the perceptions and reactions of nurses after participation in CPR. The study took place in a large urban hospital in Wisconsin in the USA, and all the participants were registered nurses in the employment of the hospital. The researchers collected qualitative data by asking open-ended questions and conducting a brief interview with each participant. They then analysed the data by using a process of thematic analysis (Lincoln & Guba 1985). The majority of the respondents from the sample felt that the CPR experience was *demanding, frustrating, overwhelming* and *stressful*. Some of the nurses attributed their stress and anxiety to a lack of equipment, to the state of disorganisation that characterised CPR procedures, and to various ethical dilemmas. Pups et al (1997:59) therefore recommended specific remedial interventions such as the provision of peer support, debriefing sessions with peers, the establishment of a supportive environment that would be characterised by a positive and enthusiastic team spirit, the procurement of all necessary CPR equipment and technology, and the meticulous maintenance of all such equipment so that all those who needed to apply CPR could perform their function in a generally supportive and professional working environment.

Table 3.15 summarises the findings of a recent study into a sample of nurses' perceptions with regard to the defibrillation process.

Table 3.15 A summary of a recent study on how nurses perceive the defibrillation process

Authors	Methodology	Findings
Dwyer et al (2007:272)	This study undertook to investigate the attitudes of rural nurses to the defibrillation process as part of a contribution to the development of nurse-initiated defibrillation programmes in Australia. The study population consisted of a selection of registered nurses who worked in acute care hospitals in Queensland. The researchers applied stratified sampling techniques to the 436 registered nurses who participated in the study. The data was collected by means of questionnaires that elucidated the attitudes of nurses to the initiation of the defibrillation process. The data was analysed by means of SPSS (Version 12.0). Descriptive statistics were used to analyse the socio-demographic data and t-tests were applied where necessary.	The results of the study revealed that those nurses who were authorised to initiate defibrillation were far more positive in their perceptions of defibrillation than those nurses who were not authorised to initiate the defibrillation process. The study also revealed that nurses in the latter group (i.e. those who were <i>not</i> authorised to initiate defibrillation) were far more concerned about learning what they could about cardiac rhythms, about the possibility of providing grounds for litigation against themselves and the hospital, and about the possibility of harming either themselves or the cardiac patient. This study also provided evidence of the fact that many nurses are reluctant to embrace the role of defibrillators. Dwyer et al (2007:272) concluded that if expertise in defibrillation were to become a compulsory part of the education of all nurses, the difficulties that nurses experience with regard to defibrillation could be openly discussed and addressed during the course of nurse education. Such a requirement would forestall the current difficulties that many nurses experience in the attitudes to defibrillation.

3.20 BARRIERS THAT HINDER THE EFFICIENT APPLICATION AND PERFORMANCE OF CPR

Clinical judgement is a nurse competency that enables nurses to assess the actual and perceived barriers that hinder nurses in their performance of CPR. Chief among these hindrances is the stress and anxiety that is evoked in many nurses when they are required to perform CPR. The performance of CPR – even when the patient concerned responds well to the application of CPR and is ultimately discharged from hospital – is always an event that induces varying degrees of stress and anxiety in all resuscitators (Pups et al 1997:59). According to Misko and Molle (2003:292), the three most commonly recurring words that staff nurses use to describe CPR are: *scary*, *intimidating* and *overwhelming*. Although a lack of the necessary knowledge and skills are always presumed to be the major barriers that hinder the proper performance of CPR, it should also be appreciated that heightened degrees of stress and anxiety, deficiencies in teamwork and leadership, and the negative attitudes on the part of members of the team also function to reduce or negate the effective performance of CPR. In the paragraph and table that follow, literature examining the effect of stress on those who perform CPR on demand.

3.20.1 Stress

Participation in medical emergencies such as CPR increase the instinctive flight-or-fight response that are automatically generated in human beings who are under extreme pressure, and this instinctive reaction contributes substantially to creating and maintaining dysfunctional levels of stress and anxiety in health care personnel who are required to deal with life-threatening emergencies. Other factors that also contribute to creating and maintaining high levels of stress in emergency situations include organisational deficiencies and problems as well as a variety of technical and environmental factors (Laws 2001:76-81).

Badger (1996:26) explains how it is possible to control and overcome one's fear of codes if it is part of one's responsibility to react to them. A *code* is a form of emergency message that is broadcast in a hospital in order to inform an emergency care team that a particular type of emergency has occurred somewhere inside the hospital. In some healthcare facilities, *code blue* is the name given to the oral announcement that informs the emergency team that a patient has gone into cardiac arrest somewhere in the hospital and that he or she requires immediate and urgent CPR (Stedmans Medical Dictionary for the health professions and nursing 2008:331). Badger (1996:26) attributes the high level of stress that nurses experience to their instinctive feeling that they are responsible for the welfare of dying patients and their concern that any kind of fundamental error during the administration of CPR might well result in the death of a patient. Such feelings of the stress and anxiety are obviously enormously magnified in nurses who find that they are unable to operate the equipment at their disposal during some emergency because the equipment has not been properly maintained, serviced and periodically certified as being in good working order and ready for immediate use. Novice nurses who are called upon to perform in code situations are subject to additional stress and anxiety because their lack of experience, knowledge and their perceptions of the difficulties inherent in code situations increase their levels of fear during CPR. Badger (1996:26) suggests that the following measures be adopted to address and diminish the prevalence of these fears:

- All nurses should be compelled to attend periodic CPR refresher courses.

- All nurses should participate in simulated resuscitation exercises with state-of-the-art mannequins in order to improve their clinical skills and their levels of self-confidence.
- All members of emergency response teams should be carefully briefed about team procedures and protocols and thoroughly debriefed after emergency events. Each member of the team should also be prepared for their responsibilities by being made aware of exactly what is expected from them in any emergency situation.
- All nurses should attend workshops in which they are carefully rehearsed in the stages of emergency situations by means of discussions, guided visualisations and actual practice with CPR manikins.
- All nurses should be familiar with every piece of technology and equipment that is stored on the emergency trolley as well as of the function and role of the defibrillator in CPR.
- All health-care personnel who have been exposed to successful or unsuccessful attempts to resuscitate a patient should be compelled to participate in structured post-resuscitation conferences so that they can be debriefed. By attending such conferences, the amount of anxiety that is being generated in CPR participants will be substantially reduced or even more or less completely negated.

Badger (1996:30) only opinion is that it is possible to enhance the performance of CPR if nurses or talk to apply sound judgment and critical thinking to the stressful events of their everyday practice. The research undertaken by Laws (2001:76) examined the perceptions of stress on the part of critical care nurses following CPRs in hospitals. This research was conducted in Adelaide, Australia, and the participants were all nurses working from coronary care, general recovery and cardiac care units. All of the participants were registered nurses who were practising in critical care units in which all patients were kept under continuous close observation. The majority of the participants in this research admitted that they experienced CPR as a critical procedure. Those participants who had recently experienced CPR for the first time explained how the stress that was generated during CPR actually interfered with their ability to perform a variety of essential tasks. Other participants who had repeatedly been exposed to CPR procedures over a long period of time explained that their experience had increase their sense of *being in control* both prior to and during the performance of CPR.

The participants suggested that the introduction of the following measures would reduce the anxiety associated with the performance of CPR in hospitals: the establishment of lower staff-patient ratios, the continuous reinforcement of skills in co-workers; improvements in the quality of in-service education, a commitment on the part of the hospital to making quality CPR equipment and technology readily available and accessible wherever it might be needed for the treatment of life-threatening emergencies, and improvements in the quality of communication between the medical staff and nurses. Participants in the study also suggested that nurse educators and managers should take responsibility for the health problems of their employees and for measures that would ensure their safety so that the working conditions of those who are required to perform CPR would not generate increased levels of stress and anxiety. It is clear that these suggestions are similar to those suggested by Badger (1996:26), namely, that repeated exposure to both real and simulated CPR procedures and improved communications during implementation of CPR would reduce the levels of stress and anxiety experienced by nurses.

Cole, Slocumb and Mastey (2001:281) have developed an instrument to measure the post-resuscitation stress levels of critical care nurses that is based on the implementation of a selection of psychometric parameters. According to Cole et al (2001:281), the source of the anxiety in critical care nurses arises out of the stress generated by a conflict within the individual himself/herself or by a conflict between the individual concerned and some other source. One of the ways that was devised by Cole et al to measure post-resuscitation stress was by identifying the conflicting emotions and expectations that arose in resuscitators after failed resuscitations.

Cole et al (2000:281) developed an instrument with 47 items to measure degrees of stress. They tested this instrument by selecting a convenience sample of nurses from four hospitals in the north-eastern part of the USA, and collected the required data by posting the questionnaires ten days after the first post-resuscitation stress scale.

Although the results made it clear that the critical care nurses in the sample did indeed experience post-resuscitation stress, it was felt that further research was needed to establish norms for identifying the actual amount of stress that was experienced by critical care nurses. On the basis of the findings of this study, the post-code stress scale devised

by the researchers shows a definite promise of being able to measure the amount of stress and is experienced by the critical care nurses. Cole et al (2001:281) also provided detailed discussion of how the stress and anxiety that is routinely associated with failed resuscitations or delays in initiating resuscitation responses in a time can become a cause of fundamental frustration, anger, guilt, helplessness and a sense of professional failure in emergency care personnel. In response to ever-increasing amounts of stress and anxiety and deeply disturbing experiences, many nurses may even unconsciously resort to restructuring their role expectations and decreasing their involvement in their clinical roles by distancing themselves from their involvement in the very emergency situations for which they are responsible. Cole et al (2001:281) note the extremely high incidence of stress and anxiety among nurses, and they recommend that nurses should alert their hospital administrators or their colleagues to the need for professionally designed interventions such as debriefing and counselling sessions conducted by professional counsellors. Such measures will undoubtedly improve the stability and satisfaction of nurses who work in hospitals and will also improve productivity, job satisfaction and staff morale. The study summarised in table 3.16 provides a detailed explanations of the importance of debriefing.

Table 3.16 A study that explains the importance and necessity of debriefing

Authors	Methodology	Findings
Drotske and De Villiers (2007:17a)	<p>This study undertook to investigate the quality of the debriefing that was offered to nurses after their last participation in CPR.</p> <p>Twelve nurses from the accident and emergency department of a hospital were selected to participate in this qualitative study in South Africa.</p> <p>The researchers collected their data from the number of semi-structured questions that were posed to each of the nurses in the sample.</p>	<p>The results of this study indicated that nurses entertained mixed feelings in the aftermath of a resuscitation event. Although none of the participants actually felt guilty after a failed resuscitation attempt, the majority of the nurses in the sample experienced symptoms of anxiety. Three of the participants experienced, for example, the range of emotions associated with anger, hatred and heartache (sadness). It was the opinion of the participants in this study that debriefings and/or post-resuscitation discussions should create a safe space for the expression of candid opinions about personal and collective “short-comings” and whatever “desired improvements” might achieve better CPR outcomes.</p>

3.20.2 Perceived barriers and needs

Hemming et al (2003:254) conducted a study whose purpose was to identify the barriers and obstacles that nurses perceived to hamper and obstruct their effective functioning during CPR. The study was undertaken in a large university hospital in the United States and both acute and non-acute units were chosen as the locus for the research. The sample

consisted of thirty registered nurses who had previously participated in CPR. The research design included exploratory, descriptive and open-ended questions for the generation of the data that was needed for analysis. Data was collected from interviews with the participants and a content analysis was performed to analyse the data. The responses of the participants to questions about the perceived barriers that ended the effectiveness of CPR produced the following six conceptual themes:

- the inexperience of particular individuals
- the presence of too many operators during a resuscitation attempt
- the role played by personal emotions
- a lack of clarity about personal and professional roles
- the difficulties presented by an inability to metabolise stress and anxiety
- the problems generated by feeling inadequate
- the importance of ethical considerations in resuscitation attempts

To overcome the barriers that diminish the efficiency and confidence of participants, Hemming et al (2003:258) suggest the adoption of the following measures:

- frequent periodic reviews of the state of readiness of all necessary equipment
- the availability of emergency medications
- frequent retraining for nurses and other health care personnel in CPR knowledge and skills
- workshops on issues related to death and dying
- workshops that train nurses in how to manage their personal stress levels
- the necessity for reviews and debriefings after cardiac arrest incidents
- the organisation of periodic simulations in workshops so that nurses can practise their skills and refresh their knowledge about CPR

Kavari and Keshtkaran (2005:1) conducted a survey in Iran to assess the problems that nurses experienced during the performance of CPR. The participants in this research were 68 registered nurses who worked in ICU and A&E units, and the data was collected by means of questionnaires. The results of the study revealed that the following factors all contributed to undermining the efficiency of nurses during the performance of CPR:

- working hours that were far too long for the maintenance of optimal readiness
- a lack of motivation on the part of nurse supervisors
- the necessity of having to cope with large amounts of stress and anxiety
- the lack of the kind of self-confidence that all nursing staff require in order to perform effectively
- inadequate theoretical and practical preparation
- the confusion and low morale caused by poor communications among colleagues
- the absence of essential equipment for the administration of CPR

Fifty four nurses (79.4%) felt that there was a decided gap between the ideals of theory and their application in real-life conditions. The majority of the nurses also felt that proper training, continuous education, a sympathetic attitude on the part of supervisors, and the provision and maintenance of adequate technological resources, would all serve to improve their motivation and hence their performance.

3.21 HUMAN FACTORS THAT AFFECT THE QUALITY OF CPR

Two indispensable conditions for collaboration are effective and honest communication and team-work. Collaboration involves carrying out intra-disciplinary and inter-disciplinary work with colleagues (Curley 1998:66). CPR is dependent on team effort because several health care workers are needed to coordinate activities and to ensure an optimal team effort (Marsch, Muller, Marquardt, Conard, Tschan & Hunziker 2004:51). According to the AACN Synergy Model for Patient Care, *collaboration* is defined as the activities that a nurse performs together with her/his colleagues in order to promote optimal outcomes for patients. The patient, the members of the patient's family and professionals from a variety of other health care disciplines all work together to promote optimal and realistic patient goals (Hardin & Kaplow 2005:6). Collaboration during CPR reinforces the effectiveness of team work and increases the likelihood that the outcomes for the patient will be positive and life-affirming. Collaboration can take any of the following forms: nurse-physician, nurse-nurse, nurse-respiratory therapist, and nurse-dietician (Hardin & Kaplow 2005:75). All members of a team share the responsibility for providing safe holistic care for all clients (AACN 2003:[2]). Ineffective or compromised collaboration efforts exerted negative effect on collegial relationships and diminish the quality and effectiveness of care that is provided

for patients (Hardin& Kaplow 2005:76). In the sections that follow, a variety of studies that have investigated the influence of team work, leadership, and the attitudes of health care professionals on the performance of CPR will be reviewed.

3.21.1 Teamwork

Meerabeau and Page (1999:29) studied a delimited series of CPR events in a trust hospital in the United Kingdom so that they would be able to analyse and reflect upon the kind of treatments that were being delivered in stressful situations that required prompt action and teamwork. They collected data from a series of debriefing sessions that they conducted with nurses in a cardiology ward following CPR events. The data they collected was derived from about eight CPR incidents over a period of six months in five debriefing sessions that involved seven staff nurses, seven student nurses and a registered nurse. Each debriefing session was conducted within 24 hours of the CPR event. One aspect of their debriefing process was to ask the nurses who were present at the resuscitation process to reflect on their practice and the performance of their actions with a view to effecting possible improvements in CPR practice.

Meerabeau and Page (1999:34) based their study on the advantages that can be derived from the kind of *teamwork* that enables resuscitators to deliver the highest possible standard of CPR in stressful emergency situations. A functional and efficient team is always led by a competent team leader whose responsibility it is to coordinate the management of the circumstances that arise during cardiac arrest situations and to assign various roles to the other members of the CPR team so that each member of the team will know exactly what to do in an emergency (even though all members of a CPR team are also trained to be sufficiently flexible to take on other roles in case of need). Meerabeau and Page (1999:34), quoting Cudmore (1996:750), note that if the members of a resuscitation team are completely familiar with what they are required to do, such *knowing* or understanding becomes a crucial factor in the successful management of cardiac arrest situations and is thought to exert a strongly positive influence on eventual patient outcomes. The debriefing sessions conducted by Meerabeau and Page(1999:34) elicited a great deal of data on the following topics, each of which is thought to exert a crucial effect on the efficiency of a team during a cardiac arrest situation:

- the power relations that prevail between doctors and nurses
- the presence or absence of qualities of leadership
- the quality and accuracy of communication
- an ability to identify areas in which competence is deficient
- problems related to the acquisition, storage, availability and efficient functioning of equipment
- the acceptance of professional accountability
- where is a means of assisting members of staff who perform adequately
- team members who exhibit a poor mix of skills

Meerabeau and Page (1999:40) concluded from their research that because CPR is an activity in which human lives depend, all health care professionals who are required to perform CPR in the context of a team need to:

- participate in regular training workshops in which their skills and knowledge can be reinforced
- have their roles clearly defined and delimited so that they will be able to function as effective members of the team

Cooper and Libby (1997:5) concur that because successful CPR is essentially a team activity, the members of the team should cultivate a multidisciplinary approach that is conducive to learning and the transfer of experiential knowledge.

3.21.2 Leadership

The research conducted by Cooper and Wakelam (1999:27) explored the connections obtain between leadership behaviour, team dynamics and task performance in CPR situations. They undertook their research in a 1300-bed district hospital in the UK. They selected an observational study design and derived their data from video recordings of 20 attempted CPRs, and collected their data over a period of 16 months from between June 1997 and October 1998. Only full cardiopulmonary arrests in which the resuscitation attempts lasted for more than three minutes but less than 19 minutes were included for the purposes of data collection. In the end, they collected organised and analysed data from video recordings of 19 cardiopulmonary resuscitation attempts.

Once the CPR team had completed their work, the researchers made comprehensive notes about all the verbal and non-verbal behaviour that they were able to observe, the timing of events, and the various tasks and actions that were performed. They then analyse their data by means of chi-square and t-tests. They also administered a leadership behaviour questionnaire to members of the team so that they would be in a position to understand how the team was structured and the kind of dynamics that prevailed within the team itself. They also measured the extent to which the leader of the team actively participated in a “hands-on” manner in the resuscitation tasks, the team leader’s previous training of ALS and the extent of the leaders’ experience of resuscitation attempts, and compared these measurements to predetermined leadership ratings. They found that if a leader adopted a “hands-off approach”, this was the most effective way for a leader way to perform his/her role. They found little improvement in leaders who had only one year of experience, while those who had accumulated three or more years experience were most likely to be effective in their role as team leaders. They also noted that training in ALS exerted no appreciable effect on leadership performances. The researchers recommended in conclusion that an emergency leadership training programme is essential for enhancing the performance of the leaders of emergency resuscitation teams and therefore of the other members of the team as well. They also noted that it was essential for leaders to adopt a holistic approach to the CPR process if they wanted to achieve the best results.

Marsch et al (2004:51) conducted a study in Switzerland to determine whether human factors affected the quality of CPR. The study was undertaken during an international congress for intensive care nurses. Participants were invited to attend a workshop that the researchers called a “medical simulation”. Teams comprising a doctor and two nurses were encouraged to register for one session of the simulation. No attempt was made to balance the teams according to the levels of pre-existing knowledge or skills on the part of the participants. The research unit was set up as an intensive care unit and a remote-controlled resuscitation manikin was used to assess the parameters. The participants were briefed about their roles: one nurse was selected to care for the patient, whereas the remaining participants were instructed to wait outside the room until they were called in to help.

A scenario involving a witnessed cardiac arrest was used and the participants were told to simulate the procedure they would use to treat a patient with myocardial infarction who had

developed ventricular fibrillation. The researchers analysed the data post-hoc by making use of video-taped recordings of the simulations. A technical and a behavioural rating scale were independently developed by the two researchers in order to assist them to analyse the data. A series of sixteen simulations were carried out to include all the nurses who had registered for the workshop. All the nurses who are included in the workshop had received special training in intensive care nursing. The technical assessment was predicated on the quality and correctness of chest compressions, the use of mask ventilation, and the way in which defibrillation was handled.

The results revealed that only six out of the 16 teams could be said to have performed a successful CPR and defibrillation. The debriefing session revealed that all of the participants had been previously involved in the treatment of a actual cardiac arrest patients. The participants were assessed on their technical skills, their behavioural attitudes such as their ability to transfer information transfer, their ability to distribute tasks in a rational way, their qualities of leadership and their ability to manage conflict. In their final analysis, the researchers made reference to the deficiencies and absence of structured leadership behaviour and their inevitable conclusion that this exerted a negative effect on patient outcomes. They also noted that the unsuccessful teams were unable to transfer their knowledge and skills to others were required them. These deficiencies in the ability to lead a team successfully obviously exerted a negative effect on patient outcomes. The researchers also observed that most of the members of the teams exhibited minimal levels of knowledge, skills, and experience in recognition of problems and in their ability to follow the CPR algorithm. The researchers therefore concluded that if CPR education is to be successful, all training in group behaviour and leadership skills should complement the knowledge of CPR algorithms that are taught in conventional courses.

3.21.3 Attitudes

Dwyer and Williams (2002:85) investigated the factors that could be associated with the participation of nurses in CPR. The researchers explained the attitudes of nurses from the theoretical perspective of the Theory of Reasoned Action and the Theory of Planned Behaviour) and used these theories in an attempt to explain how various factors affected the retention of CPR skills. The Theory of Reasoned Action and Theory of Planned

Behaviour are two influential theories that are used to explain various aspects of human behaviour.

The Theory of Planned Behaviour, which was developed from the Theory of Reasoned Action, contains the independent variable of *perceived behavioural control* (that is absent from the Theory of Reasoned Action). Perceived behavioural control deals with the degree of ease or difficulty that people experience when attempting to perform certain behaviours, and the effect that past experiences, knowledge, competencies, resources, opportunities and barriers exert on the performance of a particular task. Internal variables (such as attitudes/beliefs/perceived beliefs) and external variables (such as perceived control/behaviours) all need to be considered when interventions are being designed for the improvement of the CPR skills of healthcare professionals.

Dwyer and Williams (2002:85) made the following observations about how the attitudes, competence, confidence, perceived control and roles can affect the performance of CPR.

- Previous experiences of resuscitation, feelings of insecurity about how past cardiac arrest situations have been handled, and feelings of guilt, inadequacy, shock and grief can all influence the performance of CPR. From the point of view of the Theory of Reasoned Action, a positive or negative attitude towards the survival rates of in-hospital arrests determines the quality of a nurse's intention to perform any future CPR. This means that when a nurse *really* believes that CPR could make a decisive contribution to a patient's chances of survival, she will in all likelihood form a strong intention to initiate CPR and do whatever needs to be done when the need arises.
- Dwyer and Williams (2002:85) also noted that nurses are generally negative about the need to attend resuscitation training. The reasons for their reluctance may devolve on the perceived clinical credibility of the teacher, the particular style of the teaching methods and the general lack of enthusiasm of nurses towards any kind of clinical updating or refresher courses. The states that while Theory of Planned Behaviour nurses may not feel the need for regular CPR refresher courses to *increase* their competence, they may well believe in the need for regular CPR refresher courses to *maintain* their competence. Knowledge, confidence, skills, abilities and experience are all key determinants of perceived control. The researchers also recommend that if nurses are expected to perform leadership roles within cardiac arrest teams, they

should be properly trained and prepared for their responsibilities (Meerabeau & Page 1999:29).

Dwyer and Williams (2002:89) came to the conclusion that nurse educators should design new interventions that will address issues that arise from changing attitudes, that will reinforce skills and keep nurses abreast of the latest knowledge about CPR, and that will negate the feelings of inadequacy that nurses often feel because of the stress and anxiety induced by constant exposure to CPR events. The Theory of Planned Behaviour indicates that nurses might be happy to attend frequent CPR training sessions if they were convinced that their attendance would improve their professional abilities and if they believed that their peers actually wanted them to attend such sessions. Nurse educators and critical care nurses should serve as role models to encourage more junior nurses who are required to perform vital functions in a CPR team.

3.21.4 Motivation

Only nurses who are properly motivated to perform efficiently during CPR are likely to produce the desired outcomes. Table 3.17 summarises a study that explains the factors that influence motivation.

Table 3.17 Factors that influence the motivation

Authors	Methodology	Findings
Hopstock (2008:425)	<p>This study investigated whether Norwegian hospital personnel were adequately motivated to participate in CPR courses and whether their motivation correlated with other important factors that are characteristic of successful adult learning. The researcher selected Knowles's criteria for the implementation of successful adult learning to study the attitudes towards learning and participation among the hospital personnel who worked in the hospital in which the study was conducted.</p> <p>Hopstock administered a survey that measured learning motivation by means of the Motivated Strategies for Learning Questionnaire instrument, and administered this instrument to 361 hospital personnel before attending a CPR course.</p> <p>The researcher analysed the data by using SPSS (Version 12).</p>	<p>The results showed that the hospital personnel were motivated to learn about CPR. Those participants who worked in the high risk areas, and who had been prepared for the course by participation in their own decision about whether or not they would attend the course, were found to be more highly motivated to participate in CPR training than the other health personnel in the sample. Motivation correlates with various adult learning assumptions such as the assumption that a learner needs and wants knowledge. Motivation also correlates with the self-concept of learners, their readiness to learn, and their orientation to learning in general. The findings of this study support the assumption that CPR training should be based on the well-established principles of adult learning.</p> <p>There are also various other factors that may increase the motivation of adult learners to gain knowledge and retain skills. In the case of CPR, such factors include acknowledgement of the importance of CPR, recognition of the relevance of the participant's work environment and appreciation of the moral and legal responsibilities inherent in their job.</p>

3.21.5 Facilitation of learning as a need in the provision of CPR

The third need according to that must be fulfilled if nurses are to be in a position to administer effective CPR is the need for expert instruction, expertise and education (collectively referred to as *learning*). Only nurses who have learned everything that they need to know about the correct administration of CPR are in a fit state to administer CPR wherever it is required. This kind of learning is acquired through in-service education and training, the acquisition of the necessary knowledge and skills during a performance of CPR in actual real-life situations, an annual certification of proficiency in CPR, and participation in refresher workshops or classes. Additional expertise can also be acquired from innovative teaching methods and technology and education in how to practise advocacy and counselling on behalf of patients and their families.

A properly trained nurse will be able to educate a patient's family by giving them factual information about the real condition of the patient, the availability of treatment and

explanations about the policy of the hospital with regard to resuscitation (all of which should be based on the prevailing guidelines of the hospital concerned).

3.21.6 Innovative teaching methods as a response to diversity and their effect on the learning of CPR

Response to diversity is the ability to recognise, appreciate and incorporate the changes into the provision of care (Curley 1998:64).

Since recent technologies have an important role to play in resuscitation training, the use of these technologies at all levels of instruction should be encouraged. All new technologies that are designed for CPR should first be scrutinised and evaluated for suitability and practicability before they are accepted into the course content (Chamberlin & Hazinski 2003:11).

Moule, Gilbert and Chalk (2001:73) have noted how CD-ROMs have been used to teach BLS skills, to and how this method of teaching has introduced a paradigm shift into the delivery of essential nursing skills. The process took off when a certain number of subject specialists who were responsible for teaching BLS got together in a team to discuss the feasibility of using CD-ROMs for educating nurses. Among the problems that they discussed were the nature and needs of the target audience, the subject content, and the various methods that could be used for delivery, assessment and evaluation. The CD-ROM that they produced reflected the steps containing the European Resuscitation Council (1998) BLS algorithm. The designers of the CD-ROM also decided to encourage and stimulate critical thinking by including simulated practice scenarios and a flow chart. The designers concluded observing how effective their CD-ROM has been in replacing the standard BLS lectures delivered by the faculty. There have also noted how clearly and efficiently the CD-ROM is able to demonstrate the steps that comprise the CPR process. But Moule et al (2001:73) recommend that further evaluation and research are needed to gauge the effectiveness of the CD-ROM as a learning tool.

Just such an evaluation of the BLS CD-ROM as a learning tool was conducted in the study undertaken by Moule et al (2001:73). The aim of their evaluation was to measure the effectiveness of the CD-ROM as a learning aid, to explore the ways in which the students

mastered the skills and knowledge presented by the CD-ROM, and the opinions of lecturers about the use of the CD-ROM as a teaching aid (Moule 2002:163). The researchers selected three different university sites and 358 student nurses to participate in the study and planned the research project so that it would be completed in two stages. The first of these stages measured the effectiveness of the CD-ROM as a means for retaining the necessary knowledge and skills. In the second stage, the researchers evaluated the usefulness of the CD-ROM as a comprehensive resource for delivering BLS knowledge. In the second stage, the researchers also identified what both the students and lecturers thought about the use of the CD-ROM as a means for practising skills and reinforcing training. It was found that the CD-ROM was well received by both students and teachers. One of the overall findings of the study was that the CD-ROM was deficient in delivering the necessary learning resources and that it was particularly useful for reinforcing the confidence of students who needed to be sure of their ability to handle and operate various kinds of technology that are involved in the application of CPR.

But the study also revealed that lecturers had questions about how safe the CD-ROM would be if students were to rely on it completely to the exclusion of experienced human instructors. The reservations of the lecturers centred upon the fact that although it was undeniable that the CD-ROM was able to deliver all the necessary content, it made no provision for any assessment of students by the lecturers themselves. These lecturers also noted that the pre- and post-testing of competency skills were unable to indicate whether or not all students had actually actively used the CD-ROM. They also felt that the use of the CD-ROM would encourage some students to concentrate on outcome measures rather than using the resource to support a more comprehensive process of learning.

The faculty where Moule and Gilchrist's (2001:29) work has developed a BLS CD-ROM as part of a staff development project for a number of universities in the south-western counties of the UK. Their purpose in developing this CD-ROM was to put into effect a paradigm shift in the traditional method of teaching BLS by making the content of such lectures available to all the relevant health profession disciplines. The CD-ROM that they developed for this project made it possible for all students and staff who required instructions for BLS instructions to access the CD-ROM. Apart from all the necessary theoretical knowledge, this CD-ROM enabled staff and students to observe video demonstrations of best practice on video clips embedded in the CD-ROM. The researchers

evaluated the CD-ROM by means of a questionnaire and used a convenience sample of 26 diploma student nurses from the adult nursing branch. They found that these students valued the opportunity to learn at their own pace and that they were grateful for opportunities to practise their critical thinking skills and so enhance their learning through interacting with the scenarios that were presented on the CD-ROM. Responses from the students suggested that improvements could be made in the technical and presentational aspects of the disk. Other feedback from students suggested the inclusion of diagrams and an increase in the number of test-bank questions. The researchers suggested that their faculty should continue to evaluate and refined the CD-ROM for the purpose of improving student learning.

Peterson (2006:55) explains that computer-based training can be as effective as a traditional educational method for teaching CPR. The purpose of Peterson's web page (www.unmf.wisc.edu/clinicedu/clinical_policies.html) is to provide quality and innovative career and life-long learning opportunities for all members of the organisation's diverse clinical staff by offering them the use of the educational resources of the health education department of the University of Wisconsin Medical Foundation in the USA. This project was initiated in conjunction with the AHA and one of their most valuable contributions was to place the CPR education material on the AHA website (www.americanheart.org). In response to a variety of identified global and geographic challenges, the clinical staff educator at the foundation developed a staff education web page. Their web page features educational programmes that make use of PowerPoint presentations of heart and respiratory sounds, practice tests for CPR, and other health-related puzzles and tasks. The main target group of this project consisted of those staff members who were active in the provision of direct patient care and who needed the information and practice procedures in order to maintain their CPR certification. The web page was designed to provide up-to-date information for both clinicians with advanced skills and a great amount of experience as well as for clinicians with much less experience in providing CPR. It has been being noted that there was a growth in the use of the CPR page after the CPR web site was loaded onto the Internet. Apart from an increase in the number of visits to the web page, the overall improvement of the organisation's CPR compliance increased from 79.0% to 99.8% between 2001 and 2004. This dramatic improvement can be attributed to the accessibility of CPR materials, training modules and links to trainers who are accessible online. In following this method, the institution has benefited from low-cost and time-saving

technologies and has achieved the institution's raising the competence of those who perform CPR procedures.

In contrast to some of these findings, the research conducted by Makinen, Castren, Tolska, Nurmi, and Murola (2006:327) points out that distance learning cannot be regarded as a comprehensive substitute for traditional small-group learning experiences. Makinen et al conducted their study in Finland to evaluate the suitability of distance learning as a substitute for the more conventional group method of teaching CPR-defibrillation. All of the participants, who were nurses (N=56) who worked in a geriatric hospital, were randomly divided into three groups. These nurses were selected because they had received no previous institutional training in CPR-defibrillation. The 16 nurses in the first group were subjected to a traditional four-hour course before being given opportunities to practise in a hands-on sessions with a manikin. The second group of 20 nurses were taught by means of an Internet-based CPR-defibrillation course. This Internet-based course consisted of multimedia presentations that made use of video clips, pictures and a short written examination (their course lasted for between 15 and 30 minutes). The third group of nurses (N=20), who were given no specific CPR-defibrillation training, constituted the control group.

An Objective Structured Clinical Examination (OSCE) that made use of a manikin who had suffered a cardiac arrest, was administered two weeks after the completion of these training sessions. The results showed that nurses who were subjected to the traditional CPR-defibrillation course performed better than those who were instructed by means of the Internet-based course. The performance of the nurses who were instructed by means of the Internet course was similar to that exhibited by the control group. This seems to indicate that video instruction alone is not an effective substitute for hands-on practice when it comes to the mastering of CPR-defibrillation skills. The opinion of the researchers is that while the Internet-based interactive programs alone are quite adequate for the delivery of knowledge and information, a manikin is absolutely essential for practising the necessary CPR-defibrillation skills (Makinen et al 2006:327). The following study that is summarised in Table 3.18 gives details about this innovative teaching strategy.

Table 3.18 Innovative teaching strategy

Author	Methodology	Findings
Moule et al (2008:427)	<p>The researchers set out to investigate whether there were any significant differences between the skills and knowledge of a group that learned BLS and the use of an AED by means of e-learning and a group that learned the same skills by attending a traditional classroom in which the teaching was presented by qualified mental health care professionals. A non-randomised comparison study involving 83 health practitioners was conducted over a nine-month period. Twenty eight members of the sample completed the e-learning course and the remaining 55 were taught by means of conventional classroom teaching.</p> <p>The researchers then compared the skills and knowledge gained by the members of these two groups. While the e-learners completed the pre-test online, the classroom group took the pre-test under supervision. Both groups completed the post-test under supervision. The data was analysed by using SPSS (Version 12.0). Mean baseline and post-training scores for the classroom and e-learning group were compared by making use of Mann-Whitney U tests, Wilcoxon Signed Rank paired non-parametric tests, chi-square tests and Fisher's tests where appropriate.</p>	<p>All of the participants showed significant improvements in their BLS and AED knowledge following training. No differences were found between the basic resuscitation skills exhibited or the time taken to provide the first shock among the two groups.</p> <p>Some participants from both groups were, however, inaccurate in their placement of the electrodes.</p> <p>With regard to basic resuscitation skills or the time taken to provide the first shock, e-learners performed slightly better than those from the classroom group. The results of this research suggest that computer training might be more effective in developing some of the skills that are required for CPR and in the use of an AED than the conventional training methods that are normally used to train nurses and others health care workers.</p>

3.21.7 The role of simulation in the learning of CPR

The use of *simulation* in the context of clinical learning can be defined as an educational technique that enables interactive (and sometimes immersive) activities by recreating all or part of a particular clinical experience without exposing patients or learners to any risks (Maran & Glavin 2003:22). Simulation also provides opportunities for learners to practise individual skills and to integrate their knowledge, attitudes and skills repetitively in a safe environment without placing patients at risk (Arthur, Bennet, Santush & Mcnelly I 1998:57). According to Rauen (2001:93), clinical simulations create learning environments that are interactive and that place an emphasis on cognitive skills, critical thinking and clinical reasoning. The effects of simulation training in resuscitation are in fact difficult to measure in clinical practice with any great degree of accuracy because of the relative infrequency and unpredictability of real-life cardiac arrests.

The following studies undertook to investigate the benefits that accrued from simulation training for the maintenance of the CPR competency.

Wadas (1998:48), a nurse practitioner in an Advanced Heart Failure/Heart Transplantation unit in Arizona in the USA developed a mock simulation programme that will enable nurses to increase their clinical knowledge, to improve their psychomotor skills and to alter their attitudes towards CPR. Wadas's teaching strategy was to use a combination of several learning programmes to create a non-threatening and low-stress environment in which learners could gain these advantages. The necessary skills and information were delivered by means of a video, a simulated a resuscitation scenario and a post-disciplinary conference. Wadas also developed a mock simulation critique tool wherewith to evaluate CPR performances and the acquisition of new role behaviours on the part of the participating nurses. The participants were expected to perform CPR as effectively and enthusiastically as they would do in cases of real cardiac arrest. Their performances were evaluated by making use of the mock simulation critique tool in combination with verbal feedback obtained from participants during a post-simulation conference. It is notable that the nurses who participated in the study felt at ease, comfortable and confident during the administration of CPR, and that 90% of the participants recommended that the programme be continued. Wadas (1998:49) based his method on the belief that the repetitive reinforcement of CPR procedures in simulated programmes would increase the ability of these nurses to perform more efficiently in real-life circumstances that required CPR.

After they had spent some time in identifying the problems that nurses encountered in their efforts to maintain CPR competency, Adams, Dobbs, Greene, MacGillis & Stockhavsensl (2002:47) narrowed down their observations by making a particular study of the performance of nurses in the St Joseph Regional Medical Centre in Milwaukee in the USA. Adams et al were eventually able to report that the main deficiencies in CPR performance were occasioned by:

- the inability of nursing staff to access the necessary materials and to practise CPR as frequently as they needed to do in order to achieve mastery
- the difficulties that nurses experienced when they wanted to leave their units during shifts to attend CPR classes

- the fact that their schedules were so full that neither educators nor staff members set aside the necessary time for a full-day study session
- the tendency of CPR students to focus on cognitive rather than motor skills (and the fact that the evaluating staff assessed them in terms of the information they needed to answer the test questions)
- the fact that, despite the annual training, the staff reported that they felt anxious and uncomfortable when there were required to handle resuscitation situations

In order to overcome these problems, the researchers organised an interactive demonstration that was led by a qualified individual and evaluated by a facilitator, in order to determine levels of staff competency. Part of the implementation was that a mock drill was organised as a travelling competency that occurs on varying units and at varying times so that staff members would be able to attend the mock drill without interruptions to their duty schedules. The learning needs of the participants were identified from questionnaires, and specific topics were taught on the basis of these identified needs. In addition to the mock drill, selected amounts of written material and computerised information were also sent to the staff members for review. All the disciplines were represented in the mock simulation, and the scenario was scheduled on two particular days in each month.

It was observed that the mock simulation increased the confidence of the staff members, that it helped them to achieve a better understanding of their roles and responsibilities, and that provided them with a forum in which they could introduce new protocols. It also enabled them to share their knowledge with one another. The mock simulation-based research of Adams et al (2002:53) can therefore be said to have produced a number of useful results.

Alspach (2005:8), a researcher from the USA, voiced justifiable concerns about the high level of incompetence among CPR providers despite 40 years of real-life CPR practice and experience as well as frequent exposure to improvements in the state of CPR knowledge and skills training. Alspach drew attention to the benefits it could be acquired from practising CPR skills on remotely controlled manikins and their ability to provide an enormous amount of information about relevant clinical data and clinical responses. Despite these and other developments from the substantial body of research undertaken by Boyde and Wotton (2001:248), Wik et al (2002:273) and Abella et al (2005:305), the

basic CPR skills of resuscitators still continue to deteriorate rapidly after nurses have been instructed in CPR skills and theory. This unfortunate fact is true for all categories and levels of medical, nursing and other health care personnel.

Alspach (2005:8) quotes the results from two studies that were conducted simultaneously in a hospital setting in Chicago in United States and in three European cities. In both these studies, the consistently unsatisfactory and low 10% survival rate for patients who had been subjected to in-hospital cardiopulmonary resuscitation remained at a steady level. The failure to achieve more favourable patient outcomes was attributed to chest compressions that were either too slow and/or too shallow, to ventilation rates that were either too fast or too slow, and the intervention of long periods without any chest compressions at all (Alspach 2005:8).

While it is tempting, according to Alspach (2005:8), to ascribe these CPR failure rates to the nature of the emergency circumstances and to the disorderly, confusing and typically unanticipated nature cardiac arrest event, as well as to the necessity of establishing therapeutic coordination in the middle of chaotic and stressful conditions, there is still something mysterious and elusive about the stubborn inability of the best current CPR skills to achieve much more satisfactory patient outcomes. It is Alspach's (2005:8), suggestion that a completely new conceptualisation of CPR procedures together with a specific emphasis on simplification and the provision of technologically advanced equipment would produce better results by minimising the incidence of human error. She believes, for example, that modern defibrillation techniques, if expertly applied, could mitigate the persistently unsatisfactory success rates of CPR performance.

3.21.8 Ethical issues and their effects on the performance of CPR

The AACN Synergy Model for Patient Care defines *advocacy* as those actions that respect and support the basic values, rights and benefits of the critically ill patients (AACN 2003[3]). One of the competencies of the nurse is to be able to practise advocacy or moral agency. Since nurses who work in critical care units often face serious ethical issues and dilemmas, they need to be able to initiate discussions with a patient and with a patient's family members about the treatment options that are available to a patient. When the personal values of a nurse are at variance with those of a patient and patient's family, the

nurse needs to be able to bracket her convictions and advocate whatever methods and procedures might be available to the patient and the patient's family. A failure to resolve whatever ethical issues or dilemmas may impede the performance of CPR and prejudice its outcomes. In addition to this, the absence of clearly defined CPR policies and an established Do Not Attempt Resuscitation policy may become a cause of distress and confusion during a decision-making procedure. The following articles address some of the ethical and legal issues that a nurse who administers CPR is required to take into account.

It is inevitable that ethical problems are closely associated with the resuscitation process because of the close association between cardiac arrest and the possibility of imminent death (Holm & Jorgensen 2001:135). Although the resuscitation process has given many people a new lease on life, it also has the potential to make others extremely miserable and resentful. There are several ethical decisions that need to be made in order to ensure that a decision to attempt or to withhold CPR is appropriate, and that both the patient and the patient's family will be treated with dignity and respect. These decisions are influenced by individual, international, local, cultural, legal, traditional, religious, social and economic factors (Baskett et al 2005:S171).

It is vitally important for healthcare providers to understand the ethical and legal principles involved in the resuscitation process before they find themselves in situations where they have to make decisions that depend on a clear understanding of such principles (Baskett et al 2005:S171). It is worth noting that some ethical dilemmas such as a lack of explicit policies or a variety of cultural and religious beliefs might well delay the initiation of CPR (Baskett & Lim 2004:267; Konishi 1998:218). Konishi and Davis (2003:213) point out that in Japan, for example, nurses face ethical dilemmas about whether or not to initiate CPR because of a lack of congruence between institutional policies and a nurse's professional ethical obligations. Baskett and Lim (2004:267) undertook a study in which they observed the differences in the attitudes of ALS course directors in 20 European countries towards the ethical aspects of CPR. According to these authors, there were noticeable differences between the attitudes of respondents from Mediterranean countries and the attitudes of respondents from Nordic and central European countries. Although Turkey is a part of Europe, it is partly a Muslim country and it therefore shares the same attitudes toward CPR that are found in other Muslim countries in the Middle East and North Africa. Baskett and Lim therefore came to the conclusion that there are no clear, consistent or correct answers

to many of the ethical and legal dilemmas faced by nurses and medical staff in different countries.

Robinson (2007:312) has noted that registered nurses who are required to perform CPR on elderly clients often find themselves in morally distressing situations since it is the duty of nurses to assist patients and console their families by applying CPR as a potentially life-sustaining intervention in those situations where it is indicated. Nurses are also obliged to apply ethical considerations to the unique circumstances of each particular patient as a way of respecting their human dignity and honouring their status as worthy human beings. A joint statement from the British Medical Association, the Resuscitation Council of the UK, the Royal College of Nursing **of the UK** (2001:16) contains guidelines that state that all health care institutions should ensure that they have drawn up and promulgated a clear and explicit resuscitation plan that considers the particular circumstances of all patients who might need CPR. They also recommend that these CPR policies should be distributed to all patients and staff, and that they should be prominently displayed in places where they can be consulted by all interested parties. The policies thus devised should be so explicit that they will provide unambiguous guidance for registered nurses and other health care professionals and thus avoid potentially distressing situations that arise out of disagreements about what needs to be done and about any ambiguities in the legal and ethical formulations that guide decisions about whether or not to administer CPR. The three articles summarised in table 3.19 deal with some of the legal issues that govern CPR.

Table 3.19 Legal issues regarding CPR

Author	Details
Wood & Wainwright (2007:35)	<p>This article by Wood and Wainwright (2007:35) offers some recent reflections on the laws that govern CPR when patients who are admitted to hospital still retain the capacity to make their own informed decision about whether or not they wish to receive CPR.</p> <p>The Nursing and Midwifery Council of the UK's Code of Professional Conduct (NMC 2004) states that the nurses are personally accountable for their practice, and answerable for their actions and omissions regardless of any advice or directions offered by other professionals. Since it is sometimes necessary to perform CPR on a patient when that patient is not in a position to give consent, the nurse concerned would be justified in performing CPR on the grounds that such an act would not be unlawful provided that no advance refusal to receive CPR had been received from the patient. It is generally true that nurses who act reasonably and in good faith can avoid becoming embroiled in legal disputes and actions. Even so, it remains necessary for nurses to cooperate to the fullest possible extent with all other interested parties including the patient, the patient's family, informal carers as well as health and social care professionals. Nurses can ensure the legality and legitimacy of their CPR practices by providing all the information that patients request and by answering their questions honestly and comprehensively. Good communication with patients and other members of a health care team is essential for ensuring the legality of all CPR procedures (Wood & Wainwright 2007:40).</p>
Griffith (2007:228)	<p>Griffith (2007:228) discusses the legal basis for "Do Not Resuscitate" orders and outlines the best practice guidelines that will assist district nurses and other health professionals in the UK to decide whether making such an order is lawful and whether it operates to the benefit of the patient concerned. The law defines a lawful Do Not Attempt Resuscitation order as a result of proper consultation between all parties concerned and a careful consideration of the patient's circumstances in relation to the possible benefits of CPR. The courts and all other regulatory bodies have approved best practice guidelines are described the circumstances in which it is legitimate to withdraw or withhold CPR treatment (Griffith 2007:228). It is absolutely necessary for team members such as nurses and doctors to comply with these guidelines before they make a legally correct decision about the status of a Do Not Attempt Resuscitation order (Griffith 2007:228).</p>
Hohenleitner (2002:140)	<p>Critical care nurses play a decisive role in the decision making process that defines the kind of treatment that might be applied or withheld in end-of-life or resuscitation situations. Hohenleitner (2002:140) expands upon the various ways in which nurses should cope with ethical issues. The facilitation of communication with a patient's family is an important part of a nurse's role. Because of their intimate relationship with their patients, a nurse is in a good position to broach sensitive conversations about code status. It is part of the duty of a critical care nurse to develop a close and personal but professional relationship with a patient as well as with the members of a patient's family. Part of the purpose of this personal relationship is to enable a nurse to help both the patient and the patient's family to make satisfactory decisions about difficult end-of-life circumstances. According to Hohenleitner (2002:140), nurses are ideally situated to be actively involved in addressing the code status with the patient and the members of the patient's family in many critical care situations in collaboration with the physician and other health care providers.</p>

3.22 ACQUIRED IMMUNO-DEFICIENCY SYNDROME (AIDS) AND CPR

The actual risk of disease transmission during the process of mouth-mouth ventilation is very low (Centre for Disease Control 2003: [4]). Between 1981 and 2004, only 57 (0.00475%) health care workers in the USA were infected by HIV from occupational exposure out of an estimated 1.2 million Human Immunodeficiency Virus/Acquired Immuno

Deficiency Syndrome cases reported to the USA Centre for Disease Control and Prevention (CDC). Three of these exposures occurred when health care workers were performing CPR (Centre for Disease Control 2006:589). The fear of contracting a communicable disease, and especially HIV infection, has become a major barrier to the implementation of an immediate resuscitation response. Several studies have reported a reluctance of physicians and other health care workers to perform mouth-to-mouth resuscitation—whether as citizen bystanders in a community or during the course of their in-hospital duties (Boucek, Phrampus, Lutz, Dongilli & Bircher 2009:849; Brenner, Van, Lazar & Camargo 2000:1054). The most recent guidelines from AHA (2005) have emphasised once again that it is a *prompt* intervention with CPR there is the key to successful CPR. Recent changes in the resuscitation recommendations issued by the AHA include the use of “hands-only CPR” for bystanders who witness sudden out-of-hospital cardiac arrest events in adults (Sayre et al 2008:2162). It should be noted, however, that these recommendations for “hands-only CPR” do not apply to children or to hospitalised patients.

Mejicano and Maki (1998:813) from Wisconsin in the USA have explained the extent of the risk of acquiring an infectious disease during CPR. They collected their data from articles that have been published since 1965 from a Medline database and from selected bibliographies. **They only selected studies that contained definite information about the transmission of the kind of infectious organisms** (HIV and other blood-borne viruses in particular) that might conceivably be transmitted by means of mouth-to-mouth ventilation, contact exposure, and needle-stick injuries. They assembled all available descriptive and analytic data from these studies. Their subsequent data analysis revealed only *three* reported cases of HIV infection that were acquired during the resuscitation of an infected patient – and each of these occurred as a result of incidental exposure to high-risk cutaneous contact. *Not a single incidence of an infection that that was acquired as a result of CPR training has ever been reported in the literature.* Mejicano and Maki (1998:816) maintain that the use of appropriate infection control measures during CPR and CPR training is known to reduce the risk of infection. The AHA (2006) reports that there is no known case of HIV infection as a result of contact with the kind of training manikins that are used in CPR training or from any other CPR procedure that is administered to cardiac arrest victims. The Centre for Disease Control and prevention (CDC: 2003) recommends the use of face masks with one-way valves for trained rescuers who need to administer CPR to people who may have infectious diseases. Every hospital must maintain a

comprehensive protocol on the disinfection of training manikins, on post-exposure prophylaxis and on long-term follow up. Training programmes for CPR also need to emphasise the need for following various rules for personal protection, and they also need to implement protocols for decontaminating manikins that could harbour infectious agents (Mejicano & Maki 1998:816). Merchant, Katzen, Mayer and Becker (2007:330) also recommend that continuing educational programmes for resuscitation should recommend universal precautions to prevent the exposure of health care personnel to blood or body fluids, and that the methods used to achieve this should be clearly defined and propagated by all health care institutions.

3.23 METHODOLOGIES USED IN THE LITERATURE REVIEWS

The various research designs, the data collection strategies and the data analysis methods that have been used by the various researchers mentioned in this chapter and elsewhere are summarised in Table 3.20. The summary shows that both qualitative and quantitative studies have been used to investigate CPR. Both convenience and purposive sampling methods were used to select the participants/respondents in the studies. Most of the studies utilised questionnaires that included open- and closed-ended items. In two of these studies, debriefing sessions were used to collect data. Data analysis was carried out by the making use of descriptive statistical analysis, the Statistical Analysis System (SAS), the Statistical Package for Social Sciences (SPSS), t-tests, chi-square tests, content analysis, thematic analyses and grounded theory.

Table 3.20 Methodologies used in the literature review

Authors	Research design	Sampling	Data collection	Data analysis	Plan for this study
Pottle & Brant (2000:46)	Quantitative	Purposive	Auditing	Descriptive analysis	Phase 1
Hudson (2004:113)	Quantitative	Purposive	Retrospective auditing	Descriptive analysis	Phase 1
Boyde and Wotton (2001:248)	Quantitative	Convenience	Auditing, debriefing session, questionnaires	SAS-1, Thematic analysis	Phase 1
Hajbaghery et al (2005:317)	Descriptive study	Purposive	Check list	SPSS-9, ANOVA	Phase 1
Suraserainvongse et al (2006:188)	Quantitative	Convenience	Prospective auditing	Descriptive statistical analysis	Phase 1
Desalu et al (2006:517)	Quantitative	Purposive	Auditing	Descriptive statistical analysis	Phase 1
Broomfield (1996:1016)	Quasi-experimental	Convenience	Pre-post test	Paired t-test	Phase 2
Davies & Gould (2000:400)	Quasi-experimental	Convenience	Pre-post test	Non-Parametrical Statistical analysis	Phase 2
Madden (2006:218)	Quasi-experimental	Convenience	Pre-post test	Descriptive inferential statistical analysis	Phase 2
Page & Meerabeau (1996:317)	Qualitative	Purposive sampling	Debriefing sessions	Content analysis	Phase 3
Pups, Weyker & Rodgers (1997:59)	Qualitative	Purposive sampling	Open-ended questionnaire, debriefing sessions	Thematic analysis	Phase 3
Meerabeau & Page (1999:29)	Qualitative	Purposive sampling	Debriefing sessions	Grounded theory	Phase 3
Cooper & Wakelam (1999:27)	Observational study		Video recording, debriefing sessions	Chi-square and t-test	Phase 3
Hemming et al (2003:254)	Exploratory, descriptive design	Convenience sampling	Open-ended questionnaire and interview	Content analysis	Phase 3

3.24 CONCLUSION

The literature review identified a number of trends in the current development of CPR. These have been described in some detail in the descriptive, exploratory and participatory studies that are being discussed above. These studies have emphasised the importance of the knowledge, skills, and ability to participate in teamwork, perceptions, stress, motivation and the attitudes of nurses when it comes to the efficient delivery of CPR to a cardiac arrest victim. They were some similarities (such as a lack of necessary knowledge, inadequate skills, the non-availability of equipment, and the omission of debriefing sessions) that were identified in most of the studies that were reviewed above, regardless of the country in which they originated.

There are certain cognitive and practical components that are equally characteristic of CPR. The basic aim of CPR is to provide respiratory and cardiac support in order to ensure perfusion to vital organs in the immediate aftermath of a cardiac arrest. Any deficit in the ability to perform CPR can lead to the death of the patient or long-term complications such as severe brain damage. Studies need to be conducted in Botswana to assess the extent of the CPR abilities and proficiencies of practising nurses other health care personnel. There is also a need for research to study the perceptions that nurses have of CPR as well as the barriers and needs that nurses encounter when they attempt to practise CPR.

This chapter reported on the literature review that the researcher undertook in order to understand all the implications of modern research and practice in CPR throughout the world. The phenomenon of interest was briefly outlined. The researcher described the practice and implications of CPR in all countries in which recent research was conducted as well the practice in Botswana. The factors that influence the delivery of CPR were described and discussed at great length. The researcher also reviewed the empirical literature on CPR, studies of the role of the nurse who practises CPR and the kind of education and training that influence a nurse's ability to function effectively during CPR. The researcher used the literature review to gain insight into what is currently known about CPR management and to understand the nature and extent of the existing barriers, needs and perceptions about the provision of CPR in both developed and developing countries. The studies described in the literature review have influenced the methodological approaches that the researcher has utilised in this research.

The following chapter (chapter 4) will describe the research methodology that the researcher adopted to study the perceptions, barriers and needs experienced by nurses during the provision of CPR in Botswana.

CHAPTER 3

LITERATURE REVIEW

3.1 INTRODUCTION

In Botswana hospitals, it is usually a nurse who is the first person to notice the sudden onset of a life-threatening health crisis such as cardiac arrest. Fortunately, in such circumstances, the nurse also has sufficient authority and expertise to make responsible decisions about the kind of emergency treatment routines that must immediately be applied if the patient is to be resuscitated. The overall aim of this study has been to explore, identify and describe the perceptions, barriers and needs experienced by the registered nurses during the provision of CPR. Ideally, the patient's characteristics and nurse's competencies should complement one another in such a way that optimal outcomes for the patient will be realised after cardiac arrest has occurred. This study has utilised a systemic approach to the collection of data from nurses who provide cardiopulmonary resuscitation and has analysed their perceptions and the obstacles and hindrances that impede CPR, to make recommendations that will, if put into practice, enhance the performance of nurses when they provide CPR.

The purpose of this literature review was to describe all the relevant research into CPR and to discuss everything that is known about this treatment and the difficulties associated with it in order to gain an in-depth understanding of the processes and problems that are encountered when patients are transferred to a higher level of care.

The purpose of a literature review is to critically examine, analyse and discuss all relevant information from research on a particular topic. During such a review, a researcher locates, analyses, synthesizes and interprets all previous research and documents (such as periodicals and books and abstracts) that have a bearing on the particular area of study in which the researcher's topic is located. According to [Roberts \(2004:73\)](#), a literature review serves the following purposes:

- It helps to bring a study into sharper focus by relating it to everything that is already known about a topic.
- It helps the researcher to develop a theoretical and conceptual framework that he or she will use to guide and frame the study.
- It identifies key variables for the research and suggests the relationships that may prevail between them in a quantitative study. But if the research that is being conducted is qualitative in nature, a literature review will focus on the relative importance of a variety of concepts, problems and topics that need to be taken into account.
- It suggests how some of the previous research that has already been undertaken on the topic can be usefully extended by means of further research and study.
- It identifies how the research that is being contemplated relates to present and past studies and findings.
- It provides a basis for determining the significance of the study.
- It provides a researcher with opportunities to examine whatever questionnaires and tests were used in earlier research and the results that such questionnaires and tests were able to produce.
- It helps the researcher to make strong logical and contextual links between the findings and procedures of the study that is being contemplated and all previous studies that had been conducted in the field.

The researcher decided to use the AACN Synergy Model for Patient Care as the theoretical basis of this study because the comprehensiveness and explanatory power of the AACN Synergy Model for Patient Care seemed to be able to account for all the data that emerged from the data collection processes. (The AACN Synergy Model for Patient Care model has been described in detail in chapter 2). The researcher therefore followed the advice of a librarian to conduct a literature review by using the following data bases:

- OASIS for books in the library of the University of South Africa (UNISA)
- MAGNET for references in South African libraries
- NEXUS for research projects current and completed
- MEDLINE
- CINAHAL (R) databases 1998-2008

- Health net for health research
- British Nursing Index (BNI) Databases

The researcher also extended the literature review to conduct a global review of CPR from all available sources in order to identify the baseline data about what is known about this subject. All papers that were published between 1996 and 2009 were included in the literature review.

In addition, the researcher examined a variety of Internet data bases by using key words such as cardiac arrest, cardiopulmonary resuscitation, Basic life support (BLS), Cardiopulmonary resuscitation (CPR), Advanced Cardiac Life Support (ACLS), Immediate Life Support (ILS), manikin, defibrillation, Automated External Defibrillation (AED), Do Not Attempt Resuscitation (DNAR), synergy, perceptions, barriers, needs, debriefing and simulation. (The cited references provide additional material on this topic). The bibliography of this dissertation shows that a wide range of search engines was used to conduct Internet/World Wide Web (www) searches. The researcher utilised full-text Web searches of the databases of journal articles and also made extensive use of the popular meta-searcher Google to initiate many online searches. The initial date range that qualified for examination was 1995-2006. The effect of this was to guarantee that the information that was collected and reviewed for the research would be both relevant and up to date.

While the literature review was limited to research that has been produced during the past 15 years, the researcher made a particular effort to include primary research articles on this topic in the review. Although the search was restricted to the English-language texts, the literature that was examined described all the most recent findings and conclusions about CPR.

Although a considerable amount of literature about CPR is available from developed countries, the researcher also managed to include the limited amount of information that emanates from Botswana and other African countries. In spite of this, the researcher tended to focus on whatever literature would be most useful and valuable for answering the research questions that were formulated to guide this study. No trace of any previous research in Botswana into the perceptions of registered nurses who practise CPR and the obstacles and needs that they experience has been identified.

3.2 CONCEPTUAL FRAMEWORK

The conceptual framework of the study consists of nurse characteristics (expressed as “competencies”) and the kind of health care system that would produce a beneficial effect on outcomes during CPR. This conceptual framework suggested the use of the components of the AACN Synergy Model for Patient Care for exploring existing facilities in the two referral hospitals (healthcare system), identifying the existing nurse competencies, describing the patient characteristics presented during cardiac arrest and identifying the perceptions, barriers and needs experienced by registered nurses during the provision of CPR. In that section of the text that deals with results, the researcher has made various recommendations for the implementation of a BLS training programme for registered nurses in Botswana. Figure 2.1 (see chapter 2) depicts the various aspects of the conceptual framework that were used in the literature review.

3.3 BRIEF HISTORICAL REVIEW ON CARDIOPULMONARY RESUSCITATION (CPR)

The inversion method of resuscitation has been described in texts that date from three and a half millennia (3500 years) ago in Egypt. This method involves hanging the patient by the feet, and then alternately applying chest pressure to produce expiration and releasing pressure to produce expiration (Ardagh 2004:1).

There **are** also references to resuscitatory practices in the Old Testament of the Bible. The most notable of these references to resuscitation appears in the following words from Kings II: “and when Elisha came into the house, the child was dead and he went up... and put his mouth upon his mouth and the flesh of the child waxed warm ... and the child sneezed seven times and opened his eyes (The Bible, Kings II, chapter 2, verses 32-35). The technique for closed chest cardiac massage that was first described in 1878 by Boehm, was successfully applied in a few cases of cardiac arrest over the following decade (Resuscitation Council of the United Kingdom 2000:4). But modern CPR techniques as we know them only really began to develop during the 1940s. Beck and colleagues performed the first successful application of internal defibrillation during cardiac surgery in 1947. This technique was expanded by Zoll and his colleagues in 1956 when they performed the first

successful external human defibrillation (Acosta, Varon, George, Sternbach & Baskett 2005:142). But it was not until the 1950s that mouth to mouth ventilation was re-discovered and became accepted universally as the method of choice (Resuscitation Council of the United Kingdom, 2000:2). Open chest massage became the standard practice for treating cardiac arrest until the landmark paper by Kouwenhoven, Jude, and Knickerbocker in 1960 described closed chest massage. Their paper explained how to use a technique of external chest compression while testing defibrillation on an animal model of ventricular fibrillation (Resuscitation Council, UK 2000:1). The publication of this paper that describes how chest compressions can be used in resuscitation is widely regarded as marking the beginning of the modern era in CPR (Ardagh 2004:1).

3.3.1 Definition of CPR

The European Resuscitation Council (ERC) (1992:111) guidelines for basic life support define CPR as a process of maintaining an airway while supporting breathing and circulation without the use of equipment other than a simple airway device or a protective shield.

The AHA (1994:7) defines basic CPR as the use any of the methods and techniques from the basic CPR repertoire in an attempt to restore spontaneous circulation by using the techniques of chest wall compressions and pulmonary ventilation.

In 2000, the AHA (2002:2) defined CPR as techniques to restore the circulation of a victim of cardiopulmonary arrest by means of artificial ventilation and chest compressions. The AHA, in collaboration with the International Liaison Committee on Resuscitation (ILCOR), approved the inclusion of Automated External Defibrillator (AED) as part of BLS in the 2000 guidelines (AHA 2000:33). The international guidelines of the AHA (2000:33) also recommended the elimination of the pulse check by lay rescuers so as to reduce possible errors in assessing the carotid pulse. The guidelines recommended training lay rescuers to evaluate signs of circulation such as normal breathing, coughing or movement to rescue breaths.

The ILCOR task force reviewed the revised Utseini definition in 2002 and agreed to define CPR as an attempt to restore spontaneous circulation by performing chest compressions with or without ventilations (Jacobs & Nadkarni 2004:3387).

The Australian Resuscitation Council (ARC) guidelines (2006:1) defined CPR as techniques used to minimise the effects of cardiac arrest and to assist the return of spontaneous circulation. According to the ARC (2006), CPR consists of the following three components:

- Airway assessment and management
- Breathing assessment and management
- Circulation and management

BLS is the preservation or restoration of life by establishment of and/or maintenance of airway, breathing, circulation and emergency care (ARC 2006:1). In light of benefits demonstrated by early defibrillation, international resuscitation committees, in collaboration with the ILCOR, proposed that all personnel whose responsibilities or occupations require them to perform CPR should be encouraged to initiate defibrillation (Deakin & Nolan (2005:s35); Australian College of Critical Care Nurses (ACCCN) (2006:1). Most hospitals are now embracing the concept of first-responder defibrillation and are accordingly changing their protocols to ensure that nurses be educated in use of an Automatic External Defibrillator (AED) as part of their BLS training and practice (Moule & Albarran 2002 :227).

3.4 HAEMODYNAMICS OF, AND PATIENT CHARACTERISTICS DURING CARDIAC ARREST AND CPR

Following cardiac arrest due to ventricular fibrillation without CPR, blood flow falls exponentially for approximately five minutes until the pressure gradient between the aorta and the right heart is completely dissipated (Andreka & Frenneaux 2006:198). During CPR, there is a forward flow of blood into the aorta during the compression phase, a retrograde blood flow during the compression phase, and an ante-grade flow during the decompression phase. Carotid blood flow takes over a minute to reach plateau levels following the initiation of chest compressions. If there is even a brief interruption in chest compressions, a dramatic reduction in carotid blood flow will occur. It will then take a

minute or so for the carotid blood flow to reach its previous plateau levels again once the compressions are resumed. Coronary perfusion pressure during the release phase of CPR has been shown to be a powerful predictor of the likelihood that spontaneous circulation will be recovered following the restoration of electrical activity (Andreka & Frenneaux 2006:198). Continuous chest compressions should always therefore be performed in non-respiratory cardiac arrest (Futterman & Lemberg 2005:81).

Chest compressions produce blood flow because the intra-thoracic pressure is increased as a result of the direct rhythmic compressions of the heart. Although chest compressions (if properly performed) can produce systolic arterial pressure peaks of 60-80 mmHg, the diastolic pressure remains low and the mean arterial pressure in the carotid artery seldom exceeds 40 mmHg. But chest compressions generate a small but a critical amount of blood flow to the brain and myocardium and increase the likelihood that any subsequent defibrillation will be successful. They are especially important if the first shock is delivered after more than five minutes (Wik, Hansen, Fylling, Steen, Vaagenes, Auested & Steen 2003:1389).

The three “ABC” elements of BLS are *airway, breathing and circulation*. The most reliable sign of cardiac arrest is the absence of a carotid pulse. The recommended rate of 100 compressions per minute reflects a compromise between scientific evidence in favour of faster compressions, and the ability of the rescuers to maintain higher speeds. According to Kern (2003:274), adult cardiac arrest victims are more likely to recover if they receive a higher number of chest compressions even at the expense of reduced ventilations. Furthermore, a direct correlation has been observed between a higher number of chest compressions and the return of spontaneous circulation that leads to successful resuscitation (Kern 2003:274).

While much of the information about the physiology of chest compressions and the effects of varying the compression rate, and the compression to ventilation ratio, have been derived from animal models (Handley et al 2005:S13), the recommendations from AHA (2005) include the following recommendations:

- Every time compressions are resumed, the rescuer should place his/her hands without delay in the centre of the chest.

- The rescuers should compress the chest at a rate of 100 compressions per minute.
- The rescuer should push hard and push fast.
- The rescuer should allow the chest to recoil completely after each compression.
- The rescuer should minimise interruptions in chest compressions.

It is important to note that even when chest compressions are being carried out in the best possible way and at the recommended rate, they can only achieve 30% of the normal cardiac output. Although this may seem inadequate, it is sufficient to protect the brain and the myocardium and thus buy time until an effective defibrillation can be performed (White 2006:737).

3.4.1 The role of cardiopulmonary resuscitation

CPR is a critical component of BLS and is the established first-line response to cardiac arrest in the interim before defibrillation and ALS are available. But CPR also has the potential to save lives in other life-threatening emergencies such as strokes, respiratory arrests, trauma, drowning and airway obstruction (AHA 2001:4). The fundamental aim of CPR is to produce a neurologically sound patient who is able to breath without assistance and who has spontaneous cardiac output (Delvin 1999:201). The role of CPR is to maintain cerebral and myocardial perfusion until a definitive treatment can be given. According to the ERC (2000:3), the optimal time for the restoration of a spontaneous heart rhythm could well be as short as 90 seconds even though it is recommended that myocardial reperfusion should take place within four minutes because neurological impairment occurs if cerebral perfusion is delayed for five minutes. Futterman and Lemberg (2005:83) add that the primary determinant of a successful neurological outcome is the maintenance of circulatory support during a prolonged cardiac arrest.

3.4.2 General principles of adult, paediatric and neonatal CPR

The general principles of CPR involve airway maintenance, breathing, circulation and defibrillation/AED. While the principles of resuscitation for children and infants are similar to the guidelines prescribed for adults, certain specific precautions and modifications must be borne in mind (AHA 2005:17). The modifications that must be observed concern:

- the amount of air

- the depth of the compressions
- the use of one-hand chest compressions for very small children
- the attachment of the AED and the activation of the emergency medical system

3.4.3 Competencies required by registered nurses during CPR

The steps comprising BLS consist of a series of sequential assessments and actions which are illustrated in the tables 3.1 to 3.4. There is no medical emergency that requires more immediate attention and appropriate action than cardiopulmonary arrest. Incorrect or inadequate resuscitation techniques will result in many lives being lost – lives that might otherwise have been saved if the proper techniques had been applied.

The assessment phases of BLS are crucial. The ABCD (airway, breathing, circulation and defibrillation) of CPR begins with an assessment phase. The assessment phase consists of determining unresponsiveness, breathlessness and pulselessness. A lone rescuer should activate the emergency response system and organise for AED (if available), and then immediately return to the patient and begin CPR. Before tending the patient, the rescuer should first make sure that the environment is sufficiently safe to perform the necessary steps.

3.4.3.1 Assessment of the airway

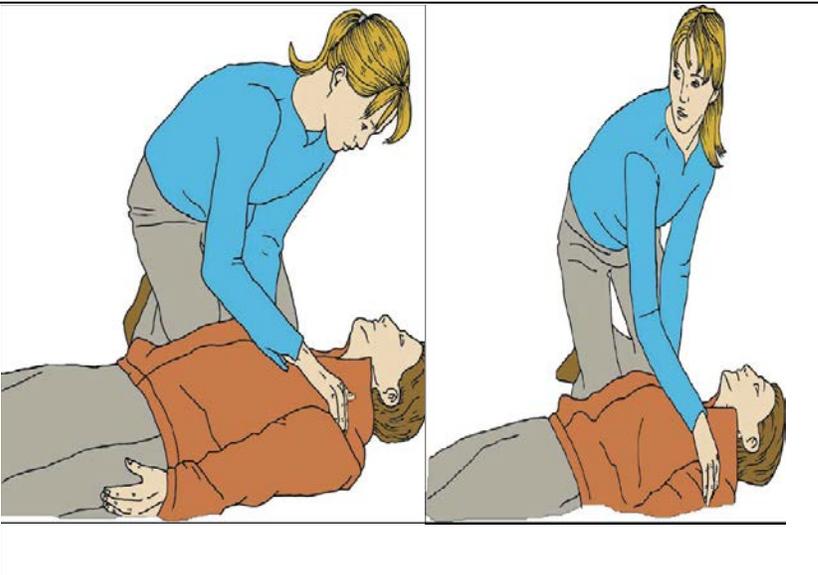
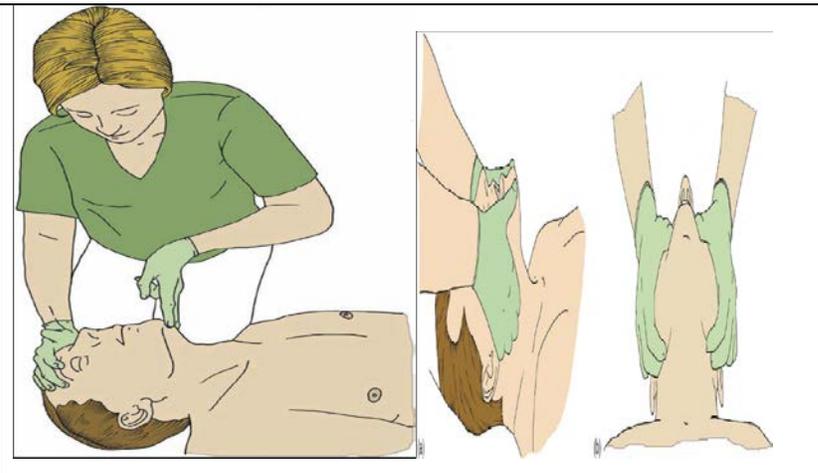
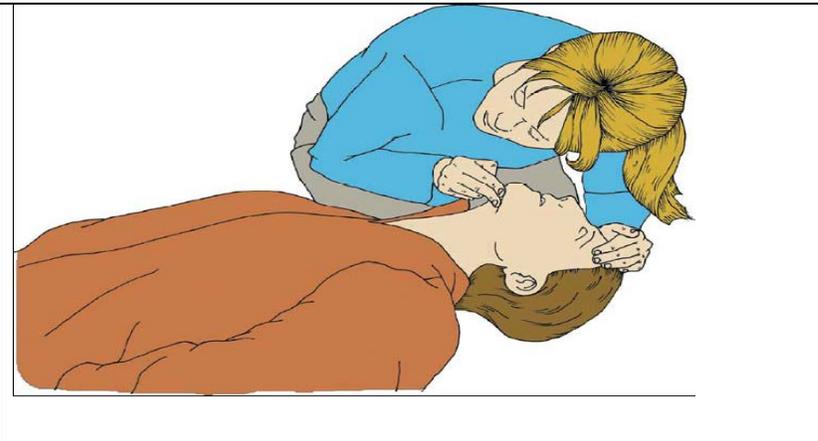
Airway management is required to provide an open airway when the victim:

- is unconscious
- has an obstructed airway
- needs rescue breathing

The following steps (see table 3.1) explain the initial action and the subsequent procedure for airway management.

Table 3.1

Assessment of the airway

Step	Action	Illustration
1	Check for unresponsiveness and then activate the emergency response system	
2	Open patient's airway with a head tilt-chin lift manoeuvre if there is no suspected neck injury. Otherwise the jaw thrust technique should be used.	
3	Place the ear near the patient's mouth and nose. Observe the chest rising and falling. Listen for escaping air during exhalations. Feel whether the air blows against the cheek.	

Source: ERC (2005:s9)

3.4.3.2 Breathing

After an unconscious victim's airway has been cleared, the next step is to check for signs of life including whether or not the victim is breathing (breathing should be more regular and rhythmic than the occasional gasp) (AHA: 2005:14).

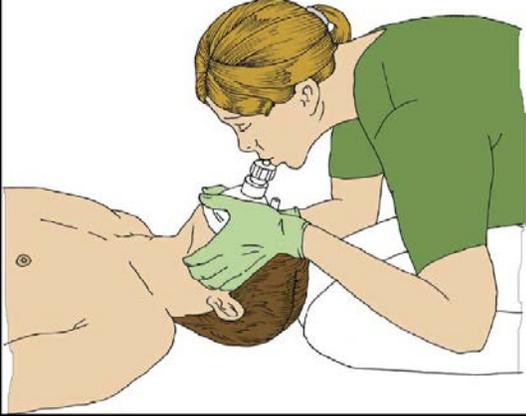
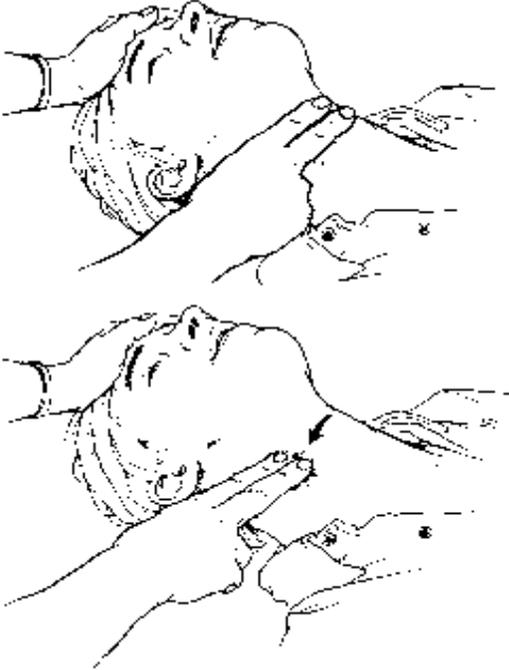
Various methods of rescue breathing

Rescue breathing can be administered by using the following techniques:

- *Mouth-to-nose rescue breathing.* This is used when the victim's jaws are clenched or tightly closed or when resuscitating infants and small children.
- *Mouth-to-mask rescue breathing.* This is used in order (mainly) to avoid the transmission of any serious infection from the infective agents of HIV, tuberculosis, hepatitis B and Severe Acute Respiratory Syndrome (SARS).
- *Mouth-to-neck stoma.* This is used for patients with a tracheotomy or laryngectomy (AHA 2005:14).

The following chart (table 3.2) explains and illustrates the steps that must be taken during rescue breathing and the checking of the pulse:

Table 3.2 Rescue breathing and checking the pulse

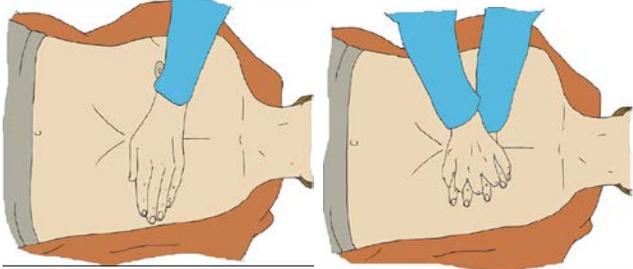
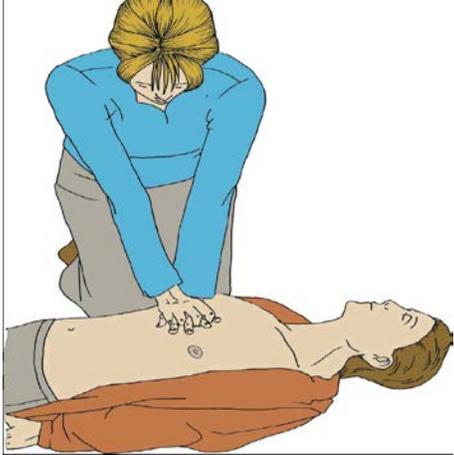
Step	Action	Illustration
1	If the patient is not breathing adequately, use a barrier device to give 2 rescue breaths (of 1 second each) while watching the rise and fall of the patient's chest.	
2	The rescuer's checking of the carotid pulse should take 5 seconds (but not more than 10 seconds).	
3	If there is no pulse, the rescuer should begin a sequence of 30 uninterrupted compressions and breaths.	

Source: ERC (2005:s12)

3.4.3.3 Circulation/chest compressions

Rescuers should start the chest compressions sequence if the victim shows no signs of life. Lay rescuers should not attempt to palpate a pulse to determine whether or not to give chest compressions. Table 3.3 illustrates the steps that comprise each set of chest compressions (AHA 2005:15).

Table 3.3 Chest compressions

Step	Action	Illustration
1	Direct visualisation may be used to locate the compression point. The rescuer places the hand flat in the centre of the chest (on the lower half of the sternum).	
2	Once the rescuer has placed the heel of the hand on the chest, the arms should be straightened and the shoulder should be held vertical.	
3	The lower half of the sternum should be compressed to a distance of one third of the depth of the chest. Compressions should be rhythmic, and the rescuer should allow complete recoil of the chest after each compression. A minimum 100 compressions should be delivered during each minute.	

Source: ERC (2005:s11)

3.4.3.4 Recommended administration of CPR for different age groups

Table 3.4 compares the administration of CPR for different age groups as recommended by AHA (2005:15).

Table 3.4 Comparative recommendations for the administration of CPR according to the age of the victim

Age group	Slow rescue breaths	Where to check pulse	Depth of chest compressions	Rate of chest compressions	Ratio of compressions and ventilations	Hand position
Adult and adolescent	1 second per breath	Carotid	1½ to 2 inches (4-5 cm) (Use two hands)	100 per compressions per minute. (Push hard and fast.)	30:2 (for one- or two-rescuer CPR)	Centre of the breast bone between the nipples
Child (between one year of age and puberty)	1 second per breath	Carotid	1/3 to ½ inches (2.5-3.5cm); (Use one hand for small victims)	100 compressions per minute	30:2 (for one-rescuer CPR). 15:2 (for two-rescuer CPR)	Centre of the breast bone between the nipples
Infant (less than 1 year old)	1 second per breath	Brachial	1/3 to ½ inches (two fingers). Use two thumb-encircling hands for two-rescuer CPR)	100 compressions per minute	30:2 (for one-rescuer CPR). 15:2 (for two-rescuer CPR).	Just below the nipple line on breast bone

Source: (AHA 2005:15)

3.4.3.5 Defibrillation

Defibrillation is a process by means of which an electronic device delivers a strong electrical shock to the heart that puts an end to the characteristically extremely rapid and irregular heartbeat and restores a normal heart rhythm (Merriam Webster's Online Medical Dictionary 2009). Defibrillation is administered to correct the life-threatening fibrillations of the heart which can cause cardiac arrest. It should be performed immediately after it has been established that a patient is experiencing a cardiac emergency, has no pulse, and is unresponsive (AHA 2005). Defibrillation interrupts fibrillatory electrical activity in the heart and allows normal pacemakers to produce an effective rhythm that ensures systemic perfusion (AHA 2005:112).

3.4.3.6 Defibrillator

A defibrillator is a device that is used to correct a dangerously abnormal heart rhythm (which is usually ventricular fibrillation) or to restart the heart by depolarizing its electrical conduction system and delivering brief measured electrical shocks to the chest wall or the heart muscle itself (*Merriam Webster's Online Medical Dictionary* 2009).

3.4.3.6.1 Types of defibrillators

There are two types of external defibrillators: Manual External Defibrillators (MED) and Automated External Defibrillator (AED) that are either fully automated external defibrillators or semi automated external defibrillators (Dwyer, Williams & Jacobs 2004:87).

3.3.5.6.2 Manual external defibrillators

Manual external defibrillators are used by a medical team, by specialist critical care nurses or by skilled paramedical staff who have been appropriately trained (Spearpoint 2008:51). Manual defibrillators rely on human interpretations of the electro cardio graphs, manual interactions and a decision about energy selection before the delivery of the shock (Spearpoint 2008:51). Figure 3.1 displays an image of a manual defibrillator and its application.



Application of manual defibrillator



Manual defibrillator

Figure 3.1 Application of manual defibrillator

AHA (2005:5).

3.4.3.6.3 Automated external defibrillator

The earliest recommendation to include the use of the automated external defibrillator by those required to perform CPR was proposed by the AHA (1992). The European Resuscitation Council (ERC: 1998) guidelines has also advocated the use of AED with BLS by emergency medical services. It has also recommended that skill in defibrillation should be a core competency of doctors, nurses and other health care professionals, and that an AED should be located throughout hospital wards (Bossaert, Handley, Marsden, Arntz, Chamberlin, Ekstrom, Evans, Monsieurs, Robertson & Steen (1998:93). The AHA have also proposed that health care providers should be trained, equipped and authorised in the use of the AED within BLS training (Cummins & Hazinski 2000:431).. The use of automated external defibrillators for in-hospital cardiac arrest has led to a two- to six-fold increase in survival rates after cardiac arrest (Zafari, Zarter, Heggen, Wilson, Taylor & Reddy 2004:848).

The key function of an AED is automated electrocardiogram recognition and an appropriate prompting of the operator to deliver the direct current shock to the patient and to recommence CPR (Spearpoint 2008:51). When the automated external defibrillators detects ventricular fibrillation or pulseless ventricular tachycardia, it will charge automatically and prompt the operator to press the shock button to deliver the direct current (DC) shock (Spearpoint 2008:52). Figure 3.2 displays an image of an automated external defibrillators and its application.



Application of AED



AED

Figure 3.2: Application of an AED

Source: Spearpoint (2008:52).

3.4.3.6.4 Automated external defibrillators

Automated external defibrillators are sophisticated, reliable, safe, computerised devices that deliver defibrillatory shocks to victims of cardiac arrest. There are two types of AED: while most are semi-automatic, a few are fully automatic. All automated external defibrillators analyse the victim's rhythm, determine the need for a shock, and then deliver a shock. A semi-automatic external defibrillators advises the need for a shock, but this has to be delivered by an operator when he/she is prompted to do so (Resuscitation Council of the United Kingdom 2005:23). In recent years, manufacturers have produced dual-function defibrillators that incorporate a semi-automated mode of operation along with their standard manual function (Spearpoint: 2008:51). Table 3.5 compares the functions of automated external defibrillators and manual defibrillators monitors (Spearpoint 2008:52).

Table 3.5 Comparison of automated external and manual defibrillators

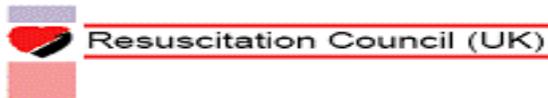
Function	Automated external defibrillator	Manual defibrillator
Electrodes/paddles	Hands-free adhesive pads	Standard electrocardiogram electrodes; hands-free adhesive pads; hard shell pads
ECG recognition	Automated	Human interpretation
Energy selection	Automated	Dual purpose Manually selected
Safety guidance	Automated voice prompt	Depends on the operator's judgment
Direct-current shock delivery	Semi-automated (the device prompts the user to press the shock button). Manual override option	The shock is delivered only when the operator presses the shock button.
Recommendation of CPR	Automated voice prompt	Depends on the judgment of the operator
CPR cycle timing	Automated and guideline complaint	Depends on the judgment of the operator
Cardio version	Available as a feature of some units	The shock is delivered only when the operator presses the shock button.
Pacing	Not available	The shock is delivered only when the operator presses the shock button.

Compiled from Spearpoint (2008:51,52).

3.4.3.6.5 Sequence of actions during the use of an AED

The AED algorithm explains sequence of actions to be followed while using an automated external defibrillator..

3.3 AED algorithm



AED Algorithm

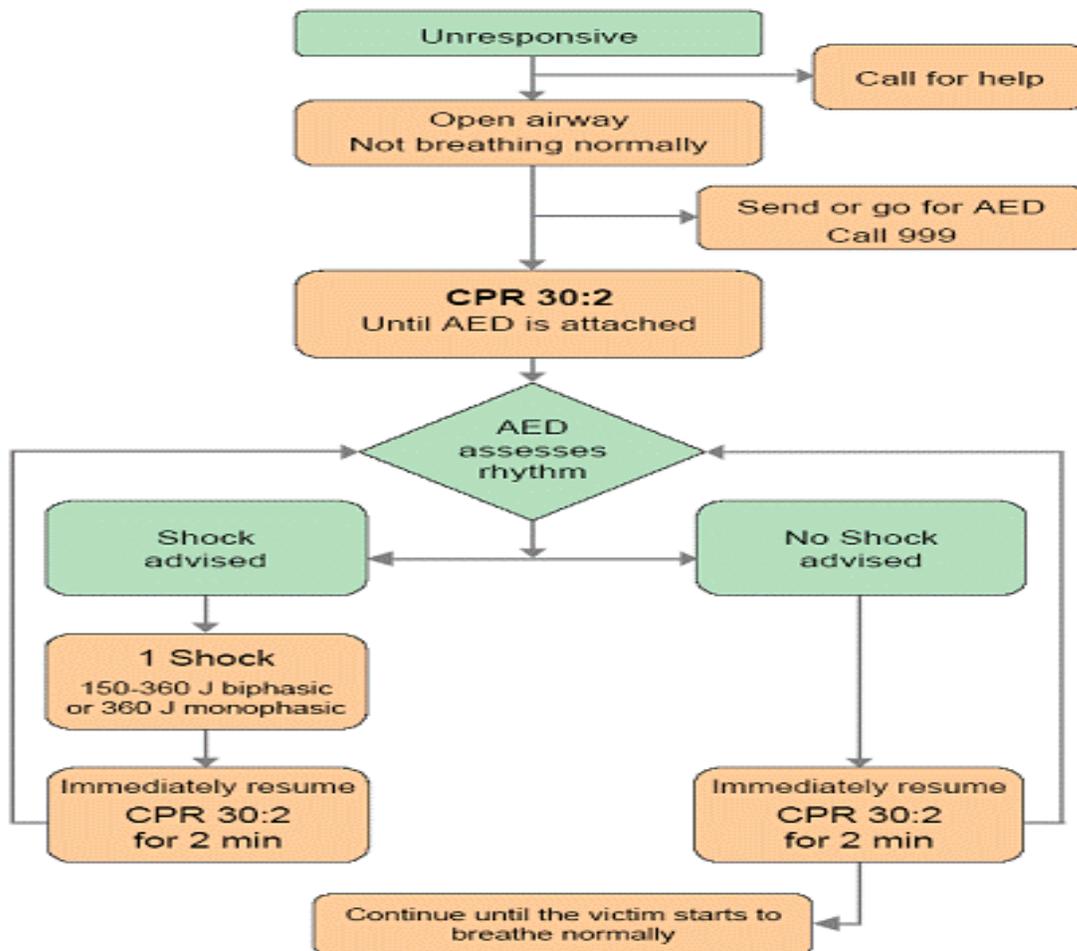


Figure 3.2: Application of an AED

Source: Resuscitation Council of the United Kingdom (2005)

A resuscitator must perform the following sequence of actions when using an AED:

- Perform cardiopulmonary resuscitation until an AED arrives.
- Place the AED alongside the patient and follow the commands.
- Turn on the AED and attach the adult pads.
- Be sure that no one is touching the patient and allow the AED to check the rhythm or push analyse button if needed.

- Make sure that no one is touching the victim before delivering a shock (follow the AED prompts).
- Start CPR immediately (beginning with chest compressions) after shock delivery and continue until the defibrillator is charged and ready to deliver a shock.
- The time interval between the arrival of an AED and the first shock should be less than 90 seconds.

In the USA, the National Registry of CPR reported a 34% average survival-to-discharge rate for in-hospital cardiac arrest caused by ventricular tachycardia or ventricular fibrillation. The survival rate if the shock is delivered *within* three minutes rises to 38%. But if the shock is delivered *after* three minutes, the survival rate is 21% (Peberdy, Kaye, Ornato, Larkin, Nadkarni, Mancini, Berg, Nichol & Truitt 2003:303).

Because of the widely proven advantages of early defibrillation, international resuscitation committees, in collaboration with the ILCOR, have proposed that all personnel whose occupations require them to perform CPR should be trained and encouraged to initiate defibrillation (Cummins & Hazinski 2000:430; Deakin & Nolan 2005:s30). It is therefore imperative to train registered nurses outside the critical care unit environment to use the AED efficiently. Such training and the ready availability of AEDs will undoubtedly result in better survival rates for hospitalised patients who have sustained cardiac arrest (Ali & Zafari 2007:174). Many hospitals in the UK have instituted a two-tier system whereby AEDs are placed in wards and other departments while manual defibrillators are located in critical care facilities (Spearpoint 2008:51). All healthcare professionals should consider the use of an AED to be an integral component of BLS (Spearpoint 2008:51).

3.5 DRUGS ADMINISTERED DURING ACLS

While basic CPR and early defibrillation are of primary importance subsequent to cardiac arrest, drug administration is of secondary importance (AHA 2005:58). While it is accepted that the medications listed in table 3.6 (below) are known to offer theoretical benefits in selected situations, it has not yet been proven that any specific medication will improve the long-term survival rate of human beings after cardiac arrest. Basic CPR and defibrillation therefore remain the primary means in the management of cardiac arrest (Ali & Zafari 2007:174).

3.5.1 Routes for administration of drugs

Intravenous drug administration is the preferred method for delivering medications. It is usually administered via peripheral canula inserted into a large peripheral vein. If there are no visible peripheral veins, an external jugular vein should be considered. The intra-osseous delivery of resuscitation drugs will achieve an adequate plasma concentration. Intra-osseous access uses the highly vascularised bone marrow to deliver fluids and medications during CPR. The primary advantage of intra-osseous delivery during CPR is its high success rate because the necessary medications can be administered within one to two minutes (Beck 2007:1679). Several sites can be used for intra-osseous access. The sternum, the proximal humerus bilaterally, and the proximal and distal tibia bilaterally are common sites used during resuscitation (Sarkar & Philbeck 2009:106). While the proximal tibia is the most popular site for children, the distal tibia, proximal humerus or sternum may be considered for adult patients. Intra-osseous cannulation provides access to a non-collapsible venous plexus and this enables drug delivery that is similar to that achieved by central venous access (AHA 2005:112).

Intra-osseous administration is a safe and effective method for delivering drugs during CPR. All resuscitation drugs should be given by means of the intra-osseous route whenever intravenous access cannot be rapidly established (Beck 2007:1679). In table 3.6 a summary of drugs, their actions and the dosage are given.

Table 3.6 Drugs used during resuscitation

Drug	Action	Dose
Adrenaline	This is naturally occurring catecholamine with alpha and beta effects. It is administered in cardiac arrest to produce peripheral vasoconstriction by means of its alpha adrenergic action. Adrenaline is generally considered to be the standard vasopressor during cardiac arrest.	The initial dose is 1 mg. This should be repeated at regular intervals (every 3 minutes) during CPR. It may be necessary to administer adrenaline in repeated small doses or by infusion in order to produce an adequate blood pressure after the return of a patient-generated pulse.
Amiodarone	Amiodarone is an anti-arrhythmic drug that is administered during ventricular fibrillation and pulseless ventricular tachycardia.	Initial bolus dose is 300 mg. An additional dose of 150 mg could be considered. This may be followed by an infusion (15mg/kg over 24 hours).
Atropine	Atropine is a parasympathetic antagonist that blocks the action of the vagus nerve on the heart. It is administered for asystole and severe bradycardia.	Atropine is given as bolus of 1.0 mg. This may be repeated up to a maximum of 3 mg.
Lignocaine	Lignocaine is an anti-arrhythmic drug that is administered during ventricular fibrillation or pulseless ventricular tachycardia.	It is given initially as a 1mg/kg bolus. During resuscitation, an additional bolus of 0.5 mg/kg may be considered at 5 to 10 minute intervals until a maximum dose of 3mg/kg has been given.

Source: AHA (2005)

3.6 ALGORITHMS

An algorithm is defined as a step-by-step problem-solving procedure. It is most frequently used to describe an established recursive computational procedure for solving a problem in a finite number of steps (*American Heritage Dictionary of the English Language* 2009). The purpose of an algorithm is to present the steps that are necessary to solve a problem in a logical and concise manner so that they will be easy to learn, remember and perform (AHA 2005:21). For the purposes of this study, the procedure is followed in the performance of CPR and the protocols upon which in-hospital resuscitation are based, are referred as an algorithm. Standardised algorithms for the performance of CPR has been developed, evaluated and are continuously updated on the basis of the best available evidence (Shuster 2006:38).

The AHA (2005) has adopted algorithms that describe the steps that need to be followed in the following emergency conditions:

- Basic Life Support (BLS)
- Advanced Life Support (ALS)

- Paediatric Advanced Life Support (PALS)
- Advanced Trauma Life Support (ATLS)

Besides the above, the Resuscitation Council of the United Kingdom (2005) conducts, through various accredited centres, an Immediate Life Support (ILS) course for life support procedures to be taken up on an emergency basis until arrival of the resuscitation team.

In this research, only algorithms for BLS, ACLS and in-hospital resuscitation will be described because the study focuses on in-hospital resuscitation. Figure 3.4 describes the sequence of actions to be followed at the onset of an in-hospital cardiac arrest.

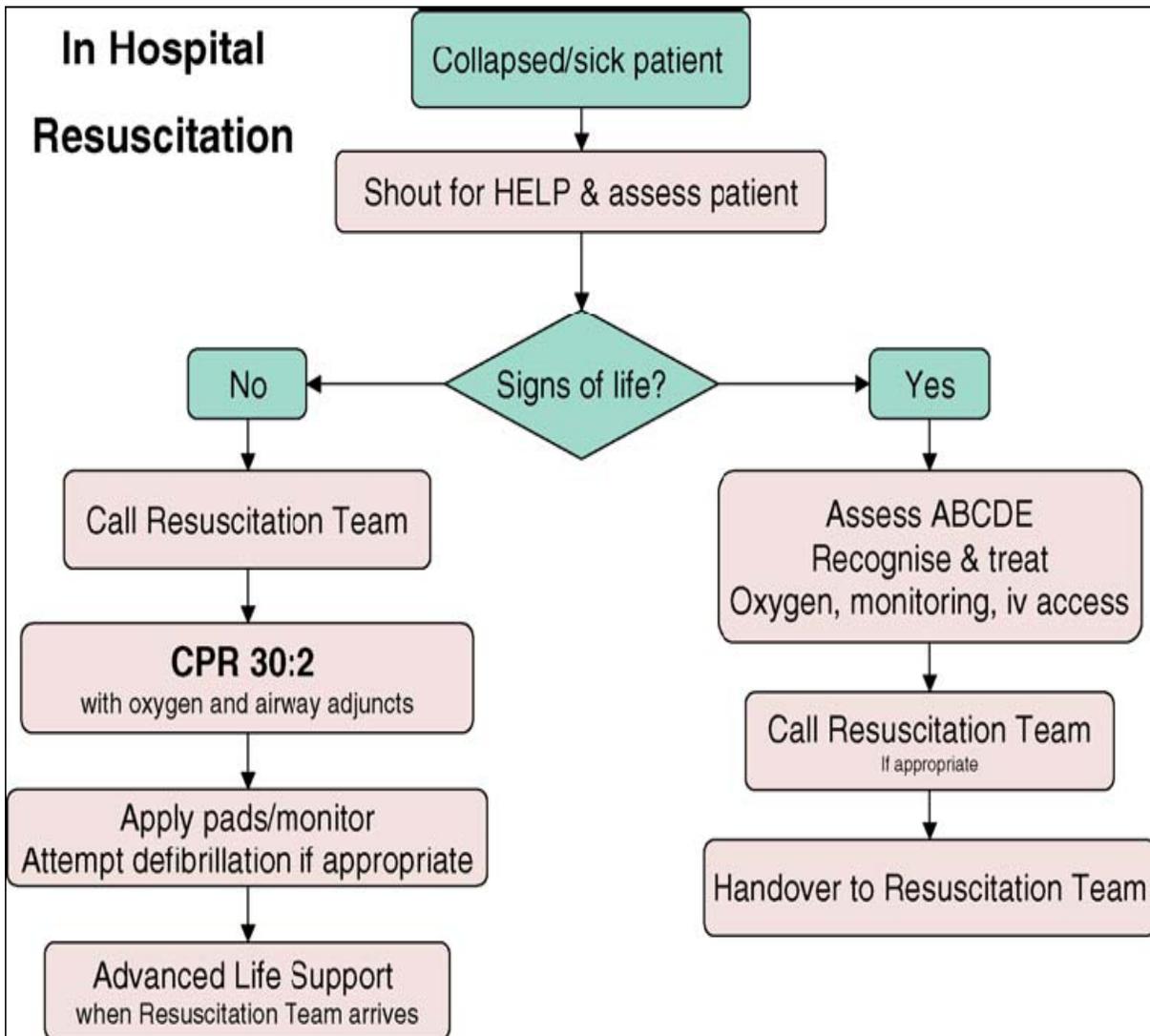


Figure 3.4: Sequence to be followed at the onset of an in-hospital cardiac arrest

Source: Resuscitation Council of the UK (2005)

For all in-hospital cardiac arrests, the nurse ensures that cardiac arrest is recognised immediately and help is summoned using a standard telephone number. CPR should be started immediately using airway adjuncts and defibrillation is attempted within three minutes of witnessed cardiac arrest (Resuscitation Council of the United Kingdom 2005). Figure 3.5 describes the sequence of actions to be followed during CPR.

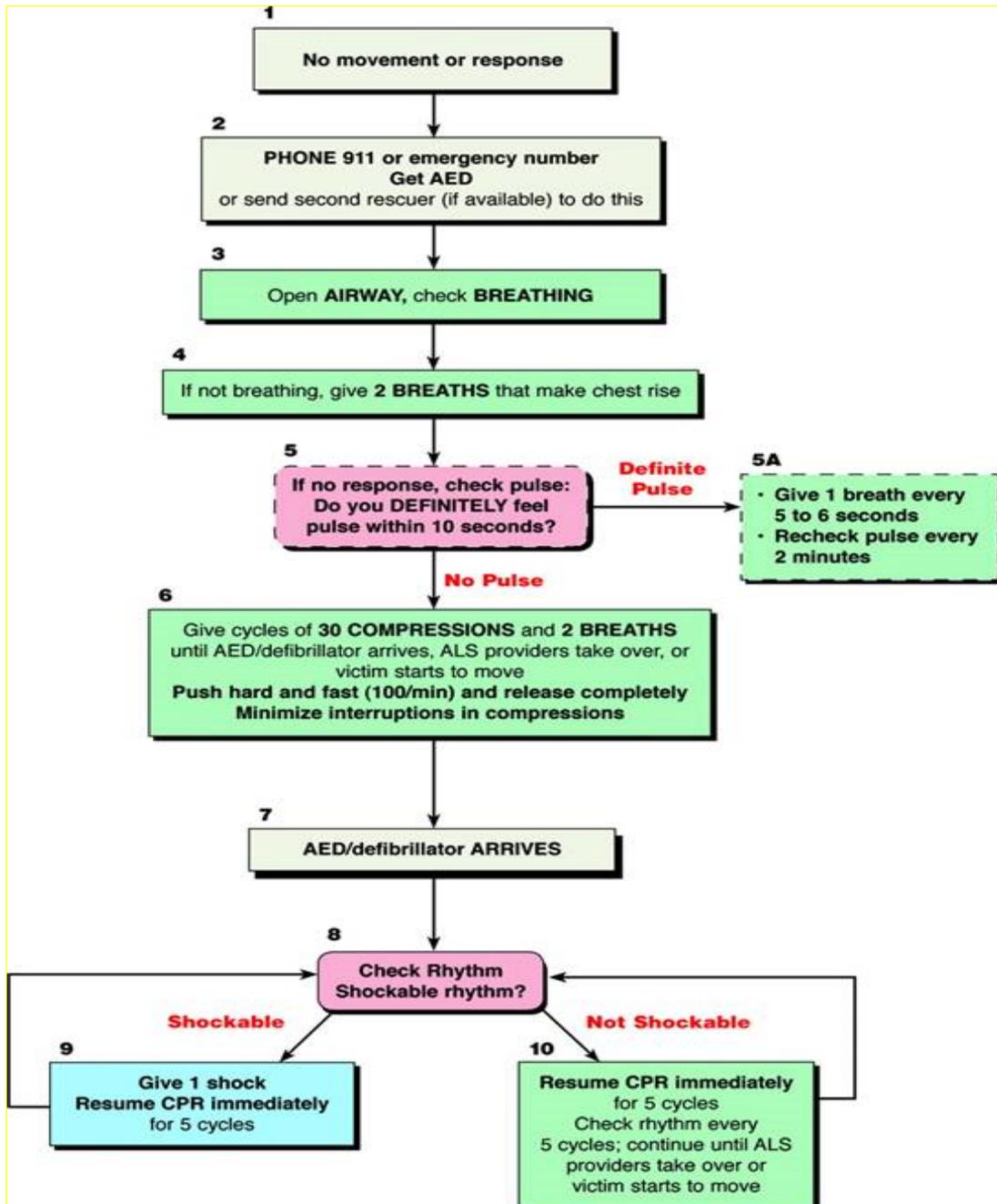


Figure 3.5: BLS algorithm

Source: BLS ALGORITHM (AHA 2005)

For basic life support and CPR, the AHA (2005) guidelines continue to emphasise the "ABCD" approach to acute cardiopulmonary arrest. Because CPR must be started as soon as possible to be effective, and because it often is performed poorly by both lay bystanders and health care professionals, the recommendations for adult CPR have been consolidated and simplified. The key emphasis of the guidelines is "push hard, push fast, allow full chest recoil, and minimize interruptions in chest compressions."

Figure 3.6 describes the sequence to be followed during the provision of ACLS. Several tasks in the algorithm may be undertaken at the same time.

The ACLS algorithm is based on the following considerations:

- The pre-eminent importance of early defibrillation is achieving successful outcomes.
- The chances of successful defibrillation decreases with time. Therefore decreasing the time to defibrillation is the first priority in resuscitation.
- There are a group of potentially reversible conditions which if, left untreated, may cause cardiac arrest or prevent resuscitation (ARC 2006:1).

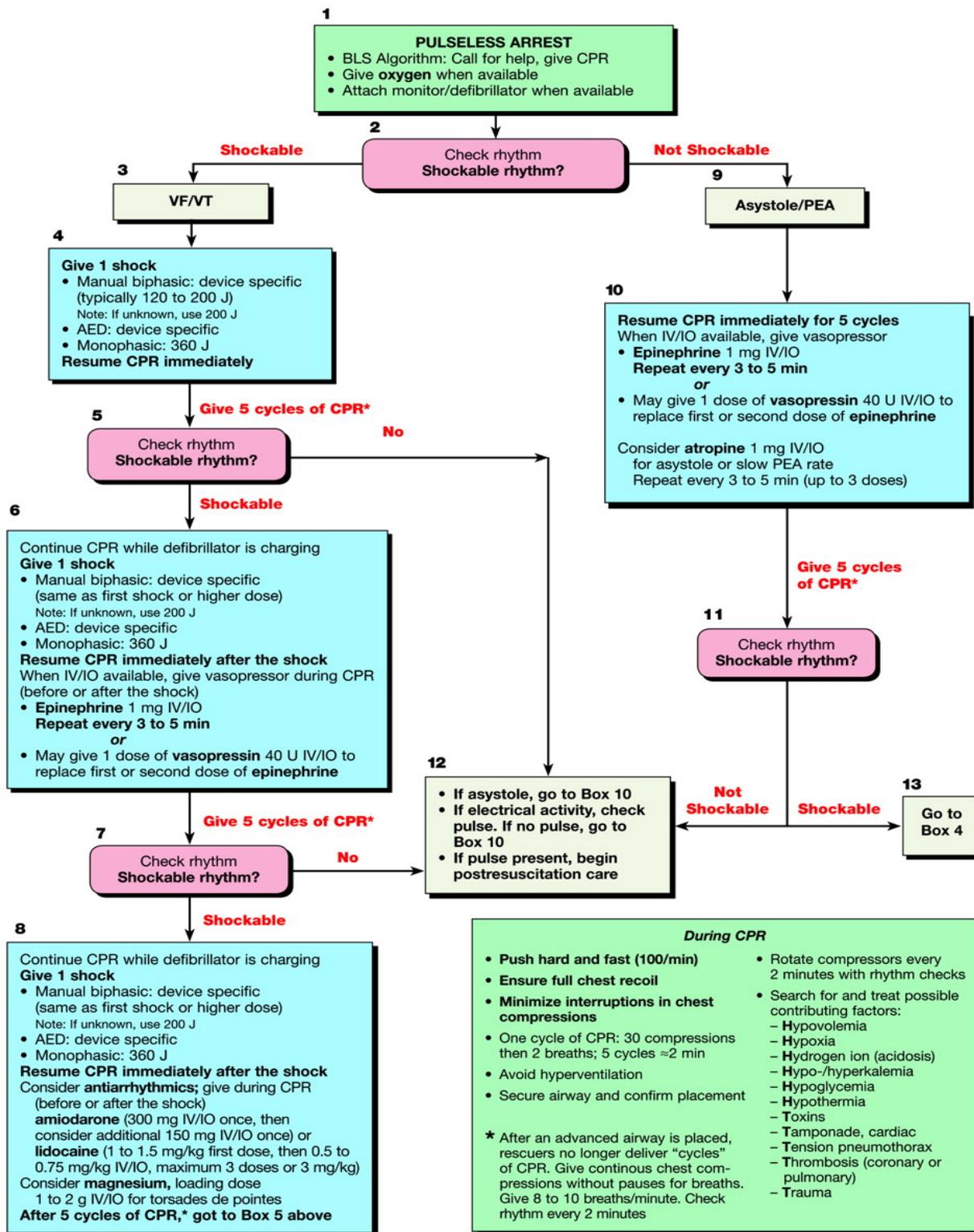


Figure 3.6: ACLS algorithm

Source: AHA (2005)

3.6.1 Differences between BLS, Immediate Life Support (ILS) and ACLS

The table 3.7 explains the differences between BLS, ILS and ACLS.

Table 3.7 Differences between BLS, ILS and ACLS

BLS	ILS	ACLS
BLS refers to the maintenance of airway patency and the support of, breathing and circulation without the use of any equipment other than a protective device. Basic life support techniques are a temporary measure for sustaining a limited degree of tissue oxygenation until the definitive treatment (defibrillation) is able to restore normal function. The use of AEDs by people who are trained in how to use them has been accepted by the Australian Resuscitation Council (Finn & Jacobs 2003:470).	The ILS course trains healthcare professionals in the causes and prevention of cardiac arrest, basic life support, simple airway management and safe defibrillation (by using either a manual or automated external defibrillator – the AED). Although tracheal intubation is not taught in the course, training institutions prefer candidates to become thoroughly familiar with the use of the equipment (Soar, Perkins, Harris & Nolan 2003:22). The ILS course was first offered by the Resuscitation Council of the United Kingdom in 2002 (Soar, Perkins, Harris & Nolan 2003:22).	A distinction is made between advanced cardiac life support and basic life support because ACLS personnel have been trained in invasive techniques, defibrillation, airway management, intravenous access, drug therapy and how to lead and manage a cardiac arrest team. The ACLS course was first introduced by the AHA in 1975. The Resuscitation Council of the United Kingdom advanced life support course was first made available in 1992 (Nolan 2001:9).

As shown in table 3.7, BLS is a procedure providing first aid treatment to a cardiac arrest patient without any invasive procedure. It is a temporary measure to maintain ventilation and circulation. Effective BLS buys time until reversible causes can be diagnosed and/or treated (Resuscitation Council of the United Kingdom 2005).

The ILS course enables the first responder to manage the cardiac arrest until the arrival of a resuscitation team and to participate as a member of resuscitation team. The ILS certification is valid for 1 year in the UK (Soar et al 2003:21).

The ACLS requires skills for leading a resuscitative team and manage the additional interventions such as cardiac pacing and cardio version.

3.6.2. The chain of survival

The term ‘chain of survival’ provides a useful metaphor for the elements of the emergency cardiovascular care systems concept (Figure 3.7). The emergency cardiovascular care

systems concept summarises the present understanding of the best approach to the treatment of persons with cardiac arrest (AHA 2005). The 4 links in the adult chain of survival are:

- early access
- early CPR
- early defibrillation
- early post resuscitation care



Figure 3.7: Chain of survival

Source: ERC (2005)

The actions that make it more likely that a victim of sudden cardiac arrest will survive are collectively known as the 'chain of survival' (Nolan 2005:S6). The chain of survival concept emphasises that all time-dependent interventions must be optimised in order to maximise a patient's chance of survival (Nolan 2005:S5). These interventions include the quickest possible involvement of emergency services, the immediate performance of CPR, rapid defibrillation and the fastest possible administration of advanced life support. The crucial importance of being able to recognise critical illness, to prevent cardiac arrest and to provide post-resuscitation care has been highlighted by the inclusion of these three elements in a new four-ring chain of survival diagram. The first link indicates the importance of being able to recognise those at risk of cardiac arrest and being ready to call for immediate help if necessary. The central link in the chain depicts how CPR and the administration of defibrillation represent an attempt to restore life. The final link shows how effective post-resuscitation care is designed to preserve the functions of the brain and

heart (Langhelle, Nolan, Herlitz, Castren, Venzel, Soreide, Engdahl & Steen 2005: 272; Perkins & Soar 2005: 254).

All nurses should maintain their competence in basic life-support techniques by continuing education and by keeping themselves abreast of any new developments that affect these techniques. All nurses should also seek to extend their basic life support skills to include the administration of defibrillation (Finn & Jacobs 2003:470). It is vitally important because the use of defibrillators by nurses as the first responders to a crisis before the arrival of the cardiac arrest team, is now considered to be one of the most important additions to basic resuscitation routines, and has resulted in improved rates of survival among those who have suffered cardiac arrest (Gombotz, Weh, Mitterndorfer & Rehak 2006:416; Spearpoint, Root, Treanor & Zideman 2006:66). The highest survival rate after cardiopulmonary arrest is obtained when the successive links of the chain can be activated in their correct sequence without any delay (Nolan 2005:S6).

3.7 PROVISION OF EDUCATIONAL TOOLS BY THE HEALTHCARE SYSTEMS – MANIKINS

Many educational tools and aids have been developed and introduced in the training of health care professionals to improve their knowledge and skills on the relevant area of practice. It is in the interest of improvement of health care that policy makers should include such developments in their healthcare *systems*. One such a development in the provision of BLS is a manikin.

A manikin is a model of the human body that is usually made up of detachable parts so that the appearance of the organs of the body and their positions relative to one another can be easily exhibited to students (*Merriam Webster's Online Medical Dictionary* 2009).

Asmund Laerdal of Stavanger in Norway completed the production of a manikin for teaching the techniques of CPR education in 1960 and named the manikin “Resusci Anne”. (In the United States it is known as “CPR Annie”). Dr Peter Safar, who later became known as “the father of CPR” wrote: “Without Asmund Laerdal, CPR would never been implemented so rapidly and so widely. Millions have been influenced by his products,

thousands by his thoughts” (Tjomsland & Baskett 2002:115). The following two paragraphs explain the history of manikins and the types that are available.

3.7.1 History of manikins

“Resusci Anne” was first presented at a Red Cross conference in the USA in 1960 (Cooper & Taqueti 2004:i12). “Resusci Anne” was initially designed to teach the techniques of mouth-to-mouth breathing. The introduction of Asmund Laerdal’s product was one of the most important landmarks in the history of medical simulations. Resusci Anne’s face was based on the death mask of the well-known girl who had drowned in the river Seine in late 1800s. (Finn & Soar: 2005:5). Her death mask had become famous because of her wistful, enigmatic and peaceful expression. She was also beautiful and Laedral commissioned the sculptress Emma Mathiassen to model the face for his training manikin. The manikin was clothed in a tracksuit and not in a dress and was therefore ideal for teaching purposes. Laerdal therefore succeeded in his intention of encouraging the teaching of resuscitation techniques by designing a sympathetic and appropriate victim. Annie’s design evolved over the years to incorporate a spring in her chest for the practice of CPR. This early simulation of a dying victim who is not breathing and who lacks a heart beat, has been widely used in CPR training ever since its first introduction (Finn & Soar: 2005:5).

3.7.2 Types of manikins

There are other kinds of manikin that are used for teaching purposes. They include:

- Harvey cardiology manikins
- Voice advisory manikin
- Virtual reality enhanced manikin

Table 3.8 Types of manikins

Type of manikin	Description
Harvey cardiology manikin	Harvey is a full-sized manikin that is able to simulate 27 different cardiac conditions. It is the earliest example of the modern concept of a part-task trainer in medical skills training (Cooper & Taqueti 2004; i13). This simulator displays various physiological attributes and indicators such as blood pressure, a bilateral jugular venous pulse, precordial impulses and a whole spectrum of cardiac diseases. Harvey has been extensively used for training medical and nursing students (Cooper & Taqueti 2004:i14).
Voice advisory manikin	An automated voice advisory manikin gives continuous verbal feedback during individual CPR training. A manikin with a computer-simulated voice is a novel approach to the teaching of the psychomotor skills of CPR. Since the acceptable limits for ventilations and compressions are pre-set, the VAM gives immediate compute-analysed audio feedback when the skill that is being practised falls outside the expected and acceptable range. This kind of approach to training has been shown to improve the acquisition and retention of psychomotor skills in the training of adult and paediatric life-support personnel (Wik, Myklenust, Auested & Steen (2002:273).
Virtual reality enhanced manikin	The Laerdal HeartSim manikin is able to deliver virtual reality information that is specifically tailored to the needs of resuscitation training. The VREM manikin is able to display clinical signs and symptoms such as the clinical features that are indicative of cardiac arrest, changes in skin colour and the absence of a pulse. Virtual reality technology and traditional training methods have been combined in this manikin for the purpose of teaching CPR (Semeraro, Frisoli, Bergamasco & Cerchiari (2009:489).

3.7.3 Types of manikin used for CPR

Several types of manikins have been introduced since the creation of the first manikin. This section describes and discusses some of them.

3.7.3.1 *Little Anne*

A description of 'Little Anne' manikin is given in figure 3.8.



Little Anne®



Little Anne® variations

Figure 3.8: Chain of survival

(Source: Manikins Update 2005:[3])

The Little Anne® manikin is a realistic and light-weight adult CPR trainer with all the essential features for adult CPR learning (Manikins update 2005:[3]). It offers the following features:

- The oral and nasal passages allow a practitioner to perform the realistic nose pinch that is required for mouth-to-nose and mouth-to-mouth resuscitation.
- An in-built obstruction in the airway gives students an opportunity to become competent by learning the important technique of opening the airway.
- The tilt of the head, the lift of the chin and the jaw thrust allow students to practise the various steps required by CPR.

- The anatomical feedback from chest compressions reinforces the learning of the correct compression depths (a clicker is an optional feature).
- The manikin produces audible computer-generated voice feedback when chest compressions are taking place. The learning of the correct compression depths is reinforced by an optional clicker feature.
- The manikin is constructed so that students can apply realistic chest compressions. This enables students to become accustomed to the correct amount of pressure that is needed to perform chest compressions on a living human being.

3.7.3.2 Little Anne Junior (“Little Junior”)

Figure 3.9 shows an image of ‘little Anne junior’ manikin, a lifelike child CPR trainer.



Figure 3.9: Little Anne Junior
(Source: Manikins Update 2005: [3])

The Little Anne Junior manikin is designed to enable students to practise child resuscitation. All its other functions and features are similar to those of Little Annie (Resusci Anne) (Manikins Update 2005:3).

- It enables the performance of mouth-to-nose and mouth-to-mouth ventilation.
- An in-built obstruction in the airway gives students an opportunity to learn the important technique of opening the airway. Abdominal thrusts can also be practised on Little Anne Junior.
- The tilt of the head, the lift of the chin and the jaw thrust allow students to practise the various steps required when resuscitating a real victim by means of CPR.

- A realistic airway simulation means that the airway remains obstructed in the absence of the proper head tilt, chin lift or jaw thrust. The chest is seen to rise and fall when correct ventilations are applied.
- All the necessary anatomically correct features such the sternal notch enables a student to practise the identification of all the anatomical features that are relevant to child CPR.
- The manikin produces audible computer-generated voice feedback when chest compressions are made to the correct depth. Learning the correct compression depths is reinforced by an optional clicker feature.
- The manikin is constructed in such a way that students must apply the correct chest compressions. This enables students to become accustomed to the correct amount of pressure that is needed to perform chest compressions on a child.
- The manikin comes with economical disposable airways for quick and easy clean-up.
- The manikin can be fitted with removable and reusable faces for convenient and affordable usage and maintenance.

3.7.3.3 Resusci Adult Anne Skill Reporter

Figure 3.10 explains about the Resusci Adult Anne skill reporter which provides a high-level CPR training for professional rescuers where feedback and skill optimisation is required (Manikins Update 2005: [5]).



Figure 3.10: Resusci Adult Anne skill reporter

(Source: Manikins Update 2005: [5])

The Resusci Anne Skill Reporter is an adult CPR training manikin that provides printed feedback on the performance of students by means of reports that contain assessments of the correctness (or otherwise) of ventilation and compressions during practice. It also offers the following features:

- It is educationally effective because it offers immediate feedback about the performance level of key CPR skills and techniques.
- It offers realistic full-body anatomy features landmarks provide the essential features necessary to learn realistic victim handling and quality adult CPR skills
- Enhanced student motivation through use of the optional skill reporter module that allows both real time performance feedbacks during training and comprehensive post intervention performance report for instructor to student debriefing.

3.8 MILESTONES ON THE WAY TO THE DEVELOPMENT OF INTERNATIONAL GUIDELINES 2000 - THE FIRST INTERNATIONAL CONFERENCE ON GUIDELINES FOR CPR AND ECC

The first CPR guidelines were published in the mid 1960s and have undergone numerous revisions since new evidence-based medical findings have become available (Ramsay & Maxwell 2009:360). Because CPR is constantly being improved on the basis of new evidence and techniques, the guidelines for CPR are periodically subject to revision and improvement (Shuster 2006:37). Since resuscitation science continues to improve and expand, its clinical guidelines need to be regularly updated to reflect the latest developments. When this happens, healthcare providers need to be advised accordingly and informed about best practice (Nolan 2005:S4). Development of such international guidelines influences the healthcare *systems* and healthcare *professionals* in setting their own policies and practice standards resulting in improved *patient* outcomes.

The following table (table 3.9) sets out the important milestones in the development of international CPR guidelines (Cummins & Hazinski 2000:431).

Table 3.9 Important milestones in the development of international CPR guidelines

Year	Conference(s)	Developments
1966	First Conference on CPR: National Academy of Sciences, National Research Council	This conference was the first to make wide-ranging recommendations about the training of medical and allied health professionals in the techniques of external chest compressions according to the latest Standards prescribed by the AHA.
1973	Second National Conference on CPR: American Heart Association	This conference made recommendations that CPR training programmes should be made available to the general public.
1979	Third National Conference on CPR: American Heart Association	The conference issued ACLS recommendations about the training, testing and supervision of medical and allied health professionals who practise CPR.
1983	First National Conference on Paediatric Resuscitation: American Academy of Paediatrics, American Heart Association	The conference issued guidelines for paediatric BLS and ALS and separate guidelines issued for neonatal ALS.
1985	Fourth National Conference on CPR and ECC: American Heart Association, American Academy of Paediatrics	The conference reviewed all the experimental and clinical research that had been published since 1979.
1992	Fifth National Conference on CPR and ECC: American Heart Association and Collaborating Councils. Founding and first meeting of ILCOR	The conference reviewed all developments in CPR that had occurred over the previous seven years. ILCOR was founded and held two meetings per year until 2000.
2000	The First International Guidelines Conference on CPR and emergency cardiovascular care. The following organisations were among the delegations represented at the conference: European Resuscitation Council ; Heart and Stroke Foundation of Canada; Resuscitation Councils of Southern Africa; Resuscitation Councils of Latin America; International Collaboration of American Heart Association (AHA);	This was the first international conference to invite a large range of papers about the latest techniques in CPR, expert contributions and reviews of recent publications. The conference focused on the evidence-based findings and techniques, and updated all previous recommendations.
2005	The Second International Guidelines by ILCOR	The conference described the latest advances in CPR and published a number of new guidelines about, for example, the compression ventilation ratio.

Source: AHA (2000:3)

3.9 FACTORS THAT PRECIPITATED MAJOR CHANGES IN THE 2005 AHA GUIDELINES FOR CPR AND ECC

The purpose of guidelines is to standardise recommendations for CPR treatment and procedures with a view to reducing the rate of preventable morbidity and mortality (Shuster 2006:37). According to Shuster (2006:38), resuscitation guidelines use all the most recent research to make recommendations about best practice and to describe the consensus of expert opinion in areas where further research needs to be performed.

The ILCOR committee, for example, concluded that the 2000 algorithms were not optimal for achieving and maintaining adequate myocardial perfusion pressure during cardiopulmonary resuscitation (Hazinski, Nadkarni, Hickey, O'Connor, Becker & Zaritsky 2005:207).

The change to the prevailing recommendation for the compression-ventilation ratio came after all the evidence that had been accumulated from recent clinical observations, theoretical analyses and the results of manikins and animal studies had been carefully evaluated, described and discussed (Hazinski et al 2005:210). Several case studies with human beings in 2004 and 2005 provided evidence that health care professionals were delivering an inadequate number and depth of compressions during CPR and that they were also interrupting compressions unnecessarily and establishing more ventilation than was needed for optimal results (Abella, Alvarado, Myklebust, Edelson, Barry, O'Hearn, Vanden Hoek & Becker 2005:305; Kern, Hilwig, Berg, Sanders & Ewy 2002:646; Wik, Johanesen, Myklebust, Sorebo, Svensson, Fellows & Steen 2005:303). It was established that a combination of inadequate, interrupted chest compressions and excessive ventilation rates reduced cardiac output and therefore diminished the likelihood that successful resuscitations would ensue (Kern et al 2002:646). In addition to this, various mathematical and animal-based models suggested that a consilience between the pulmonary blood flow and ventilation might be more appropriate when using compression-ventilation ratios higher than 15:2 (Babbs & Kern (2002:156); Sanders, Kern, Berg, Hilwig, Heidenrich & Ewy 2002:554).

A single animal study demonstrated that a ratio of 30:2 was more likely to re-establish spontaneous circulation much more quickly, and that it also resulted in a greater volume of

systemic and cerebral oxygenation than did continuous chest compressions (Dorph, Wik & Stromme, Eriksen & Steen 2004:316). An accompanying theoretical analysis of various rates of compression and ventilation ratios also suggested that a ratio of 30:2 would provide optimal oxygen flow and delivery (Babbs & Kern 2002:155). Once all the best human, animal, manikin and theoretical data had been analysed and collated, a universal compression-ventilation ratio of 30:2 was recommended for all lone-operating CPR practitioners for all victims ranging from infancy (excluding newborns) through to adulthood. In addition, a compression-ventilation ratio of 15:2 was recommended for two rescuers who were administering CPR to infants and children until the age of the onset of puberty (AHA 2005). According to Olasveengen, Vik, Kuzovlev and Sunde (2008:409), the implementation of the modified 2005 guidelines for CPR showed an improvement in the quality of CPR together with a reduction in both pre-shock pauses and the total amount of time without chest compressions. In spite of this, there was only a mild improvement in the rates of survival for patients between admission to hospital and discharge.

These new CPR recommendations were made so that lay rescuers and healthcare providers alike would find it easier to learn, memorise and perform these critical skills with a minimum of interruptions during the performance of chest compressions. It was also hoped that these new recommendations would eventually improve the survival rate of patients during and after CPR (AHA 2005:9). The issuing of new and revised recommendations for treatment does not imply that all previous clinical care that utilised earlier guidelines was unsafe. The new recommendations were issued in 2005 because ILCOR scientists felt that all the most recent knowledge, research and experience had necessitated certain refinements in the practice of CPR that would make it more effective and easier to implement (Hazinski et al 2005:206).

Table 3.10 explains the differences between the 2000 recommendations in the 2005 recommendations (as recommended by ILCOR)

Table 3.10 Differences between the 2000 recommendations on CPR and the 2005 recommendations on CPR

Measures	2000 recommendation	2005 recommendation
Immediate defibrillation for un-witnessed cardiac arrest	Recommended	5 cycles of CPR before shock is recommended
Adult compression-ventilation ratio (compression rate 100 per minute)	15:2	30:2
Paediatric compression-ventilation ratio (compression rate 100 per minute)	15:2 (for single rescuer) 5:1 (for two rescuers)	30:2 (for single rescuer) 15:2 (for two rescuers)
Ventilation rate	10-12 per minute	8-10 per minute
Sequence of defibrillation	3 stacked shocks	1 shock only, followed by immediate CPR
Rhythm/pulse check	After each check	After 5 cycles of CPR following each check
CPR quality	Not emphasised	<ul style="list-style-type: none"> • Limit interruptions • Ensure adequate depth of compressions • Allow full chest recoil • Do not hyperventilate

Source: Shuster 2006:39

3.10 ETHICAL PRINCIPLES OBSERVED DURING CARDIOPULMONARY RESUSCITATION

The aim of CPR is to preserve life, restore health, relieve suffering, limit disability and reverse clinical death (AHA 2005:1). Several ethical principles guide both the practitioner's decision whether to attempt CPR or to withhold CPR in any particular situation, and the actions that the practitioner performs to maintain the dignity of the patient in whatever circumstances prevail (Baskett, Steen & Bossaert 2005:S171). It is therefore vitally important for healthcare providers to understand and appreciate the principles involved so that they will be able to decide whether to provide or withhold resuscitation.

It is also equally important for the healthcare institutions and healthcare providers to earn the trust of the patients by demonstrating ethical principles in patient care. *Patient's* trust on the *system* and *nurses* helps in strengthening the patient's resolve to co-operate in the provision of care and in enhancing the quality of the *outcome of CPR*. Such a trust also plays a major role in the patient and his/her family accepting any outcome more gracefully.

The four key principles that govern the provision of withholding of CPR are beneficence, non-maleficence, justice and autonomy.

- **Beneficence:** While health care providers should obviously be eager to benefit their patients, they should always first weigh the probable benefits of a treatment against the risks that will be incurred by such a treatment. This means that the practitioner will, in the last analysis, either attempt resuscitation or withhold resuscitation on the basis of the principles outlined here.
- **Non-maleficence** means the avoidance of intentional harm. Resuscitation should therefore never be attempted in cases where there is no hope or possibility of resuscitation or in cases where such a treatment would be in express violation of the patient's stated wishes.
- **Justice** implies spreading the benefits and risks equally within a society. Resuscitation should therefore be made available to all who could benefit from it within whatever resources are available
- **Autonomy** refers to the ability of patients to make informed decisions by themselves. Autonomy requires that patients be adequately informed, mentally and emotionally competent, and free from any kind of external pressure, harassment or duress.

The ethical and cultural norms and standards of the community in which the practitioner operates should be taken into consideration by practitioners when they begin and end any resuscitation attempt. The AHA (2005) guidelines on ethical issues assert that patient autonomy, advance directives, living wills and patient self-determination should all be considered. In spite of this, all patients who are in cardiac arrest should receive resuscitation unless firstly they have issued an earlier and legally valid *Do Not Attempt Resuscitation* directive, secondly the patient already exhibits signs of irreversible death, and thirdly it is apparent that no physiological benefits could possibly be expected because of a deterioration of vital functions beyond the point of no return.

Since the role of nurses has changed from being the "handmaiden of a doctor" to that of being skilled practitioners in their own right who are accountable for their actions, they should scrupulously adhere to these principles during the provision of CPR (Wainwright 2007:35).

3.10.1 “Do Not Attempt Resuscitation” (DNAR)

According to Baskett et al (2005:S173), this injunction (Do Not Attempt Resuscitation) means that CPR should not be performed in the event of cardiac or respiratory arrest. DNAR does not prevent the necessity for other treatments such as pain relief and sedation in particular ventilation and oxygen therapy, fluid and vasopressors, and whatever basic nursing care might be indicated for contributing to the quality of life of the patient.

The AHA (2005:5) recommends that it is the attending physician in consultation with other members of the team and the members of the patient’s family who should interpret the ethical issues surrounding the provision or withholding of CPR and the validity of the Do Not Attempt Resuscitation directive. It should be noted that while oral Do Not Attempt Resuscitation orders are not regarded as valid, the registered nurses may accept a Do Not Attempt Resuscitation order by telephone with the understanding that the attending physician will sign the order promptly if he or she is not physically present. The decision whether to resuscitate or not and the reasons for doing so should be recorded in writing on a special form that must be included with the patient’s notes and also recorded in the nursing notes (Baskett et al 2005:S174).

3.10.1.1 Abandoning resuscitation

Several factors will influence any decision to call a halt to the resuscitative effort. These include the medical history of the patient, the prognosis, the period that elapsed between cardiac arrest and the beginning of CPR, the length of time before defibrillation could be applied, and the amount of time during which the patient has received advanced life support with continuing asystole. Any decision to abandon the resuscitation attempt should be made by the team leader in consultation with the other team members (Baskett et al 2005:S174). It is, however, necessary to continue the resuscitation said as long as ventricular fibrillation persists. It is generally accepted that a continuous asystole of more than 20 minutes in the absence of any reversible cause with all ALS measures in place, constitute valid and ethical grounds for abandoning a resuscitation attempt (Baskett et al 2005:S174).

3.10.1.2 Withholding and withdrawing CPR

All evaluations of the relevant research and practice information indicate that few criteria can accurately predict the futility of CPR (AHA 2005:6). In light of this amount of uncertainty, all patients in cardiac arrest should receive CPR unless:

- there is a legally valid DNAR directive that was issued by the patient
- the patient shows signs of irreversible death
- no physiological benefit can be expected because various vital functions have deteriorated in spite of the best possible therapy and treatments having been applied (e.g. progressive septic or cardiogenic shock)

The decision to stop or withhold a resuscitation attempt is usually made by the most senior doctor present after appropriate consultation with the other personnel. It is nevertheless both wise and prudent to seek a second informed opinion before making such a decision for fear that a doctor's own personal values or any problems in connection with the availability of resources might unduly influence his or her opinion (Forde, Aasland & Steen 2002:235). The most ethically justifiable way to reduce the rate of inappropriate and unjustifiable resuscitation attempts is to encourage any seriously ill or any other at-risk persons *in pre-hospital care* to articulate their preferences in advance and to document their personal wishes in a legally binding and valid format (Kellermann 2006:693).

3.10.2 The nurse's role in decisions about CPR

The Nursing and Midwifery Council of the UK (2004) requires nurses to cooperate with others in the team as well as with the patients themselves, their families, and the other health and social care professionals who are concerned with their case. The Nursing and Midwifery Council of the UK (2004) further obligates the nurse to adhere to the laws of the country in which he or she is practising. In order to guarantee the legality of CPR practice in all its ramifications, nurses should be assiduous in providing patients and their relatives with all the necessary information that they need to understand the process and to make ethical and informed decisions. Good communication with patients and other members of the health care team is essential if good practice within a legal framework is to be provided (Wainwright 2007:35). Since the basic purpose of CPR is to save a human life, the

withholding of CPR is likely to be considered an unlawful act wherever no valid advance Do Not Attempt Resuscitation directive has been lawfully documented or articulated (Wainwright 2007:36). It is therefore imperative for nurses to acquire and apply whatever legal precedents govern the application of CPR in nursing and medical practice. It is also necessary for nurses to regulate their conduct in terms of the policy and national guidelines that have been formulated by their professional and advisory bodies (Spearpoint 2008:56).

3.11 THE OUTCOMES OF CPR

Despite decade of efforts to promote CPR science and education, the survival rate in patients who suffer out-of-hospital cardiac arrest remains low with a worldwide averaging of 6% or less (Fredriksson, Herlitz & Nichol 2003:276; Rea, Eisenberg, Sinibaldi & White 2004:20). In fact, it may be said that the rates of survival and complete physiological recovery in the aftermath of in-hospital cardiac arrest are poor for all age groups. Even in hospitals, the number of adult patients who have suffered in-hospital cardiac arrest and who survive to go home is approximately 20% (Perberdy et al 2003: 307).

No marked improvement in survival rates *after* in-hospital cardiac arrests has been reported despite the considerable number of improvements in technology over the years and more effective resuscitation training programmes (Skrifvars, Rosenberg, Finne, Halonen, Hautamaki, Kuosa, Niemela & Castren 2003: 280). These findings are supported by Weil and Fries (2005:2827) when they note that fewer than 20% of all in-hospital cardiac arrest patients survive. Hajbaghery, Mousavi & Akbari (2005:319) are of the opinion that if hospitals with equipped with AEDs and if personnel were properly trained in basic and advanced life-support training programmes, the survival rate of in-hospital cardiac arrest patients would be likely to improve. The successful outcome of cardiopulmonary resuscitation is dependent on the availability and delivery of critical interventions, particularly early defibrillation, effective chest compressions and assisted ventilations (Jacobs & Nadkarni 2004:3386). Despite considerable efforts to improve the treatment of cardiac arrest by making use of these techniques, most reported survival outcomes figures for the treatment of cardiac arrest remain poor (Jacobs & Nadkarni 2004:3385).

According Peters and Boyle (2007:244), the factors that increase the survival of all cardiac arrest patients as a result of a rapid return to spontaneous circulation depend on the location of the patient when cardiac arrest occurs, whether or not the arrest has been witnessed and monitored, increasingly shorter intervals before the arrival of the cardiac arrest team, and the initial availability of a shockable cardiac rhythm. A recent study conducted in Oslo, Norway, after the implementation of the new guidelines reveal a decrease in both hands-off ratios and pre-shock pauses (Olasveengen, Kuzovlev & Sunde 2009:410). In spite of this, Olasveengen et al (2009:410) were able to show that there was no statistical difference between survival rates before the implementation of the new guidelines and those after the implementation of these guidelines.

By contrast, another study conducted by Garza, Matthew, Joseph, Salomone, Daniel, McElroy and Rex (2009:2600) found that changes in pre-hospital protocol for adult cardiac arrest that optimised chest compressions and reduced interruptions increased the incidence of the return of spontaneous circulation and the survival to discharge rates in their outpatient population. This study supports the belief that limiting interruptions to chest compressions improves both the overall survival rate and favourable neurological outcomes. Despite the low rates of survival for patients who have received CPR, researchers continue to try to identify therapies that will improve short-term outcomes. The goal of resuscitation research remains the identification of interventions that will produce patients who have survived with neurologically intact and uncompromised functions when they are discharged from hospitals in the aftermath of cardiac arrest (Hazinski et al 2005:211).

3.12 SCOPE OF PRACTICE FOR NURSES ON BLS, ACLS

The ARC (2006) recommends that all nurses should receive BLS training as a component of their entry level qualification and that they be responsible for maintaining their competence in BLS at a minimum level on an annual basis. The ARC (2006) further recommends that wherever semi-automatic defibrillators are accessible and in good order, competence in their use should be considered to be a feature of BLS training and practice. In addition, the Australian College of Critical Care Nurses (2006:1) recommends that registered nurses who work in critical care environments where patients are at risk of

sudden life-threatening emergencies should be competent in the provision of advanced life support treatments.

In its standards for clinical practice and training in CPR, the Resuscitation Council of the United Kingdom (2005) recommends that all staff should undergo regular resuscitation training to a level that is consonant with their clinical responsibilities and clinical specialities. In the United Kingdom, nurses are furthermore expected to develop and widen the scope of their practice to include competence in performing defibrillation. These efforts are all part of an attempt to raise standards so that nurse defibrillation may be regarded as a basic rather than an exceptional nursing function (Moule & Albarran 2002:227). In Europe, the Austrian Federal law of nursing states that all the nurses should be trained in BLS as well as in the use of AED and ALS, and that nurses working in the critical care units should be trained in BLS, AED and ALS (Gombotz et al 2006:420). Similarly, the Norwegian national guidelines have recommended that all registered nurses should be trained in BLS and AED and that CPR training should be updated at least once every six months as well as in the courses that are offered every year (Hopstock 2008:425). In the description of the scope of their practice, the Nursing and Midwifery Council of Botswana (1995) does not specifically state that competencies with regard to BLS and CPR for registered nurses who practise in Botswana are required.

3.12.1 Education and training in CPR

The objective of training in CPR is to equip the learner with the ability to be able to perform resuscitation in real-life clinical or emergency out-of-hospital situations (Baskett, Nolan, Handley, Soar, Biarent & Richmond (2005:S181).

It is evident that frequent training in both theory and practice is mandatory for the maintenance of both BLS and ACLS skills (White 2006:739). It is the resuscitation councils of countries throughout the world that are responsible for propagating and certifying resuscitation training for health care professionals and lay people alike. It is therefore the responsibility of health care professionals to avail themselves of such opportunities for training and retraining in accordance with currently recommended guidelines by their regional resuscitation councils (White 2006:739). The need for formalised training in cardiopulmonary resuscitation was already recognised in the 1950 and 1960s (De Vita

2005:1150). A variety of methods are used for training in resuscitation throughout the world. According to Baskett et al (2005:S182), practitioners cannot possibly be competent unless they subject themselves to frequent training programmes that update both their skills and knowledge and unless their retention of what they have learned is optimal.

The most common teaching method is that whereby BLS instructors are trained by the sponsoring organisation to impart information, teach skills and evaluate the knowledge and skills of BLS that they have taught (AHA 2005). Traditional resuscitation training methods have usually taken place in classrooms or training areas, and require dedicated facilities and human resources. While CPR and ACLS training have evolved, it has been a challenge to resuscitation educators to identify the best methods of transferring learning that will enable the successful application of classroom knowledge outside the classroom setting (Hravnak, Tuite & Baldisseri 2005:95). It has been argued that since educators no longer rely on traditional teaching methods, more effective learner-centred education techniques are required (Chamberlin & Hazinski 2003:11). There is also a certain amount of evidence to indicate that past BLS training programmes have been inadequate. Other studies also report that nurses and doctors demonstrate a poor retention rate of the knowledge and skills that they require to perform effective CPR (Hamilton 2005:288; Madden 2006:218).

Various innovative teaching methods have been introduced into the teaching of CPR in order to encourage a more learner-centred approach (Hamilton 2005:290). Thus there are some researchers who use self-instruction videotapes (Lynch, Einspruch, Nichol, Becker, Aufderheide & Idris 2005:35), CD-ROMS (Moule 2002:164) and simulated cardiac arrests (Hendrickse, Ellis & Morris 2001:175) to evaluate alternative methods of teaching and learning resuscitation skills. In spite of this, evidence that demonstrates the efficacy of the use of technology in the pedagogy of resuscitation within the profession is limited (Moule, Albarran, Bessant, Brownfield & Pollock 2008:428).

The following recommendations in this regard were made by the ILCOR on CPR (2005)

- Training should not take place with large groups. Lecture-based courses for small groups that are based on various scenarios and that are facilitated by interactive teaching are recommended.

- High-fidelity simulations that are designed for training should increasingly supplement instructor-directed training in advanced life-support courses.
- BLS training needs to be simplified so that the students can focus on learning the essential skills.

In order to plan BLS and ACLS training effectively, one therefore needs to assess the needs, abilities, training and quality of the learners, the resources that are available and the environment in which the training will take place (Kidd & Kendall 2006:60). The ERC recommends that training should follow the principles of adult education and learning and the course should preferably be taught to small groups of between four and eight members by making use of interactive discussions and hands-on skills practices and the construction of clinical scenarios as a forum for teaching problem solving and leadership (Baskett et al 2005:s182). Although the optimal intervals between sessions of training have not yet been scientifically established, repeated refresher training at intervals of less than six months seems to be needed for most individuals who are not required to practise resuscitation on a regular basis (Chamberlin & Hazinski 2003:30).

3.12.2 Future trends in CPR

Regardless of the training or experience of the individual who is performing chest compressions, manual CPR requires the full attention of one rescuer during any resuscitative effort. Even where two rescuers are able to alternate their efforts, the intensity of the actions required rapidly induces fatigue (Wigginton, Miller, Benitez & Pepe 2005:219). Recent studies have also demonstrated that during in-hospital and out-of-hospital resuscitation efforts, manual chest compressions were much slower and shallower than those that have been specifically recommended by the AHA and ERC (Abella et al 2005:305; Wik et al 2005:300).

The first mechanical CPR device that was introduced in clinical and preclinical application was called the “Thumper”. It is a mechanical chest compressor that makes use of a piston driven by pressurised air, and it has been in use since the late 1970s (Paul 2007:334). There are a variety of other devices that are also available to improve the quality of CPR (Leary & Abella 2008:3). These devices have been introduced to ease the burden of physical labour that is required for the conduct of CPR, and some of them are still in the

experimental stage. These newer devices include ones that are used to perform chest compressions such as the automated load-distributing band chest compression device and an air-driven piston-activated compression system (Leary & Abella 2008:3). One such device is called the “AutoPulse™” system. It is a fully automated CPR device that uses a load-distributing broad compression band that is applied across the entire chest (Krep, Mamier, Breil, Heister, Fischer & Hoeft 2007:87).

The “AutoPulse™” system is a portable chest compression device that is constructed over a back-board. It contains a motor that is able to loosen and retract a load-distributing band under the control of a small microprocessor. The band is rhythmically tightened and loosened around the patient’s chest by means of a motor that alternates the rotation of the shaft in both directions. It works in the following way. The patient is first positioned onto the board. Then the two broad ends of the band are wrapped around the patient’s chest and are connected to one another at the top. The length of the band adjusts automatically to the size and shape of the patient’s chest. The system is then activated.

An observational study conducted by Krep et al (2007:95) evaluated the effectiveness, safety and practicability of the AutoPulse™ system with its automated load-distributing band resuscitation movements in out-of-hospital cardiac arrest situations. The results of this study demonstrated improved CPR outcomes, and successful resuscitation rates rose to more than 50% of the average rates obtained by the better-known conventional methods. Automated CPR devices may thus play an increasingly important role in CPR in the future because they assure continuous chest compressions of a constant quality (Krep et al 2007:95). By contrast to the study conducted by Krep et al (2007:95), another study undertaken by Hallstrom, Rea, Sayre, Christenson, Anton, Mosesso, Ottingham, Oslufka, Pennington, white, Yahn, Husar, Morris & Cobb (2006:2627) demonstrated the *negative* effects of the use of a similar automated load-distributing band chest compression system when compared the results obtained from manual chest compressions. This study compared the use of an automated load-distributing band for making chest compressions and the making of conventional chest compressions by hand. Those who were resuscitated by means of the automated load-distributing band device experienced a lower survival rate than those the resuscitated by means of manual CPR.

Ong, Ornato, Edwards, Dhindsa, Best, Ines, Hickey, Clark, Williams, Powell, Overton & Peberdy (2006:2637) also conducted research to compare the resuscitation outcomes of

patients who were resuscitated manually and patients who were resuscitated by means of an automated load-distributing band. They found that the survival to hospital discharge rate was improved with CPR that made use of a load-distributing band rather than manual CPR. The results of these two studies were reviewed by Lewis and Niemann (2006:2664) recommended that further comparative research of the two kinds of approaches needed to be conducted in order to assess the respective efficiency of the two different methods for increasing the survival rate of cardiac arrest patients.

Preliminary studies of adjunct mechanical CPR devices have revealed significant increases in improved haemo-dynamic effects that enhance coronary perfusion and increase the frequency of a return to spontaneous circulation in both animal models and human studies as well as improvements in short-term human survival in clinical settings (Hwang, Lee & Cho 2001:293; Krep et al 2007:87; Plaisance, Lurie, Vicaut, Martin, Gueugniaud, Petit & Payen 2004:266; Steen, Liao, Pierre, Paskevicius & Sjoberg 2002:285; Suner, Jay, Kleinman, Woolard, Jagminas & Becker 2002:336). It should nevertheless be accepted that while none of these chest compression devices have yet been definitely proven to be superior for long-term survival, such technologies seem to hold significant promise for future developments in the technology of CPR (Wigginton et al 2005:219).

A variety of alternative compression devices are being evaluated and assessed in the hope of improving the effectiveness of CPR. Such improvements are concerned not only with the techniques of administering CPR and the hemodynamics of resuscitative efforts, but also with the long-term outcomes of patients who have undergone cardiac arrest (Wigginton, Miller, Benitez & Peep 2005:219). A variety of the devices that are currently being assessed in this regard are described in the sub-sections that follow.

3.12.2.1 *The Auto Pulse*

In figure 3.11 the Auto Pulse, a compression device, is depicted.



Figure 3.11: Auto Pulse™ system

(Source: Wigginton et al 2005:219).

The Auto Pulse is a lightweight and easily portable electromechanical device that makes use of a wide automated compression band that is attached to a small backboard. The wide automated compression band is programmed to squeeze the anterior and anterior-lateral parts of the human chest. The size and energy requirements for the operation of this device substantially impeded its widespread use even though it can be used for patients who are suitable for vest CPR in either a hospital or emergency vehicle setting (Wigginton et al 2005:220).

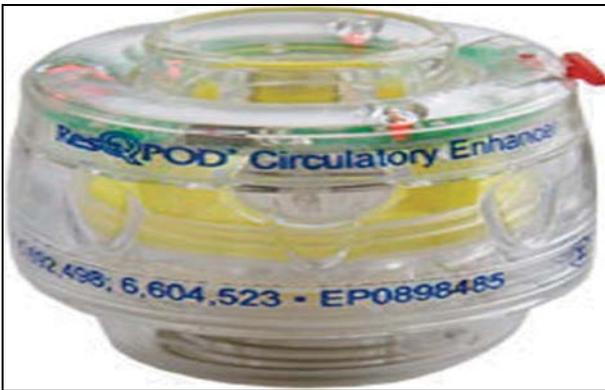
3.12.2.2 The Active Compression-Decompression device and the Impedance Threshold Device

The Active Compression Decompression device is a hand-held human-powered plunger device (see figure 3.12a) that induces a bellows-like action in the chest of a cardiac arrest victim. This mechanism functions by drawing blood into the chest during the compression phase by generating intra-thoracic pressure and then forcing the blood out of the chest during the decompression phase (Wigginton et al 2005:221). The Active compression decompression device has been tested on human beings in conjunction with another device called The Impedance Threshold Device (see figure 3.12b). The Impedance threshold device is a small, disposable lightweight plastic device that prevents full passive air movement during chest compressions. This translates into a greater degree of negative intra-thoracic pressure that can be generated by re-expanding the chest wall with the active compression/decompression device or by standard chest compressions alone.



Active Compression / Decompression device

Figure 3.12a: Active Compression/Decompression Device



Impedance Threshold Device

Figure 3.12b: Impedance Threshold Device

(Source: Wigginton et al 2005:219)

Significantly improved survival rates of patients who have been treated by the ACD and ITD in CPR have been obtained in comparison with those who have been treated by standard CPR methods alone (Hwang et al 2001:293; Plaisance et al 2004:266).

3.12.2.3 Simultaneous sterno-thoracic CPR



The SST-CPR (manikin simulation)

Figure 3.13: Simultaneous sterno-thoracic CPR device

(Source: Hwang et al 2001:293).

Simultaneous sterno-thoracic CPR is a potentially promising technique for the delivery of chest compressions. The techniques and operation of the simultaneous sterno- thoracic CPR was conceived to exploit the haemodynamic status of the patient during CPR. Studies with experimental models have shown that the simultaneous sterno- thoracic CPR can deliver improved mean aortic and coronary perfusion pressure and improved pulmonary perfusion rates (Hwang et al 2001:293). The simultaneous sterno- thoracic CPR is not yet currently available for clinical use.

Such modern devices help enhance *nurses'* competencies and CPR performance, and therefore, may be adopted by healthcare institutions (*system*) for optimising the overall *patient* care. These modern devices maximise the outcome and all the healthcare providers should develop competencies is using the devices through education.

3.12.2.4 Cardiovent® bellows on sternum resuscitation

Cardiovent bellows on sternum resuscitation are depicted in figure 3.13. The **Cardiovent® bellows on sternum resuscitation** is a cylindrical plastic human-powered mechanical CPR device that has soft but firm interface that the resuscitator places over the sternum in order to deliver closed chest compressions.



Figure 3.13: Cardiovent bellows on sternum resuscitation
(Source: Wigginton et al 2005:219)

CHAPTER 4

RESEARCH METHODOLOGY

4.1 INTRODUCTION

This chapter describes the research methodology that supported the research process as well as the analysis and interpretation of the results. It describes the phases of the research, the research population, the sample, the techniques that were used for sampling, the research instruments, the process of data collection, the way in which the results were analysed and the ethical principles that guided the research. The researcher chose this particular methodology because it seemed most apt for obtaining the best answers to the research questions. The research was conducted in four phases, each of which will be discussed separately.

4.2 AIM AND PURPOSE OF THE RESEARCH

Before the research methodology is described, the aim and objectives of this study will be discussed below.

4.2.1 Aim of the study

The overall aim of this research was to describe and explore the perceptions, barriers and needs experienced by nurses in Botswana who need to be able to deliver CPR. This should enable the researcher to make well-informed recommendations about how the knowledge and skills of these nurses could be improved.

4.2.2 Research objectives

The following research objectives have been based on the AACN Synergy Model for Patient Care. The research objectives were to:

- conduct an audit of the availability of equipment for the performance CPR in those departments that provide emergency care services in the two referral hospitals in Botswana, an audit of the policy manual and in-service education records, and a retrospective audit of the death records
- evaluate the current knowledge and skills of nurses who perform CPR in the two referral hospitals in Botswana.
- determine and identify the perceptions that nurses and senior nurse managers have of CPR in the two referral hospitals in Botswana and to identify the barriers that hinder them in their performance of CPR in these two hospitals
- make recommendations based on the findings of the research that will improve CPR training and enhance the continuous professional development in CPR of nurses in the two referral hospitals in Botswana.

4.3 PHASES OF THE RESEARCH

This research was carried out in four separate phases in order to accomplish the stated objectives of the research. The emphasis in this research has been placed on the efficiency of the system and the competencies of the nurses involved because both of these factors make a decisive impact on patient outcomes. The AACN Synergy Model of Patient Care, on which this research is based, emphasises the fact that sound clinical judgment, the ability to make correct decisions, and an aptitude for clinical inquiry on the part of registered nurses are all vital determinants of improved patient outcomes. Inadequate facilities, on the other hand, together with a lack of necessary knowledge and skills, deficiencies in competence and a lack of resources all constitute barriers that prevent the effective performance of CPR. The researcher devised the following steps (see figure 4.1) to evaluate the quality of the care that is being delivered to clients during CPR and to identify inadequacies and deficiencies in the performance of CPR in the two referral hospitals of Botswana.

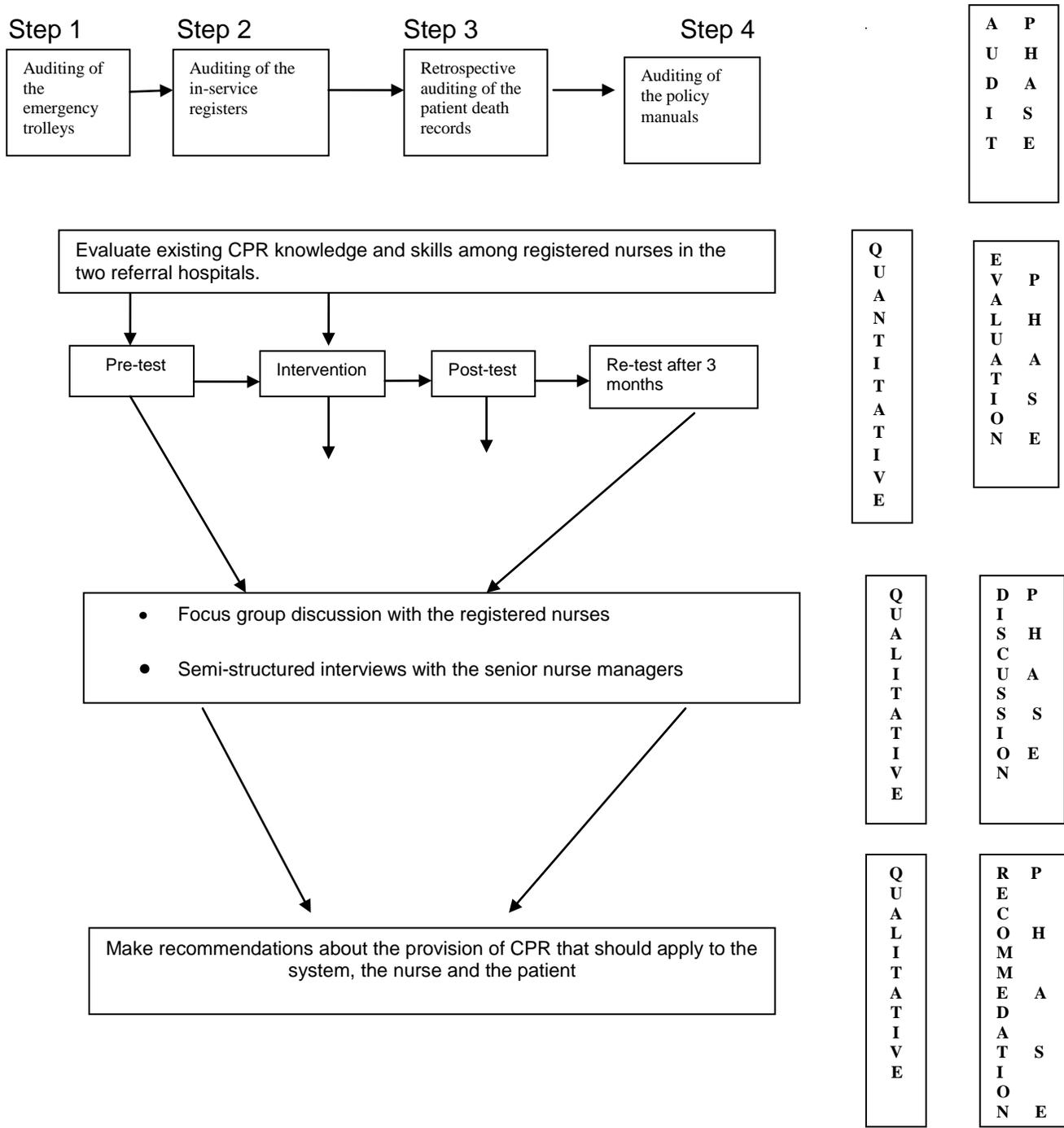


Figure 4.1: The research methodology – schematic diagram

4.3.1 Phase 1: Audit phase (the system)

The AACN Synergy Model for Patient Care maintains that all nurses should have a sound knowledge of the standards of care that they are required to deliver and that, in so doing, they should follow the policies and procedures for the delivery of care that have been established by the organisation for which they work. In addition to this, nurses should be thoroughly familiar with the safe handling and functions of the technology that they use for patient care so that the safety of their patients is in no way compromised (AACN 2003:[6]). The *system* should also contribute to the health and well-being of patients by providing nurses with whatever modern technologies result in superior standards of patient care and whatever facilities enhance the comfort and safety of both the patients and the nurses who care for them.

During phase one, the researcher performed an audit of the existing facilities for conducting CPR in all the units of the two referral hospitals in Botswana by making use of a checklist that enabled her to:

- identify the number of CPR events that had been performed in male and female medical wards, as well as in ICU and A&E units, during the period 2005-2006 in the two referral hospitals so that she could assess their effectiveness
- check and evaluate the CPR policies from the in-service education records of the two referral hospitals

The researcher checked and evaluated the CPR policies so that she could verify the number of times CPR classes had been presented and so that she could also make a note of the number of registered nurses who had attended these classes and determine whether any continuing education credits had been obtained by the registered nurses who had attended the classes.

4.3.2 Phase 2: Evaluation phase (the nurse)

The AACN Synergy Model for Patient Care maintains that nurses can only deliver effective nursing care if they are able to integrate their knowledge, skills, attitudes and experiences in such a way that they are able to meet the needs of patients and their families (Kaplow &

Reed 2008:19). Such nurses are accustomed to making use of personal reflection and critical thinking in order to make the best possible decisions for their patients within the context of the situation in which they find themselves (Hardin & Stannard 2005:57). The AACN (2003:[5]) explains that clinical judgment results from the ability of a nurse to differentiate between expected and unexpected responses from patients during nursing and medical interventions and to accommodate the situations to which this gives rise. It is also a well-known fact that participation in medical emergencies such as the provision of CPR evokes a flight or fight response in those concerned because of the automatic surge of adrenaline that occurs during unexpected emergencies. This sudden increase in adrenalin levels leaves the nurse (and all others involved in the emergency) in a heightened state of anxiety and emotional stress. When nurses experienced too much stress from emergency situations such as the administration of CPR, the accumulated anxiety that they feel might adversely affect their ability to keep events in perspective and arrive at balanced judgements.

The evaluation of the knowledge and skills of those registered nurses who perform CPR in the two referral hospitals will provide the researcher with the necessary data to assess the levels of stress that nurses experience during the performance of CPR and in the period immediately after its performance. Such data will help the researcher to identify the competency levels, the abilities, the limitations and the stress levels of these nurses, and to recommend whatever remedial educational BLS programmes will enable them to perform their functions more efficiently and confidently.

In phase two of this research, the researcher evaluated the existing knowledge and skills of registered nurses who performed CPR in the two referral hospitals in Botswana.

4.3.3 Phase 3: Discussion phase (the nurse and the system)

In a healthcare environment where resources are decreasing even as demands increase, factors such as collaboration, teamwork, role adequacy, the application of clinical judgement, clear communication, and explicit policies and protocols ensure the maintenance of proper patient care and safety. The achievement of optimal outcomes for clients evolves through the discovery, building, enhancement and expansion of the existing strengths, assets and resources of the patient and the patient's family (Hardin & Kaplow

2005:75). All healthcare institutions should address existing barriers so that they will be in a position to improve the performance of their healthcare workers as they provide care for the institution's patients and clients.

During phase three of this research, the researcher:

- conducted focus group interviews with registered nurses to identify their perceptions of CPR before and after their training in CPR
- identified the perceived needs of the registered nurses who performed CPR
- identified the perceived barriers of the registered nurses who performed CPR

The researcher also conducted individual semi-structured interviews with the nurse managers of the two referral hospitals in order to identify the barriers that they perceived as hindering the performance of CPR, to record their suggestions for ways and means to eliminate these barriers.

4.3.4 Phase 4: Recommendations phase (the nurse, the system and the patient)

Successful outcomes for patient care and the performance of nurses are dependent on characteristics that are already present in a healthcare system and on the nurse's ability to support and strengthen such characteristics of the system. True synergy can only be achieved when all three components work synergistically to support the patient (Reed et al 2007:4). During this phase, the researcher made recommendations that she derived from the AACN Synergy Model for Patient Care for possible changes to the system, to the conditions under which nurses' work, and to the situation in which patients find themselves in these hospitals.

4.4 RESEARCH QUESTIONS

During the investigation and description of the perceptions, needs and barriers experienced by the nurses during the performance of CPR, the researcher used the following research questions to help her to realise the research objectives. The following research questions were therefore derived from the research objectives:

Phase 1: Quantitative research design (healthcare system)

Objective 1: To observe existing facilities, the outcomes of CPR performed, existing CPR policies and the policies that govern in-service education

Question 1 What facilities are available for carrying out CPR in the two referral hospitals in Botswana?

Question 2 What were the outcomes of the CPR that was performed in the male and female medical wards, the male and female surgical wards, the accident and emergency wards, and the intensive care units, during the calendar years 2005-2006 in the two referral hospitals in Botswana?

Question 3 Are there any existing policies about CPR in the two referral hospitals in Botswana?

Question 4 Is any in-service training in CPR offered to nurses on a periodic basis?

Phase 2: Quantitative research design (nurse)

Objective 2: To conduct quasi-experimental research that will evaluate the existing knowledge and skills possessed by registered nurses in the two referral hospitals in Botswana

Question 5 What existing knowledge and skills do registered nurses have about CPR in the two referral hospitals in Botswana?

Phase 3: Qualitative research design (nurse, system and patient)

Objective 3: To conduct focus group interviews with registered nurses to identify the perceptions, barriers and needs experienced by the nurses in the two referral hospitals in Botswana

Question 6 What are the perceptions that nurses have about CPR, and what needs and barriers do they experience during the performance of CPR?

Objective 4: To conduct individual semi-structured interviews with senior nurse managers from the two referral hospitals so as to identify their perceptions of the barriers and needs experienced by nurses in Botswana

Question 7 What perceptions about CPR exist among registered nurses?

Question 8 What barriers hinder the function of nurses during resuscitation?

Question 9 How can the registered nurses be helped to overcome these barriers?

Question 10 What resources do registered nurses have to empower themselves to perform effective CPR?

Phase 4: Recommendation phase

Objective 5: To suggest recommendations for the provision of CPR in Botswana that will meet the needs of the *system*, the *nurses* and the *patients* (the three components of the AACN Synergy Model for Patient Care)

4.5 RESEARCH SETTING (THE SYSTEM)

The system acts as a facilitator for the support of patient needs and also acts to maintain the professional environment in which the nurse works. In this research, the system is the research setting, which consists of the two referral hospitals selected for this study in Botswana. The research setting is the environment in which the research takes place. Such an environment can be a natural setting, a partially controlled environment or a fully controlled environment. Natural settings are real-life study environments to which no changes had been made for the purpose of the study. A partially controlled environment can make use of quasi-experimental designs while a fully controlled environment is a setting that has been completely altered and reorganised for the purpose of the study (Burns & Grove 2005:34). This particular study was conducted in the two government referral hospitals located in Gaborone and in Francistown, the two largest cities in Botswana. Both of these settings are natural and partially controlled environments. The referral hospitals were chosen for the study because they make use of modern facilities such as emergency trolleys, ECG monitors and defibrillators to provide CPR wherever it may be needed. A far greater number of CPR events were performed in these two referral hospitals than were performed in comparable district and primary hospitals.

These two government facilities were chosen as the setting for the research because they employ a large number of registered nurses who have accumulated a significant amount of experience in responding to various kinds of medical, surgical, obstetric and trauma emergencies. The choice of these two different settings also enabled the researcher to make a comprehensive study of the perceptions of all the stakeholders who were incorporated into the research design.

4.6 RESEARCH METHODOLOGY

Research methodology refers to the entire strategy of the study from the identification of the problem to the final plans for data collection (Burns & Grove 2005:23).

The following section offers a definition of research design as well a discussion of the reasons for selecting a particular design and a description of the concepts that are used in a research design.

4.6.1 Definition

Polit and Beck (2006:730) state that a *research design* is an overall plan for obtaining answers to the research questions that have been posed and an explanation of how the researcher intends to cope with the difficulties that will occur during the research process. The research design is a plan or a structured framework that explains how the researcher intends to carry out the research process in order to come to conclusions that will provide answers to the research problem (Babbie & Mouton 2006:646).

The research design for this project included quantitative, qualitative, descriptive and exploratory elements that are all necessary to describe and clarify the phenomena that the researcher encountered in her investigation of the perceptions, needs and barriers that were encountered by registered nurses during the performance of CPR. The research strategy therefore incorporated an observational, quasi-experimental design as well as focus group discussions and structured interviews.

4.6.1.1 Phase 1: Audit phase (system): a quantitative research design

Phase 1 of the study utilised a quantitative research design that was of a non-interventional descriptive nature. A quantitative research design was necessary for the collection and interpretation of the data that emerged (Gerrish & Lacey 2006:163; Gillis & Jackson 2002:299).

During the first phase, the researcher performed a structured observational audit of the existing facilities for conducting CPR in the two referral hospitals in Botswana by making use of a checklist that she had formulated. It was during this phase that the following items were checked, examined and audited: the contents of the emergency trolley, the state of readiness and functionality of essential equipment such as the defibrillator, the ECG monitor, the availability of the kind of drugs that are necessary during CPR, the availability of the ambu bag (ones for adult use and ones for paediatric use), the state and condition of the resuscitation manikin and the availability of the pocket mask.

Audits of the hospital records were carried out in order to identify the number of CPRs that had been performed, and the outcomes that they had achieved, during the period 2005-2006 in the two referral hospitals. A retrospective study was also conducted in order to focus particularly on past events. It is in the nature of this kind of retrospective research that a researcher has to depend on information that has been recorded by a large number of different people. Part of the audit was to retrospectively examine the information contained in the records of patients who had experienced cardiac arrests and who had been the recipients of CPR attempts.

The researcher also conducted an audit of the CPR policies of the two research hospitals and an audit of the records of in-service CPR education that were conducted for the benefit of registered nurses in these hospitals.

4.6.1.2 Phase 2: Quasi-experimental quantitative research (nurse)

The researcher adopted a quasi-experimental time series research design to investigate the CPR knowledge and skills of the registered nurses who were employed in these two hospitals during the period of research.

4.6.1.3 Phase 3: Qualitative research design (nurse, patient and system)

- The researcher conducted focus group discussions with registered nurses during phase 3 so that she could identify and record the nurses' perceptions of CPR, the barriers that hindered them in their performance of CPR, and the particular needs that they experienced as they performed CPR.
- The findings of the focus group interviews were used to devise a protocol for a semi-structured interview with the nurse managers of the two referral hospitals. These interviews were designed to identify the perceived barriers and the needs that registered nurses felt during the performance of CPR, and to record any solutions that they were willing to suggest.

4.6.1.4 Phase 4: Recommendations phase (nurse, patient and system)

- In the recommendations phase, the researcher sums up all the observations she had made during the course of this research, draws conclusions and makes recommendations on all aspects of the study.
- The recommendations, based on observations during the study and conclusions drawn by the researcher, cover the three main stakeholders involved in a cardiac emergency situation that warrants administration of CPR, namely, the *system*, the *nurse* and the *patient*, as highlighted by the AACN Synergy Model for Patient Care which guided the researcher throughout the study.

4.6.2 Description of the concepts used in the selected study

What follows are definitions and extended discussions of the main concepts that are used in this study.

4.6.2.1 Quantitative research

Burns and Grove (2005:747) define *quantitative research* as a “formal, objective, systematic process in which numerical data are utilised to obtain information and describe variables and their relationships”. While quantitative research uses structured tools to generate numerical data, it also uses statistics to interpret, organize, represent and make

sense of the data that had been collected. The research design of this study may be described as quantitative because the researcher used a structured interview schedule, an observational auditing of the emergency trolleys, and extensive auditing of the records of the two hospitals. The researcher then performed quasi-experimental research to assess the extent of the CPR knowledge and skills that the registered nurses possessed and to determine the levels of stress that these nurses experienced during the performance of CPR. This design and procedure were implemented so that the researcher would be able to achieve the stated research objectives.

4.6.2.2 Qualitative research

Polit and Beck (2006:729) define *qualitative research* as research that is designed to obtain a great deal of richly descriptive, textured and layered information about various categories of human experience and reality. Such studies are conducted with human beings in their own natural environment and their purpose is to provide a researcher with enough descriptive data of sufficient quality to understand the experiences of participants in the research by identifying recurrent themes and patterns in the data collected. Qualitative research enables a researcher to acquire a better understanding of the personal perceptions, difficulties and needs of the subjects of the research, which, in this case, are the registered nurses who perform CPR in the two referral hospitals.

The qualitative aspect of this research enabled the researcher to uncover the registered nurses' real experiences while performing CPR. Burns and Grove (2005:54) state that the quantification of human behaviour such as feelings, opinions and attitudes is not feasible. In this study, the focus group interviews with registered nurses (in phase 3) and the semi-structured interview with nurse managers (in phase 3) assisted the researcher to explore and describe the perceptions, barriers and needs of registered nurses. The focus group discussion and the semi-structured interview helped the researcher to determine the competency level of registered nurses and the ready availability of facilities to meet the needs of patients. According to the AACN Synergy Model for Patient Care, the purpose of nursing is to meet the needs of patients and their families and to provide a safe passage for patients through the health care system during a health crisis (Hardin & Kaplow 2005:8).

4.6.2.3 Descriptive research

A descriptive study involves the identification of a phenomenon of interest and the variables that contribute to the phenomenon. It also provides a method for developing conceptual and operational definitions of the variables and for describing the variables themselves (Burns & Grove 2005:232; Polit & Beck 2006:189). Descriptive studies provide valuable baseline information. In this study, focus group interviews and semi-structured interviews enabled the researcher to elicit information about the perceptions of CPR and the barriers and needs that CPR evoked among registered nurses.

4.6.2.4 Exploratory research

The purpose of exploratory research is to investigate a phenomenon as comprehensively as possible, the mode of its existence in the world, and other related factors and characteristics are not typical of it in order to gain additional information about a particular situation or practice. Exploratory research is used to increase a researchers' knowledge about a field of study, and it generates valuable baseline information for further investigations (Polit & Beck 2006:21). The researcher used exploratory research to identify the extent of the existing knowledge, skills, perceptions and barriers that affected the performance of the registered nurses in the sample while they administered CPR to patients during the two-year period of the study.

4.7 RESEARCH METHOD

The section offers definitions and discussion of the research method used in the study, the population and sample (including the study population), the sampling process, the sampling procedure, the setting in which the research occurred and the ethical principles that guided the research.

4.7.1 Definition of the term “methodology”

Methodology refers to the steps, procedures, and strategies that a researcher uses for gathering and analysing the data that emerged during a research investigation (Polit & Beck 2006:723). The methodologies of quantitative research guided the researcher during

phases 1, 2 and 5 of this study, and the methodologies of qualitative research guided the researcher during phases 3 and 4 of this study.

4.7.2 Population

Polit and Beck (2006:727) define a *population* as the entire group of persons or objects that are of interest to the researcher or that meets the criteria that the researcher uses to select a research sample. *Population* is sometimes referred to as the *target population*. The individual units of a population are called *elements*. An element may be a person, an event, behaviour, or any other single unit of relevance in the target population. An *accessible population* is that portion of a target population that is reasonably accessible to the researcher (Burns & Grove 2005:341; Polit & Beck 2006:511). In this study, the population consisted of all the emergency trolleys, all the in-service records, all the policy manuals and directives, all the patients' records, all the registered nurses and all the nurse managers who were present in the two referral hospitals during the two-year period in which the study took place.

4.7.3 Sample

A *sample* is the set of elements that constitute a population. An element is therefore the basic unit in which the researcher is interested and about which the researcher will collect information. *Sampling* refers to the method that is used to select a portion of the population so that the elements in the sample are representative of the entire population (Babbie & Mouton 2006:171). In this study, the sample consisted of emergency trolleys from selected wards, policy manuals from the two referral hospitals, patient's records from the wards that had been selected for the study and the registered nurses and nurse managers who had been selected for this study.

4.7.4 Sampling

Sampling involves selecting a group of people, events, behaviours, or other elements to provide the sample with which the research will be concerned (Burns & Grove 2005:345). Sampling is the process whereby a number of study units is selected from a defined population (Polit & Beck 2006:260). The researcher made use of *convenience* and

purposeful sampling (a non-probability method) in this research. In convenience sampling, subjects are included in the study sample because they simply happen to be in a convenient place at a convenient time (Burns & Grove 2005:350). The elements of the research included the emergency trolleys and the policy manuals, as well as the patients' records from 2005 and 2006 for:

- the accident and emergency units
- the intensive care units
- the medical wards (both male and female)
- the surgical wards (both male and female)
- the orthopaedic wards (both male and female)
- the gynaecology wards
- the maternity wards

All of these elements, as well as the registered nurses who had been selected for this study from the two referral hospitals, were included in the research audit. Purposeful sampling was used to select the nurse manager for this study.

4.8 PHASE 1: QUANTITATIVE RESEARCH DESIGN

4.8.1 Structured observational audit of the emergency trolley

While the quality of care that nurse practitioners are able to deliver depends in part on their knowledge, skills and training, it is also determined by the availability and suitability of the equipment that is provided for their use. If appropriate equipment is not available, is not in stock, or is not stored in convenient locations, nurse practitioners may not be able to provide the optimal care that they strive to deliver. In the AACN Synergy Model for Patient Care, this factor is referred to as *resource availability*. It refers not only to equipment, but is also concerned with other resources such as the personal, financial, social, psychological and technical resources that a patient, the patient's family and the community bring to the situation. Limited resources can impede or even prevent a patient's recovery from critical illness. An effective audit presupposes agreement about criteria for good practice, about methods for measuring performance, and about the mechanisms that will be used for implementing change (Hardey & Mulhall 1999: 94).

Brink and Wood (1998:352) and LoBiondo-Wood and Haber (2002:304) point out that not all studies require a researcher first to obtain new and original sources of information. Hospital records, patients' charts, and physicians' order sheets (among other sources of past information) all constitute rich sources of data to which nurse researchers can obtain access and which they can mine as sources of information or data for the conduct of original research. Nurse researchers are fortunate in the amount and quality of data available in hospitals and public health records for them to exploit. For this research, information about the emergency trolleys was readily available on the emergency trolleys of the two referral hospitals.

4.8.1.1 Purposes of an audit

The purposes of an audit are to:

- promote effectiveness and efficiency
- set standards for future conduct and performance
- check and monitor existing resources
- provide guidelines for the acquisition of future resources
- assist in the development of future policies by understanding what has happened in the past (Johnston, Crombie, Davies, Adler & Millard 2000:23)

In order to evaluate the existing facilities for carrying out CPR, the researcher carried out an audit by utilising a checklist that she had devised for this purpose. Since it was the researcher's method to collect information either by means of self-report or observation, the researcher was able to determine the categories represented in the checklist in advance (Polit & Beck 2006:385) (see Annexure C).

According to Burns and Grove (2005:753), it is the purpose of structured observation to identify clearly what will be observed and to define precisely how the observations will be made, recorded and coded. Auditing in the context of nursing research offers a measuring device which allows nurse managers to determine the quality of services rendered in a controlled and accurate manner (Marquis & Huston 2000:398). In this research, the

researcher herself developed the observational categories and these categories then formed the basis for constructing the actual checklist.

4.8.1.2 Data collection tools/instruments

Data collection tools are devices that researchers use to collect data. The checklist was used in this research to audit the existing facilities that were available in the emergency trolleys that were being used in the hospitals for the administration of CPR. Checklists are records for recording whether or not certain behaviours have taken place or whether certain items are present or absent (Burns & Grove 2005:395). The checklist is usually formatted with a list of behaviours or events from the category system on the left and spaces for tallying the behaviours on the right. One tally mark is recorded on a data collection form each time a particular behaviour is observed. The researcher developed separate categories for the equipment that is used in connection with airway management, breathing, circulation and the administration of medications on the basis of what has been recommended as the minimum amount of equipment that is necessary for in-hospital adult resuscitation. These minimums are recorded in the guidelines of the Resuscitation Council of the UK (2004: [1]). The researcher adopted these recommendations to develop the checklist (see Annexure C).

4.8.1.3 Content of the checklist for emergency trolley

The checklist included categories for the kind of equipment that is used in the management of the airway, breathing and circulation, the administration of medications, whatever else is necessary to maintain circulation, as well as whatever other items are always included on any standard resuscitation trolley.

4.8.1.4 Sample

The emergency trolley from the male and female medical wards, the male and female surgical wards, the male and female orthopaedic wards, the gynaecology wards, the maternity wards, the ICU and the A&E units were all selected for auditing. It was necessary to include all the above mentioned wards in the audit because the need to initiate CPR as an emergency intervention could arise at any time in any of these wards. The researcher

also made the assumption that by selecting these wards, she would be able to obtain sound and accurate information about the standard practices that prevailed in the two referral hospitals that were the locus of her research.

4.8.1.5 *Sampling technique*

A convenience sampling technique was used to select a sample of emergency trolleys from the ICU and the A&E units, male and female medical wards, the male and female surgical wards, the male and female orthopaedic wards, the gynaecology wards AND the maternity wards of the two referral hospitals.

4.8.2 *Observational audit of the hospital policies on CPR*

The researcher audited both the unit and hospital policy manuals of the two hospitals in order to identify the policy that the hospitals had documented with regard to CPR.

4.8.2.1 *Sample*

The procedure and the policy manuals from the two referral hospitals were selected for this purpose.

4.8.2.2 *Sampling technique*

A convenience sampling technique was used to select the policy manuals from the two referral hospitals.

4.8.2.3 *Data collection instrument*

The checklist that was formulated by the researcher was set up in terms of the following categories:

The name of the policy, the vision statement, the extent of the availability of the policy document in the hospital, extent to which nurses were aware of the existence of the policy, a description of the procedure that was utilised, the names and ranks of the people who

were responsible for the development of the policy, the date of the last occasion on which the policy was updated, the date on which the policy is next due for next revision, and the presence or absence of the official emblem and authorisation of the certifying authority (Annexure C).

4.8.3 Observational audit of the in-service educational records

The in-service records from the two hospitals were audited so that the researcher would be able to determine the number of CPR sessions that had been conducted for registered nurses within the time period of the research, the number of nurses who had attended these CPR sessions, the frequency with which in-service education sessions had been conducted, and the credits that were awarded for participation in the training sessions.

4.8.3.1 Sample

The in-service records from the two referral hospitals were selected because they contained the data on which the audit would be performed for this research.

4.8.3.2 Sampling technique

A convenience sampling technique was used to select the records from the two referral hospitals for this study.

4.8.3.3 Data collection instrument

A formulated checklist was utilised to undertake the auditing of the frequency and extent of the in-service education (see Annexure C).

4.8.4 Observational audit of the death records

The purpose of this audit was to determine the number of CPRs that were performed in 2005 and 2006 and their outcomes and to conduct an observational audit of the cardiac arrests and the CPRs that were carried out (as reflected in the records of the ICU and the A&E units, male and female medical wards and the male and female surgical wards,

4.8.4.1 Sample

The records from the ICU and the A&E units, the male and female medical wards, the male and female surgical wards, were chosen as a sample for the study. These wards were included because the performance of CPR was much more common in these wards.

4.8.4.2 Sampling technique

Convenience sampling was used to audit the records of cardiac arrests that had occurred in the ICU and the A&E units, the male and female medical wards, and the male and female surgical wards during 2005 and 2006.

4.8.4.3 Data collection instrument

In this study, a retrospective audit was carried out on the records of patients who had undergone CPR. The auditing instrument was based on specific categories that were formulated by the researcher. The checklist which the researcher used in this study was in the nature of a 'non-exhaustive system', sometimes referred to as a 'sign system' (Polit & Beck 2006:387).

A checklist usually begins by listing the categories of behaviour that one may or may not observe in the subjects who are being studied. A checklist does not compel an observer to identify and classify *all* the behaviours or characteristics of the individuals who are being observed. Instead, it enables a researcher to identify the occurrence and frequency of only those behaviours in which she or he is particularly interested (Polit & Beck 2006:309).

The researcher formulated a checklist that included spaces for the observation of the following categories or features during the CPR audit: age, gender, diagnosis, time of cardiac arrest, time of initiation of CPR, time between the occurrence of cardiac arrest and the application of defibrillation, the duration and result of the CPR, the presence or absence of a defibrillator on the CPR on scene, and the medications that the nurse administered during CPR (see Annexure C).

The researcher accessed information about the number of deaths that had been recorded in the above-mentioned ward records after she had obtained permission to do so from the hospital research committees of the two referral hospitals. The name of the patient, the date of admission, the hospital number, the diagnosis that was made, and time of death were all obtained from each patient's file. The researcher submitted this list of the names to the hospitals' medical record departments and the relevant files were duly retrieved on daily basis for each of the wards concerned. The researcher was able to produce a number of attempted CPRs that were performed and the outcome by reading through the client's file. To maintain client confidentiality, the researcher assigned code numbers to each of the wards and to the client's records. In addition to this, it was only the researcher who was given access to this information. In order to collect this information, the researcher visited the medical record departments of the two hospitals during the evenings, at night and on weekends.

4.8.4.4 Inclusive criteria

The researcher included the ICU and the A&E units, male and female medical wards, and the male and female surgical wards, in her audit of the death records in order to ensure that all the relevant units had been proportionately represented. In these wards, the occurrence of CPR was far more common than in other wards.

4.8.5 Data analysis

The researcher then compared the data collected from the emergency trolleys, the auditing of the in-service records, the auditing of the number of CPR attempts that had been performed and the audit of the hospital policies with the checklist. After she had collected the data, the researcher performed the necessary analyses by using the Statistical Package for Social Sciences (SPSS) (Version 15.0), a standard computer software program for such analyses, as well as Microsoft Excel, which she used to generate figures and graphs. She then entered the data into the computer and performed a descriptive statistical analysis. Descriptive statistics allow a researcher to summarise and organise the data in ways that give meaning and that offer new insights. They also allow a researcher to examine a phenomenon from a variety of different angles in order to understand more clearly what is being observed (Burns & Grove 2005:461).

4.9 PHASE 2: QUANTITATIVE RESEARCH DESIGN (Nurse)

According to the AACN Synergy Model for Patient Care, nursing care is made possible when a nurse integrates her or his knowledge, skills, experience and attitudes to meet the needs of patients and the patients' families (AACN 2003:[3]). The assumption here is that it is a nurse's knowledge, experience and attitudes that enable a nurse to function effectively during a resuscitation attempt. The researcher evaluated the existing knowledge and skills of the registered nurses in the two referral hospitals of Botswana by conducting quasi-experimental research.

4.9.1 Investigating the CPR knowledge and skills of registered nurses

The researcher conducted a quasi-experimental time series design to investigate the CPR knowledge and skills that these registered nurses possessed before training, those that they acquired after training, and those that they still retained three months after CPR training had taken place.

4.9.1.1 Quasi-experimental research interventions

According to Brink and Wood (1998:66), a quasi-experimental research experiment provides a systematic framework for answering questions that might otherwise be left to unreliable subjective conjecture or to conclusions that have been drawn from compromised experiments in which the causal hypotheses have not been explicitly evaluated. A quasi-experimental research procedure thus represents a valuable alternative strategy for extending and augmenting the scope and utility of nursing research. Quasi-experimental procedures are interventions that evaluate data without using any form of randomization.

Quasi-experimental research interventions are similar to randomized trials, and their purpose is to demonstrate a *prima facie* causal connection between an intervention and an outcome (Harris, McGregor, Perencevich, Furuno, Zhu, Peterson & Finklestein 2006:16). Such quasi-experimental interventions are not only practical and feasible, but they are also directly relevant to events in the real world of nursing. Harris et al (2006:16) note that in

naturally occurring and complex health care situations, researchers often choose not to randomize their interventions because of:

- ethical considerations
- the difficulty of randomizing certain subjects
- the problems associated with the randomising of certain locations such as, for example, wards
- the small size of the sample that might be available to the researcher

In this study, the researcher decided to utilise a quasi-experimental interrupted time-series design because of the fact that the information on CPR would be likely to benefit the registered nurses and because it would not be ethically correct to deny the educational component of CPR by randomising the nurses involved or the locations. The interrupted time-series design enabled the researcher to observe the retention of the knowledge, skills and changes that had occurred after three months had elapsed.

4.9.1.2 Research questions

The researcher asked the following questions to assess the effects of training:

- What is the extent of the existing knowledge of CPR among registered nurses in the two referral hospitals in Botswana?
- To what extent do the registered nurses who attend CPR training acquire the knowledge and skills that are necessary to perform effective CPR?
- To what extent do registered nurses who attend CPR training retain the knowledge and skills that are necessary for the performance of effective CPR?

4.9.1.3 Study population

The study population for phase 2 consisted of the registered nurses who were working in the two referral hospitals in Botswana. The target population in a study is the *entire* population in which a researcher is interested and to which he/she would like to be able to generalise the study results. The individual units of a population are called *elements*. An accessible population is that portion of the target population to which the researcher has reasonable access (Burns & Grove 2006:511; Polit & Beck 2005:341).

4.9.1.4 Sample

Health care services in Botswana are provided by registered nurses. Since these nurses are the main service providers, the registered nurses who work in the ICU and the A&E units, medical, surgical, gynaecology, maternity, and orthopaedic wards constituted the target population. The target population included the registered nurses who worked in the two referral hospitals. Both male and female nurses were included in the study.

4.9.1.5 Sampling process

Sampling refers to 'the process of selecting a number of individuals from the delineated target population in such a way that the individuals in the sample represent as nearly as possible the characteristics of the whole population' (Polit & Beck 2006:731). The researcher used a non-probability sampling method for this research. With non-probability sampling, not every element of a population has a chance of being included in the sample (Burns & Grove 2005:350).

The advantages of *sampling* are that it saves time as well as financial and human resources. The disadvantage of sampling is that it does not present a researcher with an opportunity for isolating those characteristics of a population that are of particular interest to him or her. With such sampling, a researcher can only estimate or predict those characteristics on the basis of the data obtained from the sample. It is therefore possible that this process of estimating may well introduce an error into the overall design and results of the experiment (Gillis & Jackson 2002:496).

In this research, non-probability sampling method (namely, convenience sampling) was used. In convenience sampling, subjects are included in a study because they happen to be in the right place at the right time. Subject who were available because they were conveniently placed (hence the name 'convenience sampling'), were allowed to participate in the study until the sample reached the size dictated by the research design.

4.9.1.6 Selection of the required sample

The sample size for a population-based study is largely determined by three factors: the estimated prevalence of the variable of interest, the desired level of confidence, and the accepted margin of error (Gerrish & Lacey 2006: 223; Gillis & Jackson 2002:498).

Data obtained from the wards revealed that a total of 370 registered nurses worked in the selected wards of the two referral hospitals. A 95% level of confidence was selected for determining the sample size. In order to obtain a reasonable level of accuracy, the worst case percentage (namely, 50%) was used. The wider the confidence interval, the more certain it is that the answers of the whole population will be within that range. A confidence interval of 9 was therefore selected. For a 95% confidence level and a confidence interval of 9, a sample size of 90 was assembled from a population of 370. The size of the sample was calculated by using an online sample calculator produced by Creative Research Systems (2003:[1]) (see Annexure K).

For the quantitative data, the researcher drew an overall sample of 90 registered nurses from the two referral hospitals. The sample size of 90 took into account the fact that the proportion for the purposes of comparison was covered. What happened, in fact, was that the number of participants increased to 102 from the two referral hospitals because of a request from the managers of hospital B who wanted more nurses to learn BLS and CPR.

4.9.1.7 Sampling procedure

The sampling procedure of the subjects for this study was carried out in the following way:

- The researcher delivered the letters that explained the purpose of the research to the two referral hospitals.
- The researcher also asked the health services managers of the two referral hospitals to help her to obtain the active support and cooperation of the ward managers and registered nurses who worked in their hospitals.
- The ward managers of each of the units in the two referral hospitals were requested to make a list of potential participants from those who worked in the medical, surgical,

gynaecology, maternity, orthopaedic, the ICU and the A&E units available on the day of the study.

- The researcher therefore explained the inclusion criteria to the ward managers.
- The researcher requested the ward managers to release at least four nurses from each of the specified wards/units so that a sample size of ninety nurses could be assembled. Such a sample was therefore representative of all the selected wards/units in the two referral hospitals.
- The paediatric wards were not initially included in this research because the research was only concerned with adult CPR. But ward nurses from the paediatric wards were later included in the study because of requests from the respective nurse managers of these wards. They justified their request by explaining that CPR was commonly performed in paediatric wards and by pointing out that the nurses who worked in paediatric wards also regularly worked in other kinds of wards/units on a rotational basis.
- The researcher then distributed written letters to all the ward/unit managers a month prior to the beginning of the research in which she explained the purpose of the research and requested the ward/unit managers to authorise the release of the nurses involved in the study on certain specified days.
- Once this had been done, the researcher personally approached the possible participants on the list and explained to them the salient facts of the research, its purpose, methods, objectives, potential risks, possible benefits – as well as the significance of participating in research of this kind.
- Participants were assured that their anonymity and confidentiality would be maintained at all times and in all circumstances and that they would be entirely free to withdraw from the research project at any time during the proceedings without incurring any penalty or sanction. The actual identity of the participants was concealed by assigning code numbers to each of the respondents. Confidentiality was thus maintained by concealing the identity of respondents and by refusing any unauthorised access to the information or data.
- The voluntary consent of the participants was also obtained without any form of coercion or undue influence and without the promise of any kind of remuneration (Burns & Grove 2005:193).

- The researcher also contacted the ward/unit managers by telephone a week before the study began to confirm that the participants on the list would in fact be available on the required day.
- With the help of the in-service co-ordinators of the two hospitals, the researcher identified a suitable venue for conducting the study. The venue was booked well in advance to avoid any confusion and disorganisation at the last minute.

4.9.2 Criteria for inclusion and exclusion

Sampling criteria are also referred to as eligibility criteria because they include a list of the characteristics that are essential for membership of (or eligibility to belong to) the target population. The sampling criteria are developed from the research problem, the purpose of the study, the literature review, conceptual and operational definitions of the study variables and from the overall design of the study. Sampling criteria may include such characteristics as an ability to read, and ability to record meaningful responses on the questionnaire, and the ability to give free and independent consent to participation in the research. Since all the registered nurses were able to speak, write and understand English and were in addition able to give consent to participation, these criterions were all fulfilled.

Exclusion criteria are those characteristics that debar a person or an element from membership of the target population (Burns & Grove 2005:343). To be eligible for inclusion in this particular research, all participants were required:

- to be registered nurses residing in Botswana and working in either of the two selected hospitals, namely one and one in Francistown
- to have been registered with the Nursing and Midwifery Council of Botswana
- to be employed as registered nurses on a full-time basis
- to be willing to participate in the study and to have given their written consent.
- to have actively worked as registered in-service nurses for at least one year or more
- not to have participated in any CPR training programme within the two years prior to the date of this study

Participants were excluded from this study if they:

- did not freely and willingly agree to participate in it
- had accumulated less than one year of continuous service as registered nurses
- had participated in any kind of CPR training programme within the two years prior to the date of this study

4.9.3 Data collection techniques for phase 2

Data collection is the process of gathering information or data that will be able to address the stated research problem. Data collection therefore consists of the precise and systematic accumulation of information that is relevant to the research purpose, the specific objectives of the research or the questions raised by the research (Burns & Grove 2005:42; Polit & Beck 2006:498). Various data collection techniques are available to researchers. These include the use of information that is already available (such as hospital records), reliance on various kinds of observation, the use of face-to-face interviews, the administration of written questionnaires, the elimination of information from participation in focus group discussions, and various projective techniques such as mapping and scaling (Bowling 2002:273).

In this phase of the study, the researcher utilised a quasi-experimental time series research design to collect the data. Quasi-experimental designs are typical of situations in which the topic suggests that an experiment is not possible. They are therefore often the most suitable options if circumstances are constrained by various ethical or practical difficulties (Gillis & Jackson 2002:131). A quasi-experimental design facilitates the search for knowledge and attempts to establish causality between elements in situations in which complete control of the experimental circumstances is not possible (Burns & Grove 2005:245).

4.9.3.1 Data collection tool/instruments

Data collection tools are devices or techniques that are used to collect data. During the data collection phase of this experiment, the researcher administered a closed-ended questionnaire to collect the necessary data from the participants. The design of the questionnaire itself was based on an extensive review of available literature about CPR. The registered nurses' knowledge of CPR was assessed by 21 structured close-ended

questions. The AACN Synergy Model for Patient Care guided the formulation of the questions that were designed to assess the participating nurses' competencies.

4.9.3.2 Content of the closed-ended questionnaire for phase 2

- **Section A: Socio-demographic information**

A demographic data questionnaire with closed-ended questions enabled the researcher to obtain the necessary socio-demographic information about the participants who participated in the study. Questions 1.1 to 2.0 in this section requested the respondents to provide information about their age, gender, professional status, academic qualifications, work experience, area of assignment, formal training in CPR, frequency with which they had performed CPR, and the outcome of CPR attempts they had performed (see Annexure D).

- **Section B: Knowledge about CPR**

This section attempted to determine exactly how much the respondents knew about CPR. The variables in this section included questions about the causes of cardiac arrest, the signs of cardiac arrest, the purpose of the resuscitation procedure, the ventilation-compression ratio, and the drugs that are administered during resuscitation attempts. This information was important to the researcher because it enabled her to assess the amount of information about CPR that the subjects already possessed (Annexure D). The questions in this section were developed from information obtained from the literature review and in accordance with the conceptual framework of the AACN Synergy Model for Patient Care.

- **Section C: Variables on CPR skills**

Section C addressed the variables that reflected CPR skills. This was obtained from structured observations of the CPR that the registered nurses performed on a Resuscitation Anne manikin (Annexure D).

The researcher designed a checklist on the basis of the guidelines from the Resuscitation Council of the UK (2005:[2]) and American Heart Association (2006:[5]). This checklist contained 18 variables. A scoring system was developed for evaluating the registered nurses' performance of CPR on the basis of the approach that was used by Berden et al (1992:21) and also by Madden (2006:218). The only difference was that the researcher used 19 variables instead of the 18 variables in the guidelines because one question was added about "checking for hazards", which the researcher considered to be a necessary inclusion. The content for the checklist was formulated on the basis of the researchers' review of the literature about cardiopulmonary resuscitation. The focus of the skills assessment was guided by the nurses' characteristics that are contained in the conceptual framework of the AACN Synergy Model for Patient Care.

4.9.3.3 Pre-testing the instrument

A pre-test is a trial run that determines (as far as possible) whether the instrument is sufficiently clearly worded and free from major biases, and whether it solicits the type of information that the researcher has envisaged. In many studies, a pre-test is conducted to identify or detect any problems inherent in the instrument or to determine how effective the instrument is in collecting the kind of data that will answer the research questions (Polit & Beck 2006:296). In this phase, the pre-testing of the instrument was conducted with ten registered nurses who were working in private wards, eye wards and oncology wards (none of these wards were among the wards/units that were selected wards for the actual study). The pre-test was carried out to identify any difficulties or ambiguous questions as well as the clarity and comprehensibility of the language. It was also carried out in order to estimate the amount of time that would be needed to answer the questionnaire and the amount of time that would be required to complete the practical assessment. The pre-testing revealed that the participants experienced difficulty in understanding four of the questions. Questions 1, 9, 20 and 21 were therefore adjusted and reformulated in order to make them clear to the participants. In addition to this, a critical care nurse from the UK and a CPR instructor from Medical Rescue International (Botswana) also requested a review and re-examination of the wording of specific questions. She also made useful suggestions about how these questions might be re-worded. The necessary improvements and modifications of these questions were accordingly performed before the main study commenced. Since the participants in the pre-test were not included in the study sample,

the data that the researcher obtained from the pre-testing was not included in the data for the main study. The participants in the pre-test were thus effectively excluded from participation in the final study. The inter-rater reliability of the observation of the demonstration was established by inviting another CPR instructor from Medical Rescue International (Botswana) to assess the registered nurses' CPR skills simultaneously with the assessment performed by the researcher herself. The scores awarded by these two evaluators to each nurse were compared to calculate the inter-rater reliability coefficient. Close agreement was achieved on all the performance criteria.

4.9.3.4 Description of the manikin

The researcher used the standard "Little Anne"® manikin that was developed by the Laerdal Company (Manikins Update 2005:[3]) (figure 3.8) Each Little Anne manikin simulates the features of an average adult's physiology and anatomy and is designed to make training in BLS skills and in CPR skills in particular as realistic as possible.

The features that are included in the Little Anne manikin are:

- the natural obstruction of the airway
- realistic facial features and a movable jaw
- realistic responses to ventilations
- the ability of the chest to rise and fall when correct ventilations are applied
- realistic anatomical configurations for the location of the correct compressions point
- an audible vocal confirmation of the correct compression depth by the manikin itself
- a carry bag that opens out into a training mat

Little Anne is also supplied with a compression clicker that confirms the correct compression depth of 1½ inches (38 mm).

4.9.4 Data collection method

The researcher designed a quasi-experimental time series experiment to facilitate pre-testing and post-testing within the group of research subjects (Brink & Wood 1998). On

each of the three occasions, the CPR knowledge and skills of the participating nurses were assessed.

Approval for the ethical principles that guided the research procedures and conditions was obtained from the local research committee as well as from the ethics committees of the two referral hospitals. A full explanation of the ethical principles was given to each of the registered nurses who had been invited to participate in the study. A letter of consent was also obtained from each registered nurse participant.

Four days were selected for the main study. During this time a pre-test, a CPR training programme, and a post-test were conducted. A follow-up test was also carried out three months after the four days during which the main research took place. Before the pre-test, the nurses were instructed about the procedures and protocols, and what they might expect from the research was also explained to them with a view to soliciting their total cooperation during the training and assessment phases. A total of 45 nurses from hospital A were chosen to participate in the study. These nurses were divided into four groups and the research was conducted over a period of four days. Since the quasi-experimental design consisted of a pre-test, of a CPR training programme and a post-test, a division of the nurses into groups made it easier for the researcher to collect the data efficiently.

During the pre-test, the registered nurses were requested to complete the self-administered questions on knowledge. The participants took approximately 20 minutes to complete these pre-test questions. Their skills were thus assessed separately for five minutes in isolation from the other registered nurses who were present. The researcher described the scenario and asked the participants to begin a simulated resuscitation on a collapsed victim. Both the researcher and an independent observer observed the performance, and a checklist was completed independently by the two evaluators for each nurse.

The CPR training programme was presented over a three-hour period and it incorporated one of the BLS modules for health care providers (AHA 2006:7). The material in this segment included explanations of the causes of cardiac pulmonary arrest, the clinical manifestations of this condition, the concept of the airway (A), the importance of breathing (B), the restoration of circulation(C) (ABC), and the drugs that were most frequently

administered during incidents of cardiopulmonary arrest. The practical skills of CPR that included a demonstration of how CPR would be administered to an adult victim by one rescuer were demonstrated by the researcher who is a CPR certificate holder. After the theoretical session had ended, the registered nurses were given opportunities to practise their skills on 'Little Anne' manikins (see figure 3.8 and descriptions under 3.7.3.1). The knowledge and skills of the registered nurses were immediately assessed after the training by means of a post-test. At the end of the session, the CD-ROM that was developed by the AHA (2006:3) for the instruction of health care users in BLS was projected onto a large screen for the participants. After three months had elapsed, a follow-up test was conducted to assess the extent to which CPR knowledge and skills had been retained by the participants. In both of the tests, the same manikin, the same data collection instruments and the same procedures were used.

4.9.4.1 Data collection at hospital A

Before conducting the main research, the researcher introduced herself to the health services manager of the hospital, to the ward managers and to the research subjects. Seminar rooms in the two hospitals were selected for the collection of data. The purpose of the research was explained both to the health services manager and to the ward managers. On the main day of the study, a pre-test, a CPR training programme and a post-test were all conducted. A follow-up re-test was conducted after a period of three months had elapsed. This period of three months was considered by experts to be appropriate for re-testing how well the nurse participants had retained their CPR knowledge and skills. A total number of 45 registered nurses participated in the study.

4.9.4.2 Data collection at hospital B

The researcher communicated with the matron and to the medical superintendent at selected hospital B two months before the day designated for the study in the hope of securing maximum participation and cooperation from the hospital. The in-service educator of the hospital graciously helped to organise the seminar room and the multimedia technology that would be needed.

The research was conducted over a period of four days with a sample of 57 registered nurses from different wards. Although the isolation ward and the special care baby unit were not originally included in the study, the management of this hospital requested the researcher to include the nurses from those wards in the study. The researcher followed the same procedures for the hospital A that she had used for hospital B.

4.9.5 Scoring system for the performance of CPR

The researcher developed a scoring system for evaluating the CPR performed by registered nurses. She based this scoring system on the work undertaken by Berden et al (1992:21). It was, in fact, the same system that was used by Madden (2006:218). In terms of the system, the evaluator awarded a penalty point for any error in the performance of CPR skills. Value labels were assigned to each element of a skill. These value labels were able to identify whether the skill had been performed correctly, incorrectly or not performed at all, and specific values were assigned to penalty points. For each of the 19 different activities in the performance, a penalty quantification of 0 was awarded if the skill component had been performed correctly, and 5, 10 or 20 penalty points were awarded for different degrees of inability, incorrectness and deviations from the expected norm. The total number of penalty points that could be achieved ranged from 0 to 240, and a “satisfactory” CPR performance was considered to be one that had not accumulated more than 20 penalty points.

4.9.6 Data analysis

The researcher analysed the data by using the SPSS (Version 15.0) program with assistance from a statistician from the University of South Africa. Descriptive and inferential statistics, such as frequency tables and percentages were used in the data analysis to describe and explore the relationships that occurred in the data sets. The Chi-square test in conjunction with non-parametric tests such as the McNemar test, the Mann-Whitney U test and Wilcoxon matched-pairs signed-rank tests were used during this phase of the research.

4.9.6.1 The chi-square test

The chi-square test of independence tests whether the two variables that are being scrutinised are independent or related to one another (Burns & Grove 2005:518). The Chi-square test (χ^2) is frequently used to detect significance in the social sciences (Babbie & Mouton 2006:481). The Chi-square test is designed to test for differences in frequencies of observed data and to compare them with the frequencies that could be expected to occur if the data categories were actually independent of one another. In this research, the chi-square test was applied to compare the differences between the pre-test, post-test and re-test scores and to determine whether the scores were statistically significant.

4.9.6.2 The McNemar test

The McNemar test analyses the changes that occur in dichotomous variables by using a 2x2 table. This test is particularly appropriate for before-and-after or pre-test, post-test designs in which the subjects serve as their own control and the data is nominal (Burns & Grove 2005:521). The McNemar test was used in this study to test whether or not the difference in the skills before training and after training was statistically significant.

4.9.6.3 The Mann-Whitney U test

The Mann-Whitney U test is used to analyse ordinal data with 95% of the power test (t-test) to detect differences between groups of normally distributed populations (Burns & Grove 2005:741). This test was applied in this research to analyse the mean scores of the pre-test, post-test and re-test of CPR knowledge and skills.

4.9.6.4 The Wilcoxon matched-pairs signed-ranks test

A non-parametric analysis technique was used to examine the changes that occurred in the pre-test-post-test measures or in the matched-pairs measures (Burns & Grove 2005:755). This test was applied in this research to analyse the mean scores and pre-test, post-test and re-test of CPR knowledge and skills.

4.10 ESTABLISHMENT OF RIGOUR IN QUANTITATIVE RESEARCH

4.10.1 Reliability and validity

Reliability may be said to be present when, after a particular technique has been applied repeatedly to the same object, it repeatedly yields the same result on each occasion (Babbie & Mouton 2006:119). According to Burns and Grove (2005:374), the reliability of a measure denotes the consistency of the measures that are obtained when using a particular instrument and it is an indication of the extent of random error in the measurement method. In order to enhance reliability, the researcher administered a pre-test with the questionnaire to ten registered nurses who were excluded from the study.

The *validity* of an instrument is a determination of the extent to which the instrument actually reflects the abstract construct that is being examined (Burns & Grove 2005:755). Validity is the extent of the accuracy with which an instrument measures the construct it is supposed to be measuring in the context of the concepts/variables that are being studied (Brink & Wood 1998:167; Polit & Beck 2006:329). The semi-structured interview schedule was developed after a review of the relevant literature enabled the researcher to incorporate and measure the important variables in the study. The researcher and her promoters closely examined the questionnaire and the semi-structured interview to ensure that they had measured the desired variables. Face, content and construct validity were all examined in this way.

4.10.2 Validity of the research design

Validity entails both internal and external validity. *Internal validity* refers to the ability of the research tool to measure what it is supposed to measure whereas *external validity* relates to the generalisability of the findings of a study to the whole population with that problem (Polit & Beck 2006:200).

4.10.2.1 Internal validity

In this study, the internal validity of the research design was applied by the pre-testing of the research instrument. The registered nurses were asked to complete the questionnaire that determines the extent of their CPR knowledge and their skills were assessed on the

manikin. In addition to this, the researcher's promoters at the University of South Africa and the CPR instructor from Medical Rescue International (Botswana) were requested to evaluate the questions on focus group discussion and the semi-structured interview schedule and to check the logical flow of the questions. The entire proposal was also reviewed by the committee members of the research unit from the Ministry of Health in Botswana and the institutional research boards of the two selected hospitals.

4.10.2.2 External validity

External validity is concerned with the extent to which study findings can be generalised beyond the sample that is used in a study (Burns & Grove 2005:736). A representative sample is one that is similar in the distribution of its major characteristics to the larger population from which the sample was drawn. The presumption in this study was that the sample of 102 registered nurses from the two selected hospitals would tend to favour the probability that the results would be generalisable. The fact that the study was also conducted in two selected hospital settings and that it utilised senior nurse managers from different wards/units for the collection of data also increases its generalisability.

4.10.3 Validity of the research instrument

4.10.3.1 Face validity

Face validity refers to a subjective judgment about whether the research instrument appears to measure what it is supposed to measure (Burns & Grove 2005:737). In this study, face validity was maintained by constructing questions for the quasi-experimental design, for the focus group interview and for the semi-structured interview relevant to the study. The questionnaires that were used to assess knowledge and skills in the focus group interview and in the semi-structured interview were focusing on the characteristics of the nurse, the patient and the system.

In this study, the researcher formulated questions that flowed logically from the research objectives. The literature review of similar studies undertaken elsewhere and in somewhat different circumstances also facilitated the design of the relevant research tool. In addition to the pre-testing of the instruments and its evaluation by the promoter and the joint

promoter, two critical care clinical nurse specialists and a statistician checked the appearance, consistency and the tool measures. Changes were made after taking into account feedback from the statistician, the promoters, the clinical nurse specialists and the research unit officers.

4.10.3.2 Construct validity

Construct validity ensures that abstract concepts are measured adequately and logically and that the relationships between variables are identified with an instrument that is based on theory and on clear operational definitions. Construct validity examines the fit between the conceptual and operational definitions of the variables and determines whether the instrument actually measures the theoretical construct that it purports to measure (Burns & Grove 2005:731). The main difficulty in judging construct validity is that a researcher needs to know the required statistical procedures (Babbie & Mouton 2006:122).

In this study, the development of the questionnaire, the focus group interview and the semi-structured interview schedule were all based on an extensive literature review and on the conceptual framework and its relevance to the variables of the study. The variables were operationally defined so as to create a common understanding between the researcher and readers.

4.10.3.3 Content validity

Content validity is the evaluation of the tool to ensure that all the components of the variables to be measured in a study are included in the questionnaires and that there has been no neglect of important components (Brink & Wood 1998:168). According to Burns and Grove (2005:732), content related validity examines the extent to which the method of measurement includes all the major elements that are relevant to the construct which is being measured. Evidence of content-related validity is obtained from the literature, from representatives of the relevant population and from content experts. To meet this criterion, the researcher reviewed all the relevant literature before developing the instrument and she went to great lengths to ensure that all the necessary variables had been included. The instrument was also given to the two promoters, the two critical care clinical nurse

specialists and to a statistician for comment. Certain changes were made in response to their evaluations.

4.11 PHASE 3: QUALITATIVE RESEARCH DESIGN: FOCUS GROUP DISCUSSIONS WITH REGISTERED NURSES (SYSTEM, NURSE AND PATIENT)

The third phase of the current research involved a qualitative, descriptive research design. Focus group discussions were held with the registered nurses who participated in the quasi-experimental research in the two referral hospitals.

4.11.1 Research method

The focus group discussion helped the researcher to identify the perceptions, barriers and the solutions that could improve and maintain competency in performing CPR.

4.11.2 Focus group discussions

During phase 3, the researcher conducted focus group interviews with the registered nurses to identify their perceptions of CPR after their training in CPR, their perceptions of the barriers that hindered their performance of CPR, and possible solutions that would lead competence in the performance of CPR.

4.11.2.1 Purpose of the focus group discussions

The purpose of a focus group discussion is to collect detailed information about the concepts, perceptions and ideas of a particular group. Any productive focus group discussion will be more than a mere question-and-answer session. A focus group discussion is “a technique involving the use of in-depth group interviews in which participants are selected because they are [a] purposive, although not necessarily [a] representative sampling of a specific population, this group being focused on a given topic” (Stewart, Shamdasani & Rook 2007:42).

In a focus group, the ability of a researcher to obtain a wide variety of opinions will depend on a topic within a limited period of time and will depend on that researcher’s ability to

inspire, direct and address the interests of the focus group concerned (Babbie & Mouton 2006:292). When focus group sessions have been carefully planned, the group dynamics that occur between the participants in the group will stimulate the production of a useful amount of information in the limited time that is available (Polit & Beck 2004:342). The advantage of focus group interviews is that because of their structure and the way, in which the dynamics of the group work, they are usually able to produce more meaningful and authentic personal opinions than one-on-one interviews. Participants in this type of research are selected because they are the kind of people who are more likely to be willing to offer their own opinions about the topic in hand, because they fall within a particular age-range. They also belong more or less to the same socio-economic demographic sector and, they might have given some evidence that they are comfortable in conversation with both the interviewer and with one another (Richardson & Rabbie 2001:4).

The disadvantage of a focus group session is that there will always be some people who are uncomfortable about expressing their views or describing their experiences in the presence of a group (Polit & Hungler 1997:255). Such negative group dynamics can be addressed by so arranging the physical setting of the discussion that such members will not feel embarrassed, by making the group as homogenous as possible, and by skilful moderation. Since registered nurses are the ones who always witness cardiac arrests in hospital situations, the focus group interviews helped the researcher to gather a large amount of rich and textured information. These people shared their perceptions about the barriers that hindered them in their work and the needs that they experienced as they attempted to provide CPR.

4.11.2.2 Advantages and disadvantages of the focus group discussions

Stewart et al (2007:42) contrast the following advantages and disadvantages of focus group discussions. The contrast discussions are listed in table 4.1.

Table 4.1 Advantages and disadvantages of the focus group discussion

Advantages	Disadvantages
<ul style="list-style-type: none"> • Focus group discussions allow a researcher to interact directly with the respondents. This kind of forum provides opportunities for clarifying responses, following up questions, and for probing participants' responses. The format of a focus group discussion also allows a researcher 	<ul style="list-style-type: none"> • The interactions between the respondents themselves and between the respondents and the moderator may be contaminated by the following two undesirable effects: (1) The responses of the members of the group are likely to be influenced to some extent by the opinions and responses of

<p>to observe non-verbal responses such as gestures, smiles and frowns.</p> <ul style="list-style-type: none"> • The open-response format of a focus group provides a researcher to obtain a great deal of rich information that is couched in the respondents' own words. • Focus groups elicit data from a group of people much more quickly and at a much lower cost than would be the case if each individual worked in the interviewed separately. • Focus groups provide respondents with opportunities to react to and elaborate on the opinions and attitudes of other group members. • Because focus groups are enormously flexible, they can be adapted to investigate a wide range of topics with a variety of individuals in a number of different settings. 	<p>other members in the group. This to some extent compromises the generalisability of the results. (2) The opinions of a particular focus group can be unduly influenced by the opinions of the most dominant and vocal members of the group.</p> <ul style="list-style-type: none"> • The lively and immediate nature of the interactions that occur in the group may lead a researcher or decision maker to place greater faith in the information supplied by the group than may actually be warranted. • The small numbers of respondents who tend to participate in even several different focus groups and the reliance on convenience sampling for most focus groups may significantly limit the possibility of generalisation to a larger population. • The open-ended nature of responses that are obtained from focus groups often it difficult to summarise and interpret the data that is obtained from such groups.
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4.11.3 The population

Polit and Beck (2004:727) define *the study population* as the entire set of individuals that possess some common characteristics. The *population*, on the other hand, is the total group of people who meet the designated set of criteria established by the researcher (Burns & Grove 2005:746). The population for this study consisted of registered nurses who worked in the male and female medical wards, in the male and female surgical wards, in the male and female orthopaedic wards, in the paediatric medical and surgical wards, in the ICU and the A&E units, and in the gynaecology and maternity wards of the two referral hospitals of Botswana.

4.11.3.1 Inclusion criteria

Holloway and Wheeler (1996:75) state that a good informant is one who is willing to critically and thoughtfully examine his or her personal experience and responses to particular situations and conditions and who is willing to share his or her conclusions with the researcher-interviewer in the context of the research. In order to ensure the representivity of the informants, each of them had to fulfil the following inclusive criteria:

The participants had to

- be registered with the Nursing and Midwifery Council of Botswana
- be a registered nurse and be employed on a full-time basis

- be willing to participate in the study and give his or her written consent
- been actively employed in a medical, surgical, orthopaedic, maternity, gynaecology wards, accident or emergency or intensive care units for at least one year prior to the date of the research
- have prior experience of a quasi-experimental study

Both female and male nurses were accepted without prejudice as valid participants.

4.11.3.2 Exclusion criteria

Potential participants were excluded from the study if they were:

- not willing to participate in the focus group discussion
- had never before participated in any kind of quasi-experimental study.

4.11.4 The sampling process

Sampling refers to “the process of selecting a number of individuals from the delineated target population in such a way that the individuals in the sample represent as nearly as possible the characteristics of the whole population” (Polit & Beck 2004:731).

A non-probability sampling approach was used in this research. Non-probability sampling relies on the judgment of the researcher to select those subjects who know most about the phenomenon and who are best able to articulate and explain the intricacies and nuances of particular situations to the researcher (LoBiondo-Wood & Haber 2002:239). Since the researcher made use of a non-probability convenience sampling method, she selected participants on the basis of her personal judgment about which of them would be most likely to provide the kind of rich, layered and dense information that would provide valid answers to the research question. Only those participants who had participated in the quasi-experimental study were selected to participate in the focus group discussion because such participants would already be aware of the extent of their knowledge, skills and barriers in the performance of CPR.

4.11.4.1 Sample size

The optimum number of participants for a focus group varies from one group to another. Kruger and Casey (2000:68) suggest that an optimal size will consist of between six and eight participants because smaller groups provide a researcher with more concentrated information and because they tend to waste less time on peripheral matters. Polit and Beck (2004:305) indicate that it is critical in qualitative sampling to select a setting and format that will maximise the richness, complexity and variety of information that will be offered.

The number that is generally recommended for its manageability is between six and ten participants. This, most scholars feel, is large enough for obtaining a representative variety of opinions but small enough to discourage distractions, disorderliness and fragmentation. Since this phase is used for the collection of in-depth qualitative data, a sample size of twelve registered nurses from each of the hospitals was deemed to be satisfactory. The researcher selected these nurses by using convenience sampling to choose the number of nurses she needed for the discussion. The nurses who were selected were informed in advance that they would participate in the focus group discussion.

4.11.5 The setting

The *setting* is the place or places in which the research data is collected. The study was conducted in the two referral hospitals in Gaborone and Francistown, the two largest cities in Botswana. The researcher conducted the research in these facilities where registered nurses who had acquired a great deal of experience of responding to various kinds of medical, surgical, obstetric and trauma emergencies. The choice of nurses from different settings ensured a more comprehensive and representative set of perceptions.

4.11.5.1 Homogeneity of the participants

The qualified registered nurses who worked in the two referral hospitals represented the target population for this research project. They were selected on the basis of the criteria that were set by the researcher. The focus group interview was held in two different groups in the two referral hospitals.

4.11.5.2 Application of the focus group interview

The planning of the environment, the refinement of the questions, the preparations undertaken by the moderator, the setting up of the environment, the compilation of the discussion guide, the selection of the participants and the arrangements to record the discussions, are all discussed in the sections that follow.

4.12.5.3 Planning of the environment

The conference rooms in the two referral hospitals were utilised for the focus group interviews. The researcher audio-taped the focus group interviews after she had obtained the permission of the participants to do so. The researcher kept another tape recorder close at hand as a backup in case one recorder failed to function properly during the focus group discussion.

4.11.5.4 Planning of the session

- **Physical arrangements**

The focus group interview was conducted in a conference room of the two referral hospitals. The room was adequately ventilated and well lit. A “Please do not disturb” notice was hung on the outside of the conference room door. The chairs were arranged in a circle to encourage and facilitate communication and interaction. All the participants were given code numbers together with their departments and names.

- **Preparation of a discussion guide**

The discussion guide was structured by the researcher to cover all the open-ended questions that would be discussed. The discussion was squarely based on the AACN Synergy Model for Patient Care and covered all the important questions that pertained to the nurse, the system and the patient. The proceedings were opened by welcoming remarks from the researcher, a review of purpose of the discussions, an introduction of each, and a short question and answer session in which individuals could raise relevant points. The entire discussion was tape-recorded with the permission of the participants.

4.11.6 Role of moderator

The researcher utilised the services of a moderator who fulfilled all the necessary criteria mentioned by Burns and Grove (2005:544). The moderator chosen by the researcher was, in accordance with the criteria laid down by Burns and Grove (2005:544), someone who was:

- skilled in conducting of focus group interviews
- experienced in all facets of qualitative research
- an expert in the arts and skills of probing and listening
- knowledgeable about the aims and objectives of the study
- able to maintain strict neutrality and a completely non-judgmental attitude
- particularly skilled in encouraging participants to interact with one another

4.11.6.1 Moderator preparations

The function of a moderator is to be the group leader during a focus group interview. It is possible for the researcher herself to be the moderator should the need arise. The focus group discussion that was conducted in hospital A was moderated by a lecturer from the Family Nurse Practitioner Programme of the Institute of Health Sciences because she had a great deal of experience in the conduct of focus group discussions and the facilitation of such sessions. The researcher explained the purpose of the focus group discussion and the topics that would be covered to the moderator during a discussion a week before the discussion took place. In hospital B, the researcher herself moderated the session because this particular moderator was unavailable to facilitate that session.

4.11.6.2 Facilitating the session

The researcher began by introducing herself, the moderator and the recorder to the participants. The participants were then invited to introduce themselves one by one to the entire group. Certain ground rules were established and participants were asked to speak audibly and clearly, and were encouraged to express their authentic opinions and points of

view about the topics under discussion. The purpose and objectives of the session were then outlined.

The moderator explained why it was important to audio-tape the sessions. The questions that would be discussed were carefully read out in advance to the group. The participants were asked to express their views and opinions one at a time. To facilitate equal participation, the moderator encouraged participants to answer the questions spontaneously and of their own accord. The moderator encouraged everyone to participate and controlled the amount of time that was spent on each question.

The researcher and the observer from Medical Rescue International (Botswana) recorded the content of the session as well as emotional reactions of the group, in both focus group discussions held at the two referral hospitals. The sessions lasted for 1½ hours in each of the two referral hospitals. At the end of the session, the moderator summarised all the points that had been made. She then thanked the participants, and the researcher then expressed her thanks for the valuable contributions that had been made. The researcher also took the opportunity to explain that their contributions would be taken into account in any future changes that would be made in the arrangements for educating nurses in CPR in Botswana and assured all present that each of them would receive a copy of the report that was generated from their participation.

4.11.7 Planning of the questions

Based on the literature review, the researcher constructed the specific questions in sequence of importance. The content for the questions were formulated from the literature review and the questions focused on the component of the AACN Synergy Model for Patient Care such as nurse, patient and system. The following open-ended questions were used to stimulate discussion during the focus group interview.

- **Opening question (the “ice-breaker” question that gets people talking)**

Have you had interesting experiences with CPR in your clinical setting that you like to share with us?

1. Introductory questions (system)

- a. Describe the training in CPR you received during your basic nursing training.
- b. What further refresher courses on CPR did you attend after attaining the basic qualification?

2. Questions on perceptions (system and nurse)

- a. What factors influence your performance while providing CPR?
- b. What barriers hinder your performance of CPR in your work area?
- c. Please explain whether what you have learned about CPR during your basic training contrasts with the CPR that is being practised now in your clinical setting.

3. Questions and requests for information about barriers (system, nurse and patient)

- a. Explain whether you would feel competent to perform CPR on a patient who has suffered a sudden cardiac arrest.
- b. Explain how confident you would feel while performing CPR on a patient who has suffered a sudden cardiac arrest.
- c. On the basis of your observations, what factors do you think hinder other nurses from functioning at their best during the performance of CPR?
- d. Please explain the nature of the support that you receive from your colleagues during the performance of CPR.
- e. Why do you feel that the performance of CPR is invariably a stressful situation?
- f. How would you feel if you had to provide CPR for a client with HIV-AIDS?

4. Questions on needs (system and nurse)

- a. What institutional policies govern the practice of CPR in your hospital?
- b. Why are debriefing sessions for nurses necessary after they have participated in CPR in a ward?
- c. What is your opinion about making annual certification in CPR a mandatory requirement for all nurses in Botswana?

5. End question (system, patient and nurse)

- a. What suggestions would you like to make for improving the provision of CPR in your hospital setting?

4.11.8 Data analysis

The following procedure was followed for the focus group data analysis. Immediately after the focus group session ended, a debriefing session was conducted with the moderator and notes were made. The debriefing included comments about the focus group discussion and the significance of the data. The researcher listened to the tape and had the contents transcribed and checked for accuracy. The benefit of the transcription and the checking of the contents helped to elucidate the meaning of the non-verbal communication, gestures and behaviour that were observed in the group. Notes were also made about the nature and extent of the participation in the group and the ways in which the participants communicated with one another.

The researcher adapted the procedure for qualitative content analysis devised by Graneheim and Lundman (2004:107) and the method of analysing focus group data formulated by Stewart et al (2007:40) for the coding and categorisation of the focus group data that emerged during the research. The researcher used three levels of coding.

The researcher implemented level 1 coding by examining the data line by line and by creating suitable codes for the language used by the participants who had participated in the focus group.

Level 2 coding consisted of comparing the data from this research with other data and then devising appropriate categories. Because *categories* consist of clusters of coded data, they function to condense the amount of information obtained from level 1 coding.

During level 3 coding titles were given to the central themes that emerged from the categories. The documents that emerged from this process were then submitted to the

promoter, the joint promoter and to a colleague of the researcher (who is an experienced qualitative researcher) for review and comments.

4.12 PHASE 3 QUALITATIVE RESEARCH DESIGN (SYSTEM, NURSE AND PATIENT)

4.12.1 Semi-structured interviews with nurse managers

The third phase of the research involved the implementation of a qualitative and descriptive research design. The researcher utilised the findings of the focus group discussion to conduct individual interviews with the nurse managers of each hospital so that they would be given opportunities for making suggestions about how the barriers, that nurses perceived in the performance of CPR, might be addressed. In order to achieve this, the researcher made a decision to combine both quantitative and qualitative methods to expand the scope of the present study.

The quantitative and qualitative research designs complement each other because they generate different kinds of information (Burns & Grove 2005:23). Since all research methods are subject to various limitations, the researcher decided to use both methods during this phase of the research in order to acquire a better understanding of the phenomena that were the subject of the study. This combination of quantitative and qualitative approaches can be especially effective because it only contributed to the completeness of the study, but it also strengthens its reliability and validity (Creswell 2003:158).

4.12.2 Sampling procedures

The researcher used a non-probability purposive sampling method to select the study participants. Burns and Grove (2005:543) state that the researcher may use purposive sampling when certain individuals are known to possess the necessary expertise and experience of the phenomenon that is being studied. This is a technique that allows a researcher to select participants on the basis of his or her personal judgment about who are likely to be best informed possible participants (Polit & Beck 2006:506).

4.12.2.1 Target population

For this phase of the study, the target population for the interview schedule consisted of the nurse managers from the male and female medical wards, the male and female surgical wards, the male and female orthopaedic wards, the gynaecology wards, the maternity wards, the accident and emergency units, the intensive care units, the paediatric medical and paediatric surgical wards. The researcher made this decision based on the assumption that all of these nurse managers would be more likely to be able to contribute pertinent information because of their management positions and responsibilities.

4.12.2.2 Sample size

The researcher requested one nurse manager from each ward to participate in the study. Twenty two nurse managers from the two referral hospitals therefore assembled to participate in this phase of the study.

4.12.2.3 Inclusion criteria

Participants had to fulfil the following criteria and conditions before they could be included in the sample:

- The participant had to be registered with the Nursing and Midwifery Council of Botswana.
- The nurse manager had to be employed on full-time basis.
- Each participant had to be willing to participate in the study and give written consent.
- Each participant had to demonstrate a record of having worked in any of the medical, surgical, orthopaedic, maternity, gynaecology wards, accident and emergency or in one of the intensive care units for at least one continuous year of employment.
- Inclusion in the sample was open to both male and female nurse managers.

4.12.2.4 Exclusion criteria

A potential participant would be excluded from the sample if he or she:

- was not willing to participate in the study
- worked continuously as a nurse manager for less than one year

4.12.3 Data collection technique for phase 3

Data collection is the process of amassing information or data that will be able to address the research problem. Various data collection techniques are used in research of this kind. They include the use of all previously extant information such as hospital or departmental records, observation, face-to-face interviews, the administration of written questionnaires, the organisation of focus group discussions, and various projective techniques such as mapping and scaling (Gillis & Jackson 2002:424).

In this phase of the study, semi-structured interviews were conducted with the nurse managers from the two referral hospitals in Botswana. An *interview* is a data collection technique that involves the oral questioning of respondents, either individually or in a group. During an interview, verbal communication takes place between the researcher and the subject and information is the result of this process. The questions that the researcher asked were devised by the researcher prior to the initiation of data collection. One of the main advantages of the semi-structured interview is that although it provides the kind of data that can be compared, it also provides the researcher with opportunities to collect additional data that might be impossible to collect from self-completion questionnaires (Polit & Beck 2006:291).

Semi-structured interviews are normally used when researchers have a list of topics or broad questions that need to be addressed during an interview (Polit & Beck 2006:291). The researcher pre-tested the interview guide in order to check whether the questions were clear and logical.

4.12.3.1 Data collection instrument

With the help of her promoter and joint promoter, the researcher developed a semi-structured interview schedule that consisted of a selection of both closed and open-ended questions. The interview schedule was designed in such a way that the same semi-structured questions were addressed to all the respondents. This ensured that the

participants were all responding to the same set of questions. The section devoted to biographical data contained closed-ended questions that elicited the necessary information about the participants such as age, gender, educational qualifications, formal training in CPR, and the number of CPR attempts they had participated in (Annexure D).

The second part of the interview guide comprised closed-ended questions, all of which were based on the assumptions of the AACN Synergy Model for Patient Care that guided this study. The researcher herself administered self-administered questionnaires to each nurse manager and requested him or her to complete the questionnaires in the presence of the researcher. The researcher, acting without the assistance of research assistants, therefore conducted the individual interviews with the nurse managers from the two referral hospitals.

4.12.3.2 *Conducting the interviews*

A semi-structured interview is “a method in which information is collected through personal interaction with the respondents to give their views” (Burns & Grove 2005:397). The researcher visited the two referral hospitals, interviewed the selected sample, and used the predetermined semi-structured interview schedule in the same order and manner in each of the hospitals. This method of interaction allowed respondents to clarify questions and answers where necessary.

4.12.3 Reason for choosing the semi-structured interview method

The researcher chose the semi-structured interview schedule as a method of data collection for the following reasons:

The use of semi-structured interview method for data collection is appropriate for research that utilises a qualitative methodology because such a methodology facilitates the collection of narrative data from respondents. Qualitative interviews take place in a congenial and conversational atmosphere.

The semi-structured interview schedule was suitable for phase 3 because it helped the researcher to elicit the information that she needed from the participants. Parahoo

(2006:329) notes that while the participants are all asked similar questions, there is a certain amount of flexibility in the way that the questions are asked and the order in which they may be asked.

Although semi-structured interviews are time-consuming, respondents are far less likely to withhold important and controversial information during a conversation with a friendly interviewer than they are to ignore certain questions in a questionnaire that they find disturbing or distressing. Interviews of this kind also minimise the probability of misinterpretation, and an interviewer can immediately sense whether the question has been understood by the participants or not. Interviewers can also provide additional important information that can be deduced from discreet observation of the behaviour and body language of the participants (Polit & Beck 2006:296). **Nachmias and Nachmias** (1997:236) agree that semi-structured interviews allow a researcher to maintain far greater control over an interview situation and that they also present a researcher with opportunities to collect supplementary information when he or she feels that it would be advantageous to do so. The individual interview method thus gave the researcher various opportunities to collect data about each participant's perceptions, barriers, opinions and needs with regard to CPR.

4.12.3.4 Development of the instrument

The researcher took into account all of the following factors during the development of the instrument:

- Demographic data that was collected by means of closed-ended items.
- The development of the questions for the semi-structured interview was guided by the research objectives of the study and was based on a data analysis of the focus group discussion.
- The questions in the semi-structured interview schedule were based on the constituent components of the AACN Synergy Model for Patient Care.
- The language of communication was English since all the nurses managers were able to communicate in English.

4.12.4 Anticipated problems during data collection and measures taken to minimise these problems

The following section discusses the problems that were anticipated from the responses of the participants, from the possibility of bias, from the influence of transient personal factors, from possible situational contaminants and researcher bias during the process. The various options that were available to the researcher for minimising these problems are also discussed in this section.

4.12.4.1 *Minimising responses set bias*

Since the personal characteristics of participants may influence responses to questions, the answers that an interviewer receives in response to questions may be influenced by beliefs about the social desirability of responses. Also by a perverse desire to make one's responses as extreme and "interesting" as possible, and, conversely, by a frame of mind that might influence a particular respondent to prejudge what he or she believes the interviewer *wants* to hear.

The interviewing techniques of questioning, probing, clarification, a clear prior explanation of the purpose of the research, and an assurance that total confidentiality will be preserved, were all assumed to reduce the possibility of the incidence and intensity of the above-mentioned propensities (Polit & Beck 2006:300). In each case, the researcher introduced herself in a friendly and informal way that established a pleasant rapport with the participants and that put each of them at ease. The participants were informed that the purpose of the research was to explore the perceptions, barriers and needs experienced by nurses in Botswana during the provision of CPR.

4.12.4.2 *Minimising transient personal factors*

A variety of temporary states of mind and emotions such as fatigue or anxiety can influence the responses of participants. In order to minimise the influence of these factors, the researcher conducted the semi-structured interviews in the afternoons in sessions that lasted no longer than 20 to 30 minutes. It is known that when an interview period is shorter, the concentration of the participant is likely to be more intense

4.12.4.3 *Minimising situational contaminants*

Some situational factors may negatively influence a participant's behaviour. The participant, for example, is constantly aware of the interviewer's presence. Environmental factors such as temperature, noise, lighting and other disturbances may also exert an impact on the reactions of participants. In this research, such situational contaminants were excluded by making use of well-ventilated and well-lit rooms in which there were no distracting influences. A "Do not disturb" notice was hung outside the interview room, and this presumably deterred passers-by from intruding.

4.12.4.4 *Minimising researcher's bias*

The researcher's interest in the issue that is addressed has the potential to distort the findings of the study (Burns & Grove 2005:213). The researcher engaged in reflexivity and self-observation throughout the course of the interview in order to minimise the potential for researcher bias.

4.12.4.5 *Pre-testing of the instrument*

The pre-testing of the instrument was conducted on two nurse managers who fulfilled all the eligibility criteria for participation in the study but who were excluded from study itself.

The pre-testing of the semi-structured interview guided the researcher to assess the following features of the instrument:

- the amount of time consumed by each interview
- the flow of the interview which could be deduced from the responses and comments made by the participants
- the reliability and validity of the tool
- potential technical problems that might be encountered during the audio-recording of the interview

It was noted during the pre-testing of the instrument that the two nurse managers were able to understand the questions quite clearly, and so no emendations were made to the questions as they had been formulated.

4.12.5 Content of the semi-structured interview schedule for phase 4

The semi-structured interview schedule included both open-ended and closed-ended questions.

- **Section A: Demographic information**

Questions 1.1 to 2.0 (see Annexure E) requested the respondents to provide personal information about their gender, age, professional status, academic qualifications, work experience, current area of assignment, formal training in CPR, additional training in CPR, the frequency with which they had performed CPR, and the outcomes of their performance of CPR.

- **Section B: Perceived barriers and needs in providing cardiopulmonary resuscitation**

This section attempted to determine the perceived barriers and needs of the nurse managers when the registered nurses performed CPR. Such barriers and needs centred upon factors such as the competency and confidence of the registered nurses, dexterity and accuracy in the use of the defibrillator, the availability of team support, the efficacy of current guidelines that were being followed for the administration of CPR and the adequacy of the hospital's policy on CPR. These matters were covered in questions B.1 to B.21 (see Annexure E).

The content of the closed-ended questionnaire was developed based on current literature pertaining to CPR, and the focus of the questions about the patients, nurses and health care system were derived from the conceptual framework of the AACN Synergy Model for Patient Care. Because no existing tool could be identified, a new instrument was designed. This information was important because it allowed the researcher to identify the perceptions of the nurse managers and the barriers and needs that they experienced

during the provision of CPR. Assessing the nurse managers' perceptions about perceived barriers and needs helped the researcher to gain a clear picture of the support for nurses provided by the health care system at the time of the research and to assess the impact that it made on patient care.

- **Section C: Semi-structured interview**

This section of the interview guide comprised open-ended questions that were designed for the collection of the data from the nurse managers. The research instrument was constructed on the basis of the findings that were accumulated from the focus group discussion with the registered nurses, from the literature review, and from the conceptual framework. All of these questions proved to be useful in the collection of relevant data about the provision of CPR. The researcher focused on those issues that were particularly important to the research problem (see Annexure E).

4.12.6 Administration of the instrument

In order to ensure that the data collection process would proceed smoothly, the researcher took the following precautions:

4.12.6.1 Familiarisation with the use of the tape recorder

The researcher took some time to familiarise herself with the operation of the tape recorder in preparation for the interview sessions with the participants. The knowledge that she was competent in the handling of the tape recorder enhanced the self-confidence of the researcher during the interviews.

4.12.6.2 The self-introduction of the researcher and the explanation of the purpose of the study

The researcher introduced herself in a pleasant way and established rapport that put all of the participants at ease. The participants were told that the purpose of the study was to explore the perceptions, barriers and needs that were being experienced by nurses during the provision of CPR in Botswana.

4.12.6.3 *Timing of the interviews*

The interviews were scheduled for the afternoons because the nurses in the wards were busy with essential routine work during the morning hours. The interview sessions, which lasted for 30 to 40 minutes, never exceeded an hour. The researcher asked the questions and filled in the responses about the respondents' perceived barriers and needs during the provision of CPR. The researcher pursued this method in order to obtain the cooperation of the respondents and to establish rapport with the nurse managers.

4.12.6.4 *The process of interviewing*

The researcher conducted a one-on-one interview with each participant and maintained eye contact with each of the participants during the interview. Data were collected only once from each of the participants are that was done during the course of the interview. The researcher facilitated communication as best she could during these one-on-one semi-structured interviews and encouraged the participants freely to express their opinions about what they considered to be factors that influenced their performance during the provision of CPR. During the course of the interview, the researcher made observations and recorded field notes at the same time.

Before these semi-structured interviews commenced, the interviewer sought permission to carry out the interviews in a private room. Although some of the interviews were interrupted to a certain extent by external noises that emanated from the wards, the researcher did manage to record all the interviews successfully. The research also requested permission from all the interviewees to tape record the interviews, and such permission was duly granted.

Certain measures were taken to secure the ease and comfort levels of each participant. Before the conclusion of each interview, each participant was encouraged to add comments and express her or his personal opinions (no matter how controversial they might have been) about the topics in hand without any inhibition or constraint. The researcher summarised in her own words the ideas and opinions that had been expressed by the participant in each of the interviews in order to confirm that she had correctly

understood what the participants had been saying. During the interview, the researcher was the sole data collector. These tape-recorded interviews were transcribed verbatim (Burns & Grove 2005:547) in order to facilitate the process of qualitative data analysis.

4.12.6.5 The process of recording interview data

During the interview, the data collected was tape-recorded (audio-taped), and the researcher augmented this information with her own field notes wherever possible in order to enrich what had been expressed on the tape recordings. The field notes helped the researcher to crosscheck the reliability of the information that she had gathered from the audiotape.

4.12.6.6 Note-taking during the interview

Note-taking is an important activity that enables researchers to extend the range of information and data that they collect during each interview. Before the beginning of each interview session, the researcher informed the participant that she would be making additional notes during the interview. The participant's reactions, body language and other non-verbal behaviour were all reflected in the field notes that the researcher made during the interview.

4.12.6.7 Tape-recording of the interview

Permission was obtained from each nurse manager before an interview to tape-record the proceedings. It has long been accepted that the tape-recording of interviews is a useful method for confirming the accuracy and objectivity of the data collection. All of the following factors were considered by the researcher in order to guarantee the success of the interviewing sessions:

- The tape recorder was carefully checked and tested before it was used during the interview.
- The tape-recorder was situated between the researcher and the participant – sufficiently close to both of them for the ensuing conversation to be accurately

recorded. The researcher kept additional batteries on hand in case of any sudden failure in the power supply.

- Each of the tapes was labelled with a unit code number, the subject of the interview, the name of the ward and the gender of the participant.

4.12.7 Data analysis

Data analysis is performed for the purposes of reducing, organising and assigning meaning to the collected data (Burns & Grove 2005:794). The closed-ended data was analysed by means of the SPSS program (Version 15). Descriptive statistics was used in the study to facilitate the organisation of the descriptive data.

Data analysis in qualitative research usually begins when the data collection process begins. According to Streubert and Carpenter (1999:28), data analysis consists of the process of clustering of data that refers to the same content under particular descriptive headings. All of these clustered or collected ideas and statements that refer to the same topic, opinion or idea are referred to as *themes* and, together, they give an overall coherence and meaning to the data that has been obtained from the respondents.

The qualitative data were analysed during this phase by means of Tesch's (Creswell 2003:192) open coding method of analysing descriptive data.

4.12.7.1 Transcription from the tape-recorded interview

The verbatim transcription of the interviews enabled the researcher to obtain a full, rich and accurate record of the data. The following procedure was utilised:

- Notations from the tape recordings were made on the written transcripts of the tape recording in order to give an initial coherence to the raw data. The researcher then manually transcribed the transcript onto a personal computer in MS Word format and checked the transcriptions against the tapes for accuracy.
- The researcher then read through all the narratives and transcriptions carefully and thoughtfully in order to obtain a broad sense of the whole enterprise. According to Tesch (1990:73), it is this reading and re-reading of the data that enables a researcher

to obtain a broad sense of the overall coherence and focus of the data. Whatever ideas occurred to the researcher during these readings were immediately noted and recorded.

- The researcher then made a list of all the topics that emerged from the interviews and collected them under similar topic headings in separate columns. During this process, the researcher read each sentence phrase by phrase and line by line. The content of the interviews was transcribed line by line in terms of recurrent words, phrases and ideas. It was by using this method that the researcher created the necessary classificatory codes and sub-codes.
- To facilitate the preliminary analysis, the researcher identified the most descriptive words and phrases for creating meaningful categories and even referred back to the literature for cues for creating the main thematic headings that would comprehensively describe the topics under investigation. The purpose of referring back to the literature review was to place the findings squarely within the context of what was already known. This procedure also helped the researcher to be certain that no important themes had been omitted from this overall process of descriptive coding and classification.

4.13 ESTABLISHMENT OF RIGOUR IN QUALITATIVE RESEARCH

Because objective reality and subjective experience co-exist in varying proportions in all qualitative research data, the problems connected with trustworthiness in qualitative research are different from those in quantitative research. Terms such as consistency, dependability, audibility, credibility and transferability are used to describe the need for a certain level of academic rigour in qualitative research (Burns & Grove 2005:33). Rigour in a qualitative study is established by means of *trustworthiness* (Parahoo 2006:326).

Lincoln and Guba (1985) use the following terms to describe the operational techniques that support and confirm the rigour of the qualitative research: credibility, dependability, confirmability and transferability.

4.13.1 Establishment of trustworthiness

Trustworthiness may be said to be present when the findings of a qualitative study accurately represent the reality experienced by the respondents who are being investigated or the phenomena that are being scrutinised. The researcher used Guba's model for confirming the trustworthiness of qualitative research to assess and confirm the trustworthiness of her research. Table 4.1 shows how the researcher applied Guba's model of trustworthiness in this study.

Table 4.2 Guba's model of trustworthiness of qualitative research

Criterion	Indicator of qualitative approach	Strategies/techniques
Truth value	Credibility	The use of independent coders Prolonged engagement with the data and the subject matter The use of triangulation Routine peer debriefing The utilisation of member checks Meticulous attention to interviewing techniques
Consistency	Dependability	Dependability audit
Neutrality	Confirmability	Inquiry audit
Applicability	Transferability	Descriptive data that is thick, representative and richly layered

Source: Lincoln and Guba (1985:218)

4.13.2 Credibility (truth value)

Credibility establishes the degree of confidence that the researcher has established in the truth of the findings because of the rigour of the research design, the quality of the informants, and the representivity and consistency of the context. Lincoln and Guba (1985) note that the credibility of an inquiry requires the fulfilment of the following two conditions: firstly, the investigation must be conducted in such a way that believability is maximised, secondly, the researcher should subject the research to whatever techniques are necessary for the establishment of credibility. Lincoln and Guba suggest a number of techniques for improving and documenting the credibility of qualitative data. Those that are relevant to this study are discussed in section 4.13.3 of this thesis.

4.13.3 Prolonged engagement and persistent observation

A first and most important step in establishing credibility is prolonged engagement with an immersion in the topic of the investigation and all other matters relating thereto. These

include the investment of a sufficient amount of time in data collection activities to achieve an in-depth understanding of the culture, language and opinions of the group under study. Prolonged engagement may also be necessary for securing the trust of the research participants and for establishing genuine rapport with the informants. During the course of this study, the researcher visited the two participating hospitals before the commencement of the study in order to secure permission to conduct study. During phase 1 of the data collection process, the researcher also met the matrons of the hospitals concerned and also spent some days in Francistown to familiarise herself with the system and how it operated there. The researcher also contacted the participants two weeks before the commencement of the research, visited them personally in their work areas, and reminded the registered nurses about the times and venues for the focus group discussions. Similar steps were followed prior to the commencement of the semi-structured interviews with the senior nurse managers.

4.13.4 Triangulation

Triangulation refers to the use of multiple methods to collect and interpret data about the same phenomenon so that the accuracy of the way in which the particular representations of the reality that is described by the data can be confirmed from a number of different angles. Triangulation was used in this research to ensure that as much as could be done, was done, to offer credible solutions and answers to the research problem (Burns & Grove 2005:25). Triangulation can also enhance credibility. Triangulation refers to the use of multiple referents to draw conclusions about what truth is embodied in the data and the research (Polit & Beck 2006:333). According to Burns and Grove (2005:224) as well as Polit and Beck (2006:333), the purpose of triangulation is to obviate the intrinsic bias that could result from utilising a single method, a sole observer, the exclusive use of a particular theory.

Triangulation also reveals the varied dimensions of a phenomenon and helps to create a more accurate and persuasive description of the field that is being investigated (Streubert & Carpenter 1999:300). Confirming the same information from more than one source helps researchers to describe how their findings might differ under different circumstances, and it also helps to assist them to confirm the truthfulness and accuracy of the phenomena on which the study is based.

4.13.4.1 Investigator triangulation

Investigator triangulation means using more than one person to collect, analyse and interpret a particular set of data (Polit & Beck 2006:333). This concept requires two or more investigators with diverse research training backgrounds to examine all the elements of the research from their own particular points of view (Burns & Grove 225). During phase 2 of this study, the researcher relied on the involvement of the inter-rate moderator while assessing the knowledge and skills of the registered nurses. During phase 3, the researcher utilised the services of a moderator who is experienced in conducting focus group discussions. The promoter and the joint-prompter were also closely involved in the progress of the research – from the initial planning phase until the presentation of the final report.

4.13.4.2 Data source triangulation

Data source triangulation refers to using multiple sources of data in a study. In this study, the researcher interviewed a number of key informants such as registered nurses and nurse managers about exactly the same phenomena (Polit & Beck 2006:333). The researcher also relied on the conclusions of evidence obtained from multiple sources such as the literature review and the conceptual framework. She also referred to several international and regional primary and secondary sources.

The second and third phases of the study concentrated on the registered nurses from the various wards of the two referral hospitals. The fourth phase of the study focused on the senior registered nurses from various wards/units in the two referral hospitals. The researcher did this so that she could obtain a number of diverse views about the phenomenon under study for the purpose of validation. These different sources of data presented opportunities for examining the phenomenon from the point of view of different groups of well-qualified observers and operators in the field of study (the registered nurses and the senior registered nurses who participated in the study).

4.13.4.3 Method triangulation

Method triangulation involves the use of multiple methods such as observations and interviews to pursue solutions to a research problem. In this study, two different research designs and data collection methods were used. The researcher studied the perceptions, barriers and needs that were encountered by registered nurses during the performance of CPR in Botswana by conducting audits of hospital policies on CPR, by scrutinising the availability and functionality of the available CPR equipment, by making inquiries into the prevailing arrangements for in-service education, by conducting quasi-experimental research, and by organising focus group interviews with the registered nurses, and by undertaking individual interviews with the participating nurse managers.

The direct observations of the researcher during the focus group interviews were also validated cross checked and confirmed by the field notes and the transcriptions of the tape recordings that were made during the interview sessions. The researcher thus used a combination of methods to increase the scope of the investigation of the research problem and to confirm its validity.

4.13.5 External checks

Polit and Beck (2006:334) mention two other techniques for establishing credibility that involve independent external scrutiny of the methods and proceedings of the inquiry. These two other techniques are peer debriefing and member checks.

4.13.5.1 Peer debriefing

Peer debriefing was incorporated to strengthen the credibility of the findings. The two promoters of the research and a nursing colleague who was working in Medical Rescue International (Botswana) and who had also undertaken qualitative research assisted in the process of peer debriefing. Peer collaboration requires a researcher to discuss the research process and its findings with impartial colleagues who have had extensive experience of qualitative methods of research and their respective advantages and drawbacks (Lincoln and Guba 1985:218).

4.13.5.2 Member checks

Member checks involve soliciting reactions of the study participants to the preliminary findings and interpretations of the research. This process can be carried out either informally (in an ongoing way as the data is accumulated) or more formally (after all the data has been collected and analysed) (Polit & Beck 2006:334). The researcher organised the member checks during the process of data collection, by confirming the information they she had been given by the participants during the interviews, and by replaying the tape recordings immediately after the interviews in order to confirm the comments that had been made. These methods gave participants opportunities to correct whatever errors they might detect and to confirm what they had said earlier.

4.13.6 Dependability (consistency)

The *dependability* of qualitative data refers to the stability of the data over time and under various conditions. Dependability is a qualitative equivalent of reliability in quantitative research. Dependability can be achieved by replicating procedures step by step and by making use of inquiry audits. Dependability is one of the main criteria that is used to measure trustworthiness in qualitative research, and it is established by maximising the credibility of the findings (Streubert & Carpenter 1999:26). The researcher made use of peer examination, triangulation, the involvement of her promoter and joint promoter in reviewing the raw data, and by paying careful attention to field notes, to enhance the overall dependability of the study.

4.13.7 Confirmability (neutrality)

Confirmability refers to the objectivity or neutrality of the data. This means in effect that two or more independent and impartial investigators are able to confirm the congruence of the data's accuracy, relevance and meaning (Polit & Beck 2006). The audit strategy, which is one of the major techniques for establishing confirmability, is an ongoing process. For this purpose, the investigator develops an audit trail, which is a systematic collection of documentation that allows an independent auditor to reach various conclusions about the data.

In this study, the raw data were collected by means of field notes and tape recordings during the focus group discussions and the semi-structured interviews with the registered nurses and nurse managers. Later, the data were classified and catalogued in terms of the codes that had been devised and the resultant product was analysed. In addition, the data were subsequently reconstructed, synthesised and refined in terms of its predominant categories, themes, definitions, findings and conclusions.

4.13.8 Establishment of the inquiry audit

The investigator can develop *an audit trail*, which is a systematic collection of documentation that allows an independent auditor to come to the same conclusions about the data that another qualified and independent auditor would reach.

The following six classes of records are vital for the creation of a reliable audit trail:

- the raw data, such as that contained in tape recordings, diaries and field notes
- the analysed data findings
- the processes, such as the design strategies and procedures, that have been utilised in the study
- the early expressions of the intentions and purposes of the study such as, for example, the study proposals and the original expectations of what might be achieved by the study
- information about the development of the instrument
- data reconstruction products such as the drafts of the final report

4.13.9 Transferability (applicability)

Lincoln and Guba (1985:282) assert that framework *transferability* refers to the extent to which the finding from the data can be legitimately and coherently transferred to other settings or groups. Lincoln and Guba (1985:298) note that transferability can be maximised by collecting a sufficient amount of data that is thick, rich and layered in descriptive power and by amassing enough information for another researcher to be able to replicate the findings in a similar setting in another research project. The stated aims, objectives,

methodology and strategy followed by the researcher provide the basis for the transferability of the study to other similar research projects in comparable circumstances.

Table 4.3 Measures for ensuring trustworthiness

Strategy	Criteria	Applicability
Credibility	Prolonged engagement	The researcher worked for many hours with the participants during phases 2, 3 and 4. Her understanding of and interactions with the nurses enhanced the credibility of the registered nurses' and nurse managers' perceptions, barriers and needs.
Triangulation	Multiple investigators	The researcher utilised a moderator and an observer during the focus group discussions. The researcher relied on the critical assessments and advice of the promoter and the joint promoter from the initial planning phase to the final report.
	Multiple sources	Focus group interviews, semi-structured interviews, audio-recordings and field notes were all used as data collection methods.
	Member checks	The researcher discussed the preliminary findings with the participants. She also replayed the tape-recordings of the participants' responses with the participants themselves.
	Peer examination	The researcher asked an experienced colleague to review and scrutinise the methodology of the study.
	Authority of the researcher	The researcher has a master's degree, has attended several relevant research workshops and has accumulated a great deal of practical and theoretical experience in this field. The researcher also holds a certificate in BLS.
Applicability and transferability	Sample	Purposive sampling was carried out during the semi-structured interview
	Dense description	Peer checking by colleagues and supervision by promoters
	Code-recode procedure	Consensus-based discussions between the researcher and an independent coder
Consistency and dependability	Audit trail	A full description of the research methodology was provided.
Confirmability	Audit trail	Record keeping (field notes, interview transcripts, process notes, data reduction, analysis products and final reports). The researcher utilised raw data from the focus group interviews with the registered nurses and from the semi-structured interviews with the nurse managers.

Source: Lincoln and Guba (1985:213)

4.14 ETHICAL CONSIDERATIONS

It is important to be guided by ethical considerations in all research because adherence to ethical principles guarantees the status and reliability of their research and because the

researcher can use them to secure the cooperation of the intended participants. According to Polit and Beck (2004), the researcher needs to be proactive in promulgating and publicising the ethical standards of the research process because they are basic to the integrity and believability of the research.

4.14.1 Permission to conduct the study

The researcher obtained permission to conduct the research from the relevant authorities. Letters seeking permission to conduct the research were sent to the Ministry of Health after the submission of the research proposal, and the necessary permission was granted. The researcher also sought and obtained permission from the research committee of the two referral hospitals. The researcher similarly sought and obtained permission to conduct the study from the Research and Ethics Committee of the Department of Health Studies at the University of South Africa (see Annexure A and Annexure B).

4.14.2 Securing informed consent

A covering letter was attached to the questionnaire and was distributed to the subjects by the researcher. The objectives of the research were explained in the covering letter and reassurance was given to potential participants that the information obtained would be treated confidentially. Verbal consent was also obtained from each of the subjects before the interviews began. Written informed consent was also obtained from the participants. The participants were informed that they could withdraw their participation from the research at any time if they felt like doing so, and that they would incur no penalties or disadvantages by withdrawing from the study. The written informed consent forms were kept separately from the completed interview schedules so that they could not be used to identify the respondents (see Annexure D).

4.14.3 Protection of human rights

Human rights are certain inalienable claims and demands that must be offered to individuals or groups if they are to maintain their freedom, dignity, integrity and self-respect. The human rights and principles that need to be respected in the conduct of research are *beneficence, respect* and *justice* (Burns & Grove 2005:196).

4.14.4 Beneficence

The principle of *beneficence* (the principle of doing good and refraining from doing harm) ensure that research respondents will not be exposed to any kind of undue harm or exploitation during the research process (Burns & Grove 2005:728). It was for this reason that the researcher communicated the benefits and risks of the study to respondents and emphasised the benefits of the study. The researcher avoided any kind of misuse of the relationships that she had to establish with the respondents, and also avoided exposing the subjects to any kind of harm or embarrassment by asking unduly intrusive and sensitive questions or by using the information that she gained during the course of the research against the respondents themselves. The researcher would immediately have discontinued the research if she suspected that any kind of injury or disability might have had been sustained (Polit & Beck 2006:88).

The researcher also constructed the questions in such a way as to avoid any kind of undue intrusion into the respondents' privacy. The benefits and purpose of the study were explained to the respondents and the respondents were provided with the researcher's contact numbers in case the respondents had any questions before and/or after the interview. The respondents were reassured that they could exclude themselves from participation if they felt in any way uncomfortable with the questions. In addition to this, the researcher assumed that since the study had been conceptualised in terms of the tenets of the AACN Synergy Model for Patient Care, any implementation of the final recommendations and strategies of the study would improve the knowledge, skills and ability of the nurses to think critically during the provision of CPR.

4.14.5 Respect

The right to self-determination is based on the principle of respect for individuals and their ability to control their own destiny. Respondents have a right to determine whether or not they will participate in a study without in any way being deceived or coerced. The respondents also have a right to a full disclosure of all relevant information (Polit & Beck 2006:89). In this study, the researcher treated the respondents with proper respect and dignity. The participants were also informed that they retained the right to withdraw from

participation in the study at any time during the proceedings. In addition to this, they were told that they were welcome to ask for clarification about any aspect of the study that was unclear to them.

4.14.6 The right to informed consent

In any research involving human beings, the respondents need to be fully informed about the nature and purpose of the study and be free to choose whether they wish to participate without any kind of coercion or deception on the part of the researcher (Burns & Grove 2005:193). Each respondent signed a written informed consent form in which she/he agreed to participate voluntarily in the study and to share information with the researcher. The respondents were also informed that data would be reported in a dissertation that would be made available in the library of the University of South Africa, hospital in which the study was conducted, the Ministry of Health of Botswana and in the government archives of Botswana. During phases 2, 3 and 4, the participants were asked to sign a consent form once they had decided to join the study.

4.14.7 Privacy and confidentiality

Privacy and *confidentiality* are based on the principle of respect. Privacy is the respect of an individual to determine the circumstances, time, and extent, and type of information that he or she will share or withhold from others (Polit & Beck 2006:91). According to Polit and Hungler (1997:698), a promise of confidentiality to participants is a guarantee that any information that the respondents provide will not be publicly reported or made accessible to parties other than those involved in the research. In this study, the focus group interviews were conducted in the seminar room with the registered nurses.

The semi-structured interview for the nurse managers were conducted in the manager's office. An additional measure was that the respondents' names were not written on the interview schedule. This procedure maintained their anonymity, and the written consent form was kept separately from the interview schedule so that it could not be used to identify the respondents.

The researcher ensured privacy during data collection by assigning code numbers to the settings, the questionnaire, and the interview schedule. The completed interview schedules were kept in a secure location to which only the researcher had access. The information collected was thus not shared with anyone except with those who were actively involved in the analysis of the data. Furthermore, the participants were assured that their names would not appear in any of the documentation that would be disseminated as a result of this study. Despite the fact that the consent forms were signed by participants, they were also reassured that the semi-structured interview schedules and the consent forms would be kept separately and that the interviewers would not be able to link their names to the information that had been given by them.

4.14.8 The right to fair treatment

The *right to fair treatment* is based on the principle of justice that states that people should be treated fairly and that they should receive what they deserve (Polit & Beck 2006:90). This principle was maintained by selecting only those respondents who were available and by being very careful not to base the selection criteria on any racial, social or cultural benchmarks. The researcher was also sensitive not to cause any kind of discomfort to the respondents by maintaining the time schedule that had earlier been agreed upon. The researcher also treated the participants with due respect.

4.14.9 Benefits

The respondents were informed that no immediate benefits in terms of money or any other kind of reward would be conferred in return for participation in the study. The benefits of acquiring and improving CPR knowledge and skills, and the importance of an annual updating of CPR certification that would improve the overall quality of the health care services of Botswana, were carefully explained to the registered nurses who participated in this research.

4.15 CONCLUSION

In this chapter, the various aspects of the methodology that were used in this research were discussed under the headings of research design, population and sample, data collection instrument, the plan for the analysis of the data, as well as the researcher's adherence to the ethical principles of research. The researcher's methods of data collection and analysis were also discussed in this chapter. This chapter also dealt with the issues of establishing rigour and complied with the necessary ethical principles. The following chapters will focus on a discussion of the interpretation of the research findings.

Ethical issues were taken into consideration in order to protect the study participants throughout the course of the study and during the period after the study. The ethical principles that were identified as indispensable in the context of the present research were beneficence, respect for human dignity, and justice.

Research results that will be presented in the following chapters:

- Chapter 5: Discussion of the findings of the observational audit of the emergency trolleys, the auditing of the hospital policies on CPR, and the auditing of the in-service registers of the two referral hospitals. The observational audit of the CPR performed between the years 2005 and 2006 is also discussed in this chapter.
- Chapter 6: Discussion of the quasi-experimental design of the CPR pre-test and the post-test following training. The post-test evaluation after three months is also discussed in this chapter.
- Chapter 7: Discussion of the focus group discussion with registered nurses and discussion of the semi-structured interviews with the nurse managers.
- Chapter 8: Conclusions and recommendations derived from the study as well as the limitations of the study will be presented.

CHAPTER 5

DATA ANALYSIS AND DISCUSSION: THE AUDIT PHASE

5.1 INTRODUCTION

This chapter presents the quantitative results of the data analysis from phase 1 (the audit phase) of this study. It discusses how the researcher audited the emergency trolleys, performed a retrospective audit of the records of the two research hospitals, examined and reviewed the procedure manual, and audited the in-service records.

5.1.1 Statement of the problem

In Botswana, CPR is still a procedure that is in the process of being established, developed and refined. Nurses in Botswana constitute the core of the health-related workforce, and it is they who are actively involved in the management of the primary, secondary and tertiary health care facilities all over the country. Since the majority of health care providers are nurses, it is essential for nurses to be competent in CPR techniques so that they will be able to save many more lives during the course of life-threatening emergencies such as cardiopulmonary failure. All nurses are expected to be able to function efficiently during emergencies of all kinds. But, factors such as lack of knowledge, lack of skills and the absence of indispensable resources such as defibrillators and the kind of medications that are necessary for the treatment of cardiac emergencies are causing many more CPR procedures to fail when they might otherwise have reflected a far more satisfactory rate of success. This research has identified the problems and factors that influenced the performance of CPR among registered nurses in Botswana.

5.2 RESEARCH OBJECTIVES

The research objectives of this study are to explore and describe the perceptions, needs and barriers that are being experienced by nurses during the performance of CPR in the two largest hospitals of Botswana. The specific objectives of this study can be described in terms of the following four phases:

5.2.1 Phase 1 (Audit phase – the system)

Successful outcomes for the patient and the nurse directly affect the overall success rates of the entire health care system. According to the AACN Synergy Model for Patient Care, a proper synergy in the provision of healthcare can be achieved only when the eight dimensions of nursing practice delineated by the AACN Synergy Model for Patient Care, support from the system so that it has the capacity to meet patient needs. Successful advanced life support systems need to be able to rely on the availability and correct functioning of essential resuscitation equipment and the availability of emergency-related drugs conveniently stored among the items on the resuscitation trolleys (Smith et al 2008:4).

- Make a careful survey of all the existing facilities for conducting CPR that are present in all the wards/units of the two referral hospitals in Botswana by making use of a checklist that was specifically devised for this purpose.
- Conduct an audit of the hospital's records in order to identify the number of CPRs that were performed in the wards/units and their outcomes during in the years 2005 and 2006 in the two referral hospitals.
- Scrutinise and evaluate the policies that the hospital has set in place to guide the performance of CPR.
- Audit all in-service education records to verify the number of workshops on CPR that were presented during that period and the number of registered nurses who attended them.
- Ascertain whether any credits for continued education were obtained by those registered nurses who attended these refresher courses.

5.2.2 Phase 2 (Evaluation phase – the nurse)

- Conduct a quasi-experimental research to evaluate the existing knowledge and skills that registered nurses have with regard to CPR.

5.2.3 Phase 3 (Discussion phase – the patient, nurse and system)

- Conduct focus group interviews with registered nurses to identify their perceptions about CPR both before and after their education and training in the administration of CPR.
- Identify the barriers and obstacles that hinder the effective performance of CPR and the needs of registered nurses as they perform CPR.

Conduct individual interviews with the nurse managers of the two referral hospitals in order to identify their experience the perceived barriers and needs of registered nurses as they perform CPR and their opinions about the best possible ways of eliminating the barriers and overcoming the obstacles that hinder optimal performance.

5.2.4 Phase 4 (Recommendation phase – the patient, nurse and system)

- Based on the findings from this study and based on guidelines from the AACN Synergy Model for Patient Care, make recommendations for possible changes to the system and for improving knowledge and skills on CPR for registered nurses for better patient outcomes in Botswana.

5.3 DATA ANALYSIS

The data analyses that the researcher performed during the auditing of the records involved coding, categorising, ordering, systematically organising, summarising and synthesising the data so that she might obtain meaningful results (Polit & Beck 2006:498). The researcher also used descriptive analyses to summarise and organise the data. The figures that she obtained during this process are all relevant to the study objectives and questions that were raised by this research. Frequency distribution tables were used to summarise the data. The data are displayed in figures and is expressed by means of percentages and proportions in an attempt make the results more readily comprehensible. The most frequently used figures for presenting the data include bar charts and pie charts.

The recording of the data and its analysis were performed by means of the SPSS (Version 15.0), and Microsoft Excel was used to generate figures and graphs with the assistance of a statistician.

5.3.1 Analysis of the data. Phase 1: The auditing of the emergency trolleys, the records, hospital policies and procedure manuals

This phase of the research was carried out in hospital A and hospital B, the two referral hospitals of Botswana, during February and June of 2008. It involved the auditing of the emergency trolleys, the retrospective auditing of the records of patients who had died during the years 2005 and 2006, the scrutiny and auditing of the CPR policies of the respective hospitals, and the auditing of the procedure manual. Emergency trolleys from ten wards/units from each hospital were audited by means of a checklist (Annexure C).

5.3.1.1 Description of the emergency trolley

An emergency trolley of the kind that is used in Botswana hospitals has three compartments. The upper compartment contains the equipment that is necessary for maintaining the patency of the patient's oropharyngeal airway and breathing capacity by any kind of Guedal-pattern airway device, the correct management of endotracheal tubes and the use of an ambu bag. The next compartment contains a defibrillator and the bottom compartment contains those items that are necessary for managing circulation. The drugs that are necessary to revive the patient are stored on the one side of the first compartment. Jevon (2004:28) asserts that all resuscitation equipment and the layout of the resuscitation trolleys should be strictly standardised throughout an institution. A total of 88 items are kept in all the emergency trolleys of the two hospitals.

5.3.1.2 Auditing of the emergency trolley

For the purpose of conducting the audits, the researcher adapted a checklist that was developed by the Resuscitation Council of the UK (2004:1). The checklist made provision for checking the various categories of items that had to be included on the emergency trolley such as the equipment needed to maintain the airway, breathing and circulation, first- and second-line drugs, various kinds of electrical equipment and additional equipment such as a disposable razor, a pair of scissors and a sharps box. The researcher personally audited every emergency trolley in each of the wards and the items were ticked off on the checklist only if they were present (Annexure C).

The auditing of the emergency trolley is of primary significance in the purpose of this study. According to the literature (Desalu et al 2006:517; Ranse & Arbon 2008:38), any shortage or absence of necessary equipment and supplies, the non-functioning of equipment and the storage of the emergency trolley in an unknown location, can delay or even prevent the timely initiation of CPR during an emergency. All such dysfunctions also contribute immeasurably to the high levels of stress that normally afflict the nursing staff who are responsible for attempting to resuscitate a dying patient. The research undertaken by Smith et al in the UK (2008:6) found that the emergency trolley had evidently remained unchecked and that it was therefore of little or no assistance to the nursing staff as they attempted to cope with an emergency CPR. The failure or absence of regular checking creates an additional vulnerability in a critical care system and contributes to delays in the administration of CPR – a procedure that depends upon rapid and timely intervention for its success.

The distribution of the equipment was better arranged in hospital A than in hospital B. The results of the auditing revealed that an average of 45% of the emergency trolley equipment was present in hospital A whereas an average of only 26% was present in emergency trolleys of the hospital B.

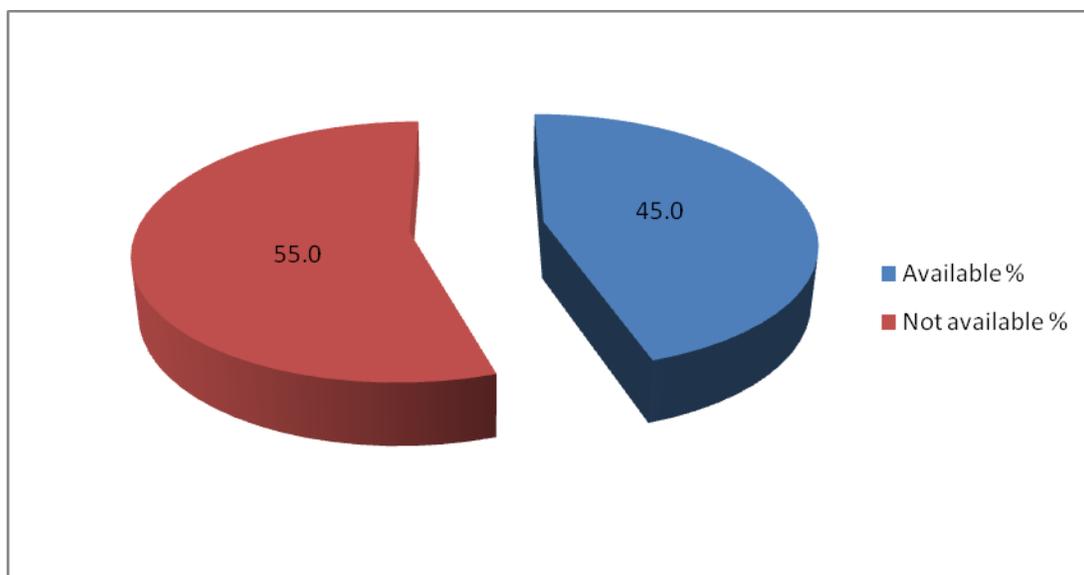


Figure 5.1: Availability of equipment in hospital A

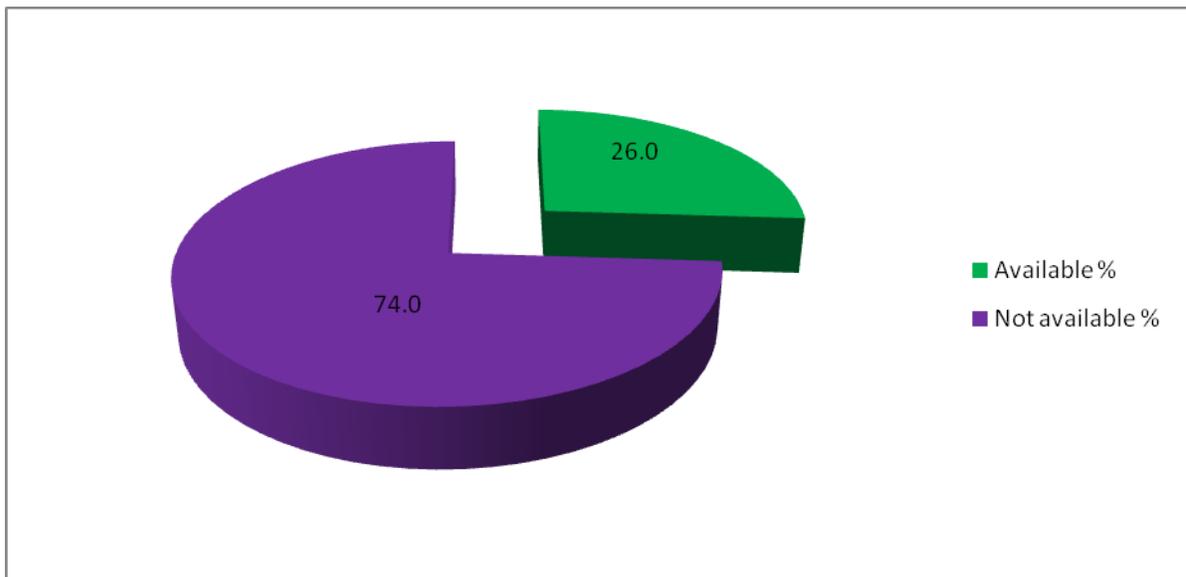


Figure 5.2: Availability of equipment in hospital B

Figures 5.1 and 5.2 indicate the availability of emergency equipment in the two referral hospitals. According to the standard checklist, a total of 88 pieces of equipment should be present on/in the emergency trolley.

The researcher had checked the emergency trolleys in the following ten wards of the two hospitals: the A&E unit, the ICU, the male medical ward, the female medical ward, the male surgical ward, the female surgical ward, the male orthopaedic ward, the female orthopaedic ward, the gynaecology ward and the maternity ward. An overall summarised percentage score of available equipment against the 88 pieces of equipment and other artefacts was also calculated in order to assess the overall situation in the two hospitals.

5.3.1.3 Comparison of equipment in the emergency trolleys of the ten wards in the two referral hospitals

Figure 5.3 sets out the distribution of the equipment in the ten wards of the two referral hospitals. In both of these hospitals, the A & E unit and the ICU contained relatively more of the necessary equipment in comparison to the other general wards. The A&E of the hospital A contained 66% of equipment as compared to hospital B, which contained only 51% of the total amount of equipment that was required for an emergency trolley. The ICU of the hospital B revealed a slightly better distribution of equipment (58%) in comparison to the ICU (55%) of hospital A.

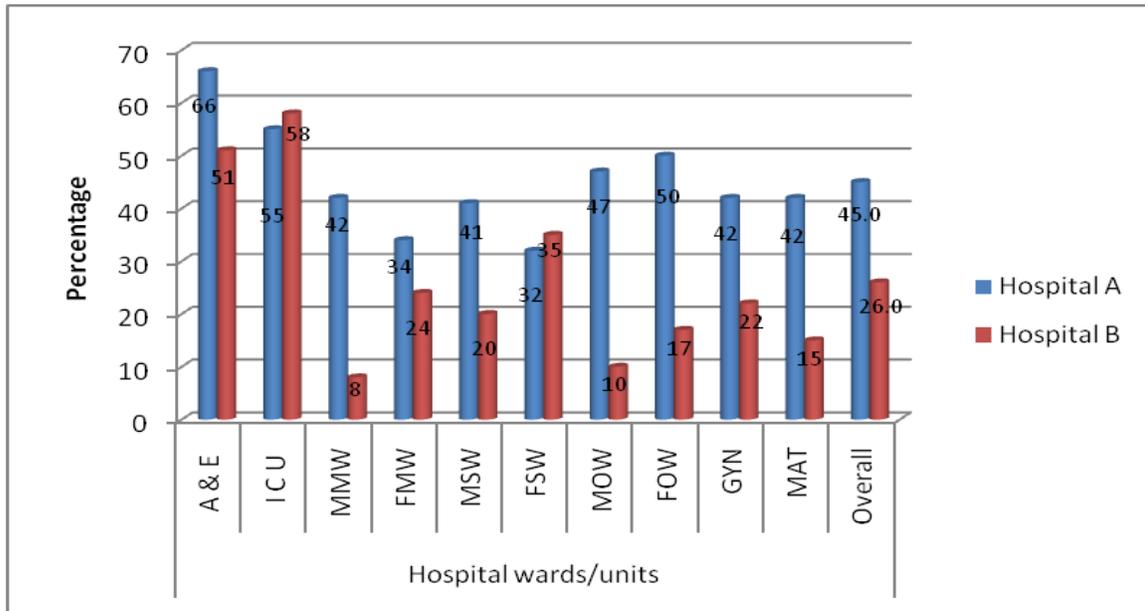


Figure 5.3: Distribution of equipment by wards/units in the two hospitals

KEY:

A&E – accident and emergency unit	ICU – intensive care unit
MMW – male medical ward	FMW – female medical ward
MSW – male surgical ward	FSW – female surgical ward
MOW – male orthopaedic ward	FOW – female orthopaedic ward
GYN – gynaecology ward	MAT – maternity ward

The relative distribution of the equipment in the medical wards was low in comparison to the distribution of equipment in the critical care units. The male medical ward in hospital A contained 42% of the required equipment whereas the male medical ward in hospital B contained only 8% of requisite equipment. While the female medical ward of hospital A had 34% of the total amount of equipment, the female medical ward of hospital B had only 24% of equipment stipulated on the checklist.

Hospital A revealed a much better overall distribution of equipment in comparison to the overall distribution of equipment in the wards of hospital B. A study conducted by Finn and Jacobs (2003:470) indicated that hospitals in Australia revealed serious deficiencies in the emergency trolleys since many of them were found to be deficient in the proper storage, maintenance and placement of resuscitation equipment. Gnanalingham, Harris and Didcock (2006:1677) also found that the availability and accessibility of basic paediatric resuscitation equipment varied enormously within primary health care centres in the UK.

The current findings of studies also indicate that the two referral hospitals in Botswana are experiencing similar problems.

5.3.1.4 Distribution of equipment for airway and breathing maintenance

According to the Resuscitation Council of the UK (2004: [1]) and the checklist, the emergency trolley should contain 44 specific items of equipment to assist in the maintenance of the patient's airway and breathing. The present study determined that the accident and emergency units and intensive care units of the two referral hospitals contained more equipment than the other wards/units of the hospitals.

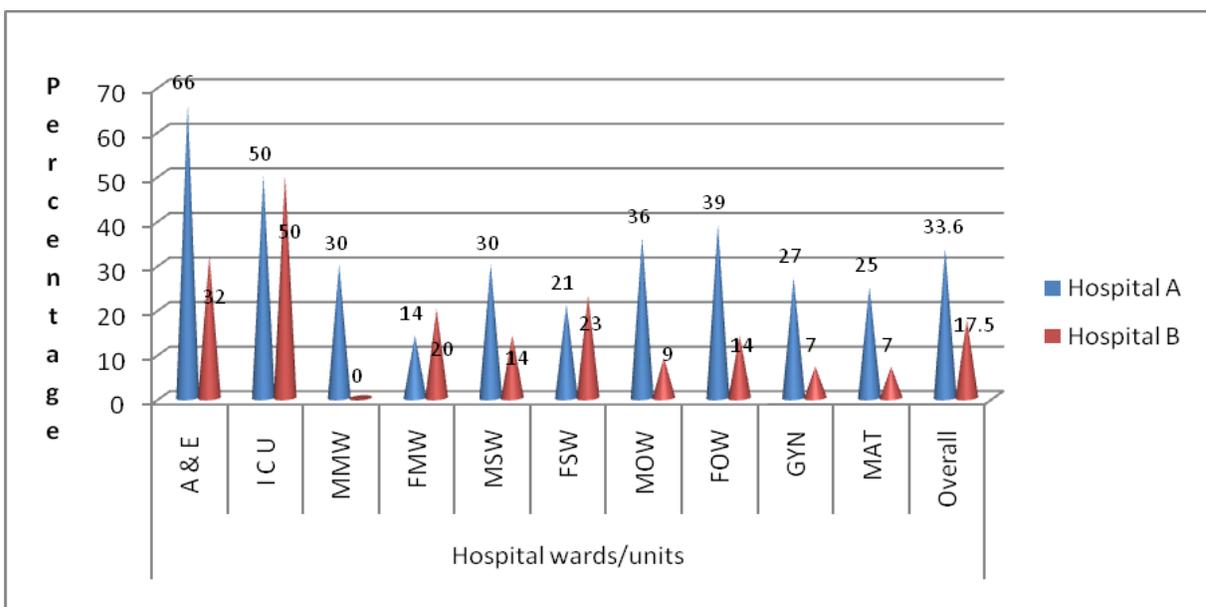


Figure 5.4: Airway and breathing maintenance equipment in the two hospitals

KEY:

A&E – accident and emergency unit	ICU – intensive care unit
MMW – male medical ward	FMW – female medical ward
MSW – male surgical ward	FSW – female surgical ward
MOW – male orthopaedic ward	FOW – female orthopaedic ward
GYN – gynaecology ward	MAT – maternity ward

Figure 5.4 details the distribution of airway and breathing maintenance equipment in the two hospitals under study. Among the two hospitals, the A&E unit in hospital A had 29 items of equipment (equivalent to 66%) whereas the A&E unit in hospital B had only 14 items of equipment (equivalent to 32% of the total required number). The intensive care

unit of hospital B and the intensive care unit of hospital A were identical with 22 items of equipment in each (equivalent to 50% of the total number of items required). The male medical ward in hospital B contained none of the required items (0%) for an emergency trolley. The National Patient Safety Agency (2008: [8]) in the UK reported a number of incidents that involved missing or broken equipment on emergency trolleys. A separate survey of emergency trolleys conducted in a selected number of hospitals in the UK in 2002/2003 found that the availability of necessary equipment varied enormously from one hospital to another (Hogh, Kane, Bhalla & Ward 2005:409).

5.3.1.5 Distribution of equipment for fluid and circulation

According to the Resuscitation Council of the UK (2004: [1]), there should be ten items of equipment available in the emergency trolley for the management of fluid and circulation alone. Figure 5.5 indicates the distribution of fluid and circulation equipment in the ten wards of the two referral hospitals in which this study took place. More than seven wards in each hospital contained 50% or more of the equipment that is needed to manage fluid and circulation. It was observed that the A & E ward had 80% (n=8) of the number of items present in hospital A while the intensive care unit of hospital B had 60% (n=6) of the equipment that was necessary to manage fluid and circulation during cardiac arrest. The female and male medical wards of the two hospitals each scored above 50% for the number of items that were present in their trolleys.

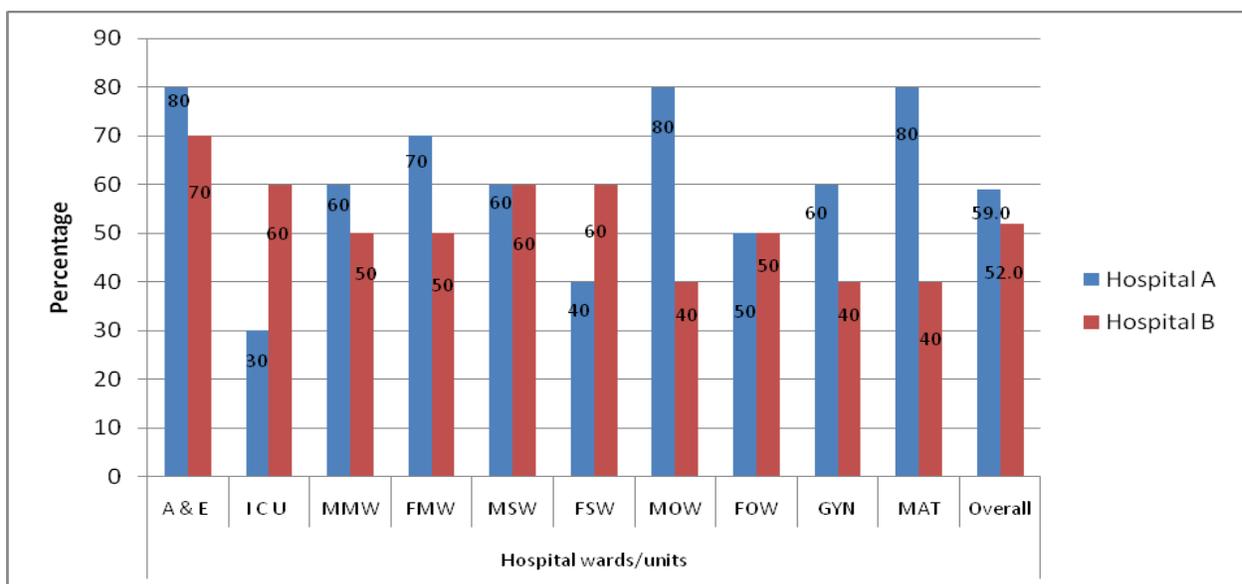


Figure 5.5: Fluid and circulation equipment in the two hospitals

KEY:

A&E – accident and emergency unit	ICU – intensive care unit
MMW – male medical ward	FMW – female medical ward
MSW – male surgical ward	FSW – female surgical ward
MOW – male orthopaedic ward	FOW – female orthopaedic ward
GYN – gynaecology ward	MAT – maternity ward

Figure 5.5 shows that the female surgical ward of the hospital A had only 40% of equipment needed for fluid and circulation management, as did the male orthopaedic, the gynaecology ward, and the maternity wards in hospital B. The intensive care unit in hospital A scored the lowest percentage with only 30% (n=3) of the equipment being present at the time when the researcher conducted the audit. The researcher also observed that the intravenous fluids and intravenous canulas in four of the wards were kept in side rooms instead of being immediately available in the emergency trolleys. It is the opinion of Strzyzewski (2006:10) that since cardiac arrests do not occur very often, nurses should assume responsibility for checking the emergency trolley on a daily basis and replacing equipment that has been used immediately after a resuscitation attempt. Strzyzewski (2006:10) further noted that critical moments are wasted when nurses have to hunt for particular pieces of equipment when they should actually be active in the administration of CPR.

5.3.1.6 Availability of electrical and hardware equipment

A total of 23 electrical and hardware equipment needs to be available on all correctly stocked emergency trolleys. These essential pieces of equipment include a manual defibrillator and ECG electrodes.

Figure 5.6 shows the high availability of equipment in terms of percentages in the accident and emergency wards and the intensive care units of the two referral hospitals. The female orthopaedic ward and the maternity ward of hospital B were both completely void of the necessary electrical equipment for resuscitation (0%).

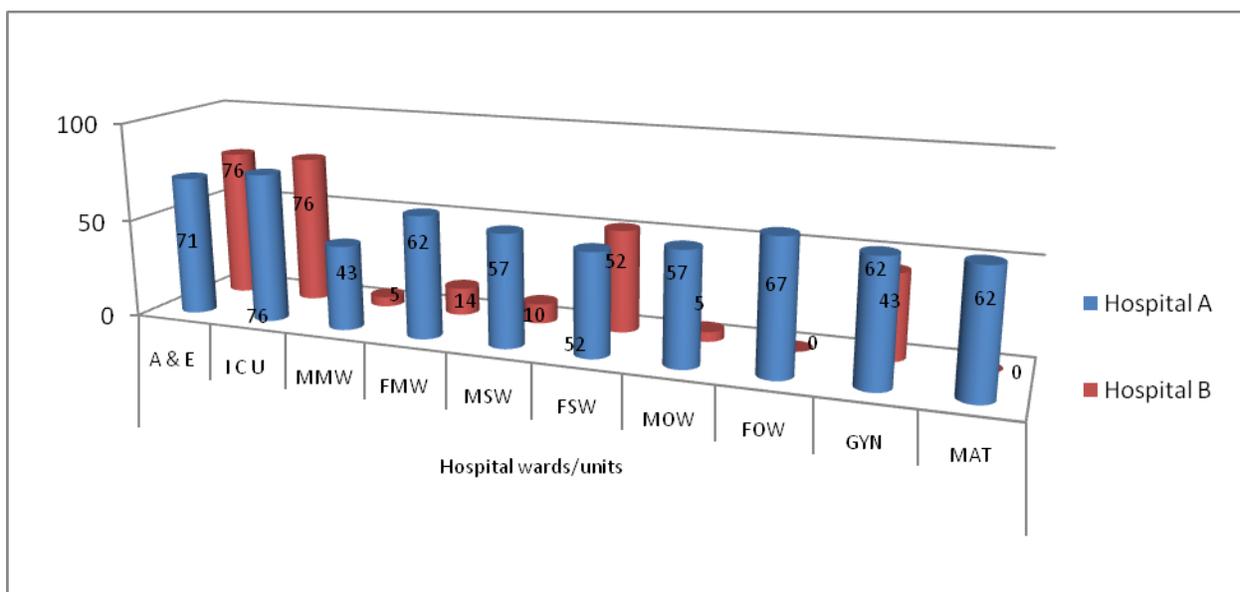


Figure 5.6: Electrical and hardware equipment in the two hospitals

KEY:

A&E – accident and emergency unit	ICU – intensive care unit
MMW – male medical ward	FMW – female medical ward
MSW – male surgical ward	FSW – female surgical ward
MOW – male orthopaedic ward	FOW – female orthopaedic ward
GYN – gynaecology ward	MAT – maternity ward

Two wards/units (20%) in hospital A and four wards/units (40%) in hospital B did not possess a manual defibrillator. A similar absence of defibrillators was detected in studies conducted by Suraseranivongse et al in Thailand (2006:188) and Gnanalingham et al in the UK (2006:1677). The impossibility of early defibrillation because of the absence of functional defibrillators would mean that patients where such a situation prevailed would have little hope of survival.

5.3.1.7 Availability of emergency drugs

The first-line and second-line drugs (Annexure C) are vital elements in the provision of an effective and advanced life-support care system. The absence or the non-availability of sufficient amounts of the necessary resuscitation drugs simply mean that the resuscitation team will not be in a position to administer advanced life-support measures (Desalu et al 2005:517). The present study found that some of the essential drugs, that should be present on all emergency trolleys in the wards of the two referral hospitals, were missing.

Figure 5.7 indicates the distribution of drugs in the two referral hospitals. A comparison of the two referral hospitals shows that hospital A had more of the drugs available (42.5%) than hospital B (33.3%). According to the recommendations of the Resuscitation Council of the UK (2004: [4]), all emergency trolleys should contain twelve first-line and second-line drugs. The data indicates that drugs were more available in the intensive care units (50%) than they were in other wards (35%). In a study conducted by Gnanalingham et al (2006:1677), the availability of basic drugs such as adrenaline was found to be deficient and below standard.

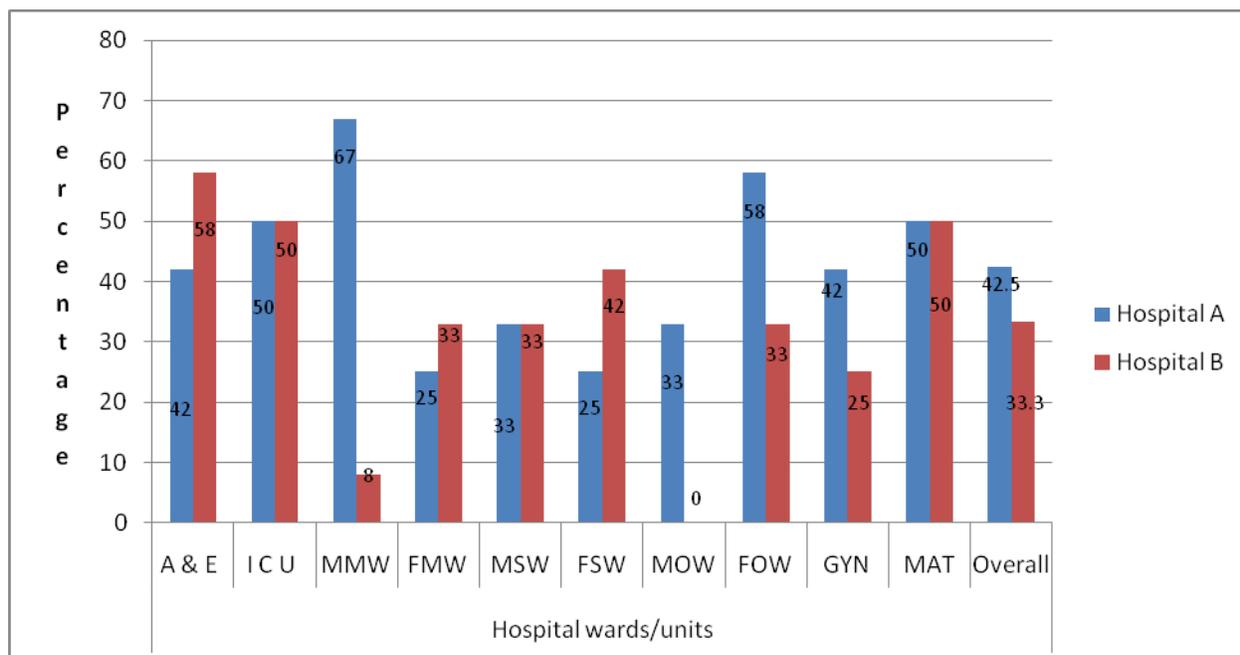


Figure 5.7: Availability of emergency drugs in the two hospitals

KEY:

A&E – accident and emergency unit	ICU – intensive care unit
MMW – male medical ward	FMW – female medical ward
MSW – male surgical ward	FSW – female surgical ward
MOW – male orthopaedic ward	FOW – female orthopaedic ward
GYN – gynaecology ward	MAT – maternity ward

5.3.1.8 Frequency of the checking of the emergency trolleys

The researcher audited the emergency trolley checklist book from each ward of the two referral hospitals and found that the emergency trolley was checked on a daily basis only in

the accident and emergency ward of hospital A and in the intensive care unit of hospital B. In the remaining wards, the practice of checking the trolley was far more infrequent.

Jevon (2004:29) recommends that each clinical department should be responsible for checking its own resuscitation equipment – preferably on a daily basis. The functionality and efficiency of the electrical equipment and other hardware on emergency trolleys should also be frequently checked and serviced on a regular basis. In the research that they conducted in the UK, Smith et al (2008:4) found that because basic trolley-checking procedures were not being followed, the trolleys were frequently ill-prepared and lacking in essential items, and were therefore of little use for responding to sudden cardiopulmonary arrests. They also found that the checking procedure was sometimes only carried out every three days, and that some trolleys would remain unchecked for as long as nine days at a time (Smith et al 2008:4).

Table 5.1 Frequency of the checking of emergency trolleys

	A&E	ICU	MMW	FMW	MSW	FSW	MOW	FOW	GYN	MAT
Hospital A	D	W	I	I	I	I	F	I	I	I
Hospital B	I	D	I	I	I	I	I	I	I	I

KEY:

A&E – accident and emergency unit	ICU – intensive care unit		
MMW – male medical ward	FMW – female medical ward		
MSW – male surgical ward	FSW – female surgical ward		
MOW – male orthopaedic ward	FOW – female orthopaedic ward		
GYN – gynaecology ward	MAT – maternity ward		
D = daily	I = infrequently	F = fortnightly	W = weekly

The auditing carried out by the researcher revealed that emergency trolleys – especially those in non-critical care wards – were not checked on a daily basis. The Resuscitation Council of the UK (2004: [1]) recommends that all resuscitation trolleys be checked by a suitably qualified member of staff on a daily basis. In addition to this, Dyson and Smith (2002:137) recommend that, since resuscitation equipment is most frequently used in critical care areas such as emergency departments and intensive care units, emergency trolleys should be checked during every shift and that general wards should be

conscientious about checking their equipment on a daily basis. Hand and Banks (2004:44) state that it is imperative for staff to check the contents of emergency trolleys on a daily basis. Gabbot et al (2005:171) concur that the responsibility for checking resuscitation equipment resides with registered nurses and that although the frequency of checking will depend upon local circumstances, it is ideal for all emergency trolleys to be checked on a daily basis. Each hospital should have a standardised checklist that should be stored in a suitable place on every resuscitation trolley, and that the absence of a checklist should be reported immediately (Gabbot et al 2005:171). Infrequent checking of the resuscitation trolleys could lead to significant delays in the replacement of non-functional equipment. Variations in the availability of resuscitation equipment undoubtedly affect the kind of emergency care that patients are likely to receive during resuscitation (Hogh et al 2005:409).

5.3.1.9 Guidelines followed in the wards

The researcher's auditing of the procedure manuals of the two referral hospitals revealed that no standard guidelines were followed in any of the wards that relied on being able to perform emergency resuscitation attempts. Desalu et al (2006:517) produced evidence to show that the failure to follow standardised guidelines negatively affects the quality of teaching CPR and the practice of CPR in developing countries. According to Shuster (2006:38), the resuscitation guidelines are important because they describe the best current practice in the world from currently available research evidence, and that they also describe the consensus of experts in those cases where sufficient evidence is not available to reach absolutely certain conclusions. The degree of importance accorded to guidelines and policies helps to improve survival rates, the quality of life of those who survive, and the quality of post-resuscitation care (Spearpoint 2008:48). A study conducted in the UK by Gnanalingham et al (2006:1677) reveals that from 27 health care facilities that were investigated, only seven had provided algorithms for the guidance of staff required to perform paediatric BLS.

5.4 AUDITING OF IN-PATIENT DEATH RECORDS

The factors that crucially affect the prognosis of in-hospital cardiac arrest patients include the organisation of in-hospital responses to emergency calls, the length of the delay that

occurs between the “Code Blue” call and the arrival of the cardiac arrest team, the quality and comprehensiveness of the equipment available, and the degree to which staff have been trained in emergency procedures (Dane, Lindergren, Parish, Durham & Brown 2000:83). The accuracy of resuscitation documentation is also indispensable for providing evidence-based treatment. Perberdy et al (2008:785) concur that it is vitally important to encourage hospitals to critically evaluate the efficiency and effectiveness with which their emergency staff respond to and perform resuscitation attempts.

The researcher’s objective in auditing the death records of patients who had died during resuscitation was to evaluate the general proficiency and effectiveness of the in-hospital attempts to resuscitate patients that had taken place in the past as well as the outcomes of these attempts.

The auditing of such records is crucially important for this research because it will help these hospitals to improve the quality of their resuscitation procedures when confronted by cardiac arrests. The researcher was also interested in determining whether the two referral hospitals utilised a common method of reporting resuscitation attempts.

5.4.1 Demographic data of 508 patients who died during the years 2005 and 2006 in the two referral hospitals

From the audit of the death records, demographic data of 508 patients who died during 2005 and 2006 in the two referral hospitals were collected and are listed in table 5.2.

Table 5.2 Demographic data of patients from the audited death records

Categories	Frequency
<u>Gender:</u>	
Male	362(71.3%)
Female	146(28.7%)
<u>Age:</u>	
0-20	29(5.7%)
21-40	251(49.4%)
41-60	151(29.7%)
61and older	77(15.2%)
<u>Units</u>	
ICU	158 (31.1%)
A&E	25 (4.9%)
Male medical ward	194 (38.2%)

Female medical ward	33 (6.5%)
Male surgical ward	58 (11.4%)
Female surgical ward	50 (9.8%)

5.4.1.1 Discussion of the findings revealed by the auditing of the death records

The researcher audited the records by examining them physically and scrutinising each one. Altogether, the research examined the records of 411 patients who had died during 2005 in 2006 in hospital A, and the records of 97 patients who had died in hospital B in the same two years. These records were audited in 2008. The majority of the recorded deaths occurred in the medical wards of hospital A and in the critical care units of hospital B. Out of the total number of 508 mortality records that the researcher audited, 325 (64%) deaths occurred in medical wards while 183 (36%) occurred in critical care wards. Almost half of these deaths (n=251 or 49.4%) occurred among people in the prime age group of 21- 40 years old, while the second largest number of deaths (n=151 or 29.7%) occurred among people in the 41 - 60 year old age group. It is worth noting that the number of deaths of male patients was more than twice that of female patients (71% versus 29%).

5.4.1.2 Causes of death

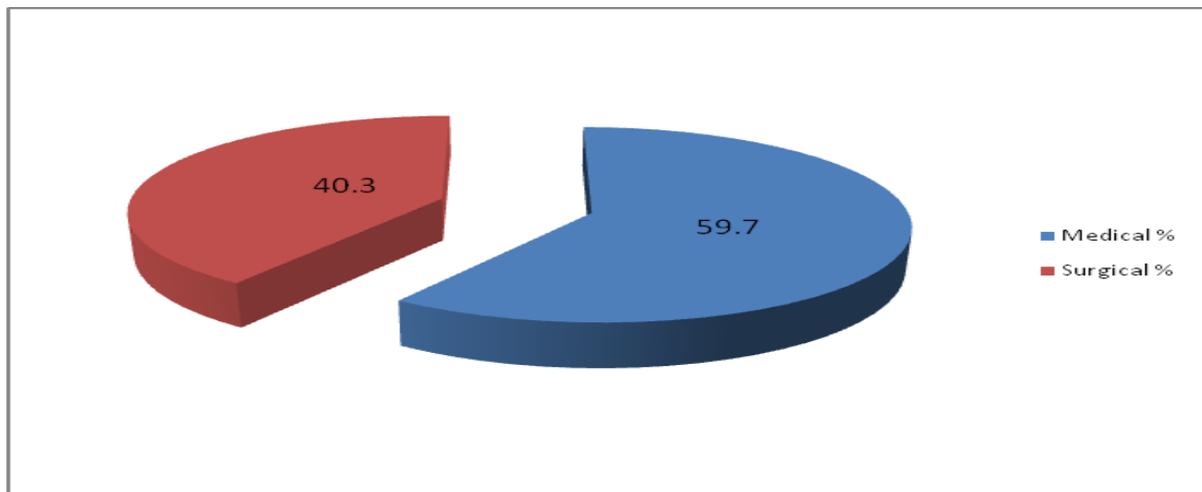


Figure 5.8: Causes of death in both hospitals

Of the total number of 508 records audited, 59.7% of them (n= 303), the cause of death was attributed to medical conditions while for 40.3% of them (n=205), the cause of death was attributed to surgical conditions. Figure 5.8 classifies the causes of death in the surgical and medical wards of the two participating hospitals.

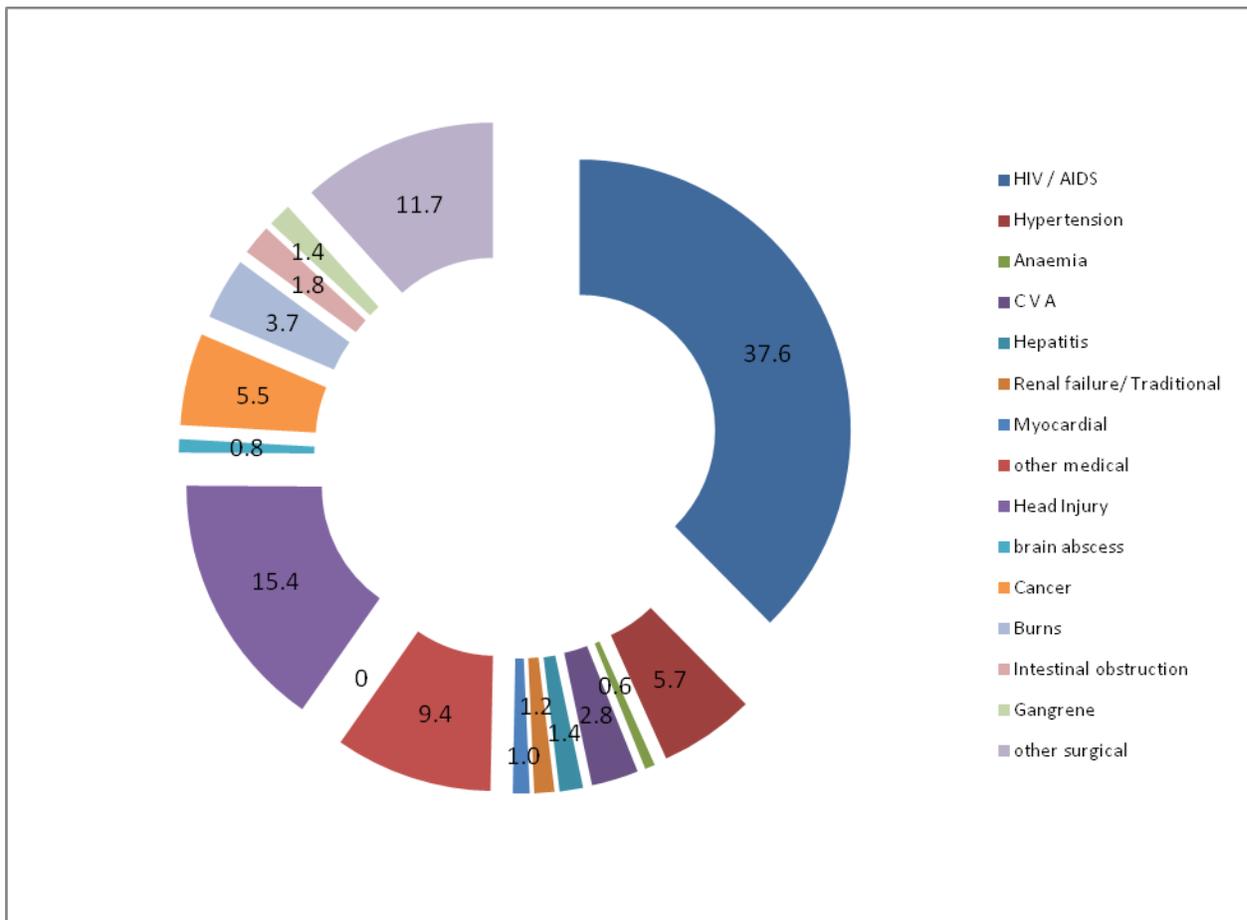


Figure 5.9: Causes of death attributed to medical and surgical conditions

Figure 5.9 shows a breakdown of the causes of death in the surgical and medical wards of the two referral hospitals. The most common cause of death in these wards (37.6%) was precipitated by HIV/AIDS. Among the most common surgical causes of death, 15.4% were connected to conditions induced by head injuries.

5.4.1.3 Deaths recorded by shifts

Figure 5.10 shows that more deaths (namely, 233 out of 508 = 45.9%) occurred during the (20h00 to 7h00 am) night shift than during the (7h00 to 15h00 hours) morning shift (103 out of 508 = 20.3%) or during the (15h00 to 20h00) afternoon shift (172 out of 508 = 33.8%). While resuscitation was attempted on 22 patients (21.4%) during the morning shift, resuscitation was attempted on 32 patients (18.6%) and 49 patients (21%) respectively who died during the evening and the night shifts.

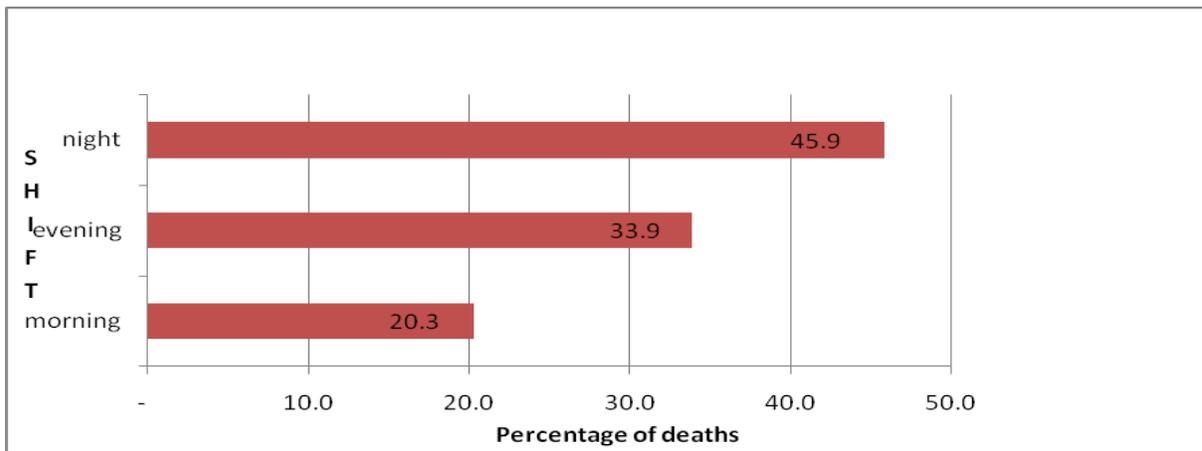


Figure 5.10: Deaths recorded by the three shifts

Tok et al (2004:265) report that because nurses are quick to detect the occurrence of cardiac arrests during the day, those who suffer cardiac arrests during the morning and afternoon shifts have a better chance of survival. The present study confirms that a substantial percentage of the attempted resuscitations occurred during the day.

5.4.1.4 The incidences of death during the weekends

Figure 5.11 reveals that no attempts were made to resuscitate patients during the deaths that occurred during the weekends. In hospital A 121 out of 411 deaths (29.4%) were recorded during weekends. In each of these cases, no attempt was made to resuscitate the patients. The researcher found a similar situation in hospital B. While 38 out of 97 deaths (39.2%) from cardiac arrest were recorded during the weekends for the period under review, no attempts had been made to resuscitate the patients concerned. Research conducted by Wood and Vega (2008:[1]) indicates that people who suffer an in-hospital cardiac arrest at night or on weekends are far more likely to die than people whose cardiac events occur during the day or in the early evening between Monday and Friday (inclusive). The findings of the present research are similar. This study found that more deaths had occurred during the night, and that no attempts had been made to resuscitate patients who had died during the weekends.

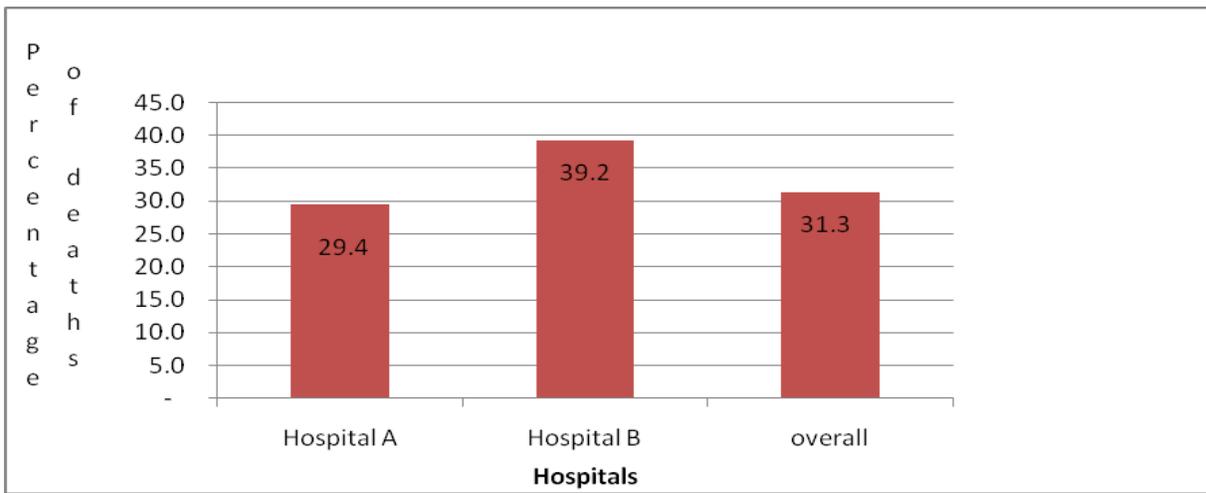


Figure 5.11: Weekend death record – percentage of deaths during the weekends

5.4.1.5 Cardiac compressions and defibrillation

The 508 records that the researcher audited indicated that external cardiac compressions had been given to 81 patients (16%) and that 15 patients (3%) had been defibrillated. No mention of the rate of compressions and ventilations that had been given to patients was made in any of the records. It is worth noting that defibrillations were only attempted in the ICU. Figure 5.12 sets out the percentage of compressions that were attempted and the number of defibrillations that were administered to patients who eventually died in the years 2005/6.

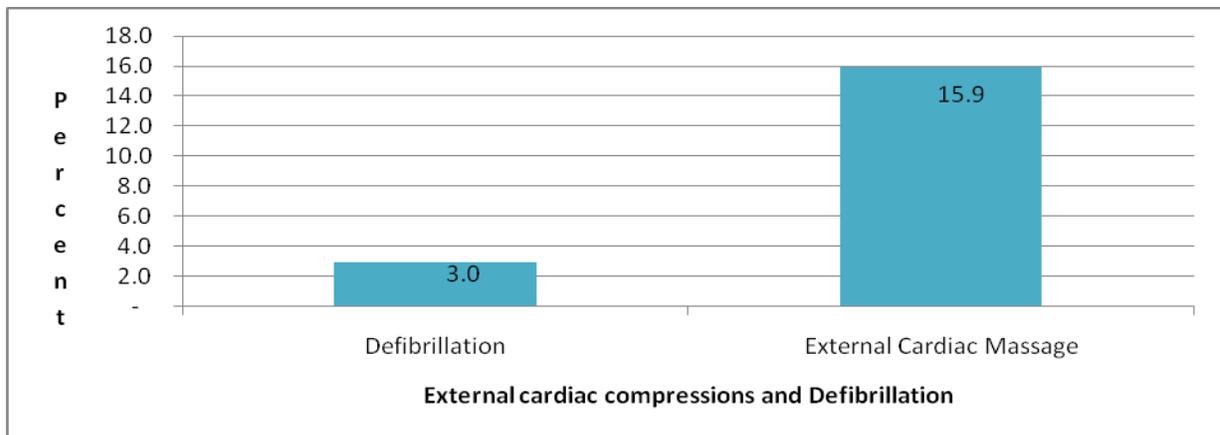


Figure 5.12: Cardiac compressions and defibrillation – both hospitals.

Among the 15 defibrillations that were applied, 10 were attempted during the morning hours by an anaesthetist but none survived. Tok et al (2004:265) asserts that if nurses are trained to use conventional and automated defibrillators, it might be possible to reduce the

amount of time that lapses between the cardiac arrest and the application of defibrillation. Desalu et al (2006:517) points out that the infrequent use of defibrillators in general wards may be attributed to the following causes:

- Few defibrillators are available.
- Some doctors and nurses have had little practice in the correct use of defibrillators.
- Some health care personnel are inexperienced in the diagnosis of cardiac arrest.
- Many hospital staff members have not been trained to use defibrillators correctly.

The delivery of shock immediately after the collapse is critical for the patient's survival (Finn & Jacobs 2003:470; Gombotz et al 2006:416; Spearpoint 2008:48).

5.4.1.6 Resuscitation by a nurse, by a nurse and a doctor, and by a nurse and an anaesthetist

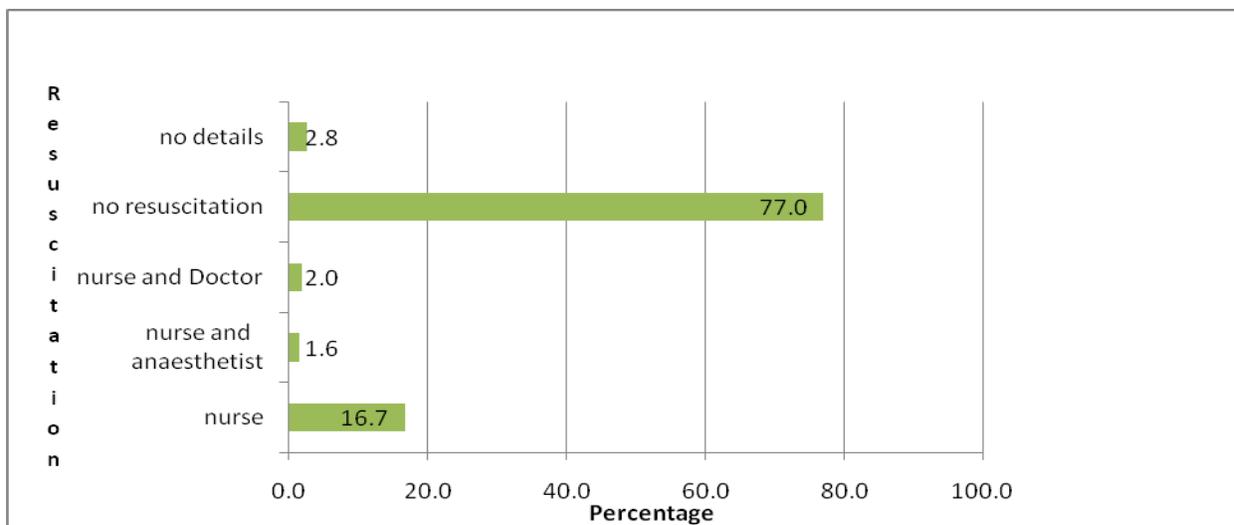


Figure 5.13: Resuscitation attempts by various combinations of medical personnel

Of the 508 records that were audited, 85 (16.73%) records showed that the resuscitation was attempted by a nurse alone. The total number of records examined showed that a nurse and an anaesthetist together resuscitated 8 (1.57%) patients in an intensive care unit. For 10 (1.97%) of the resuscitations, both a doctor and a nurse together attempted the resuscitation. In the case of 391 (76.97%) patients, the records showed that no resuscitation was attempted by either a nurse or by a doctor. The patients who had not received resuscitation were from the general wards and especially from the medical wards.

In these situations, doctors had been called to certify the deaths. The exact time of the cardiac arrest and the certification of death are noted by the doctor on the basis of the nurses' documentations. There were no resuscitation details available for 14 (2.76%) of all the patients. In almost 80% of the patient records, there was no documentation about any vital signs prior to the cardiac arrest. Parr (2001:13) believes that because nurses are continuously present in the wards, they should be in a position to pre-empt the deterioration of patients at risk by taking appropriate actions. The present study identifies this gap in the documentation of the patients' conditions prior to cardiac arrests.

5.4.1.7 Administration of drugs

The 508 audited records of deaths show that 118 (23.23%) received an injection of adrenaline, and 111 (21.85%) received an injection of atropine. An injection of hydrocortisone was given to 20 (3.9%) patients. Although the ACLS algorithm does not mention the usefulness of injecting hydrocortisone during resuscitation, 3.9% of patients in medical wards were injected with this drug during resuscitation. The records also show that 6% of all patients were administered adrenaline by means of injection in divided and irregularly timed doses in quantities larger than those recommended by the Resuscitation Council of the UK (2004:[1]).

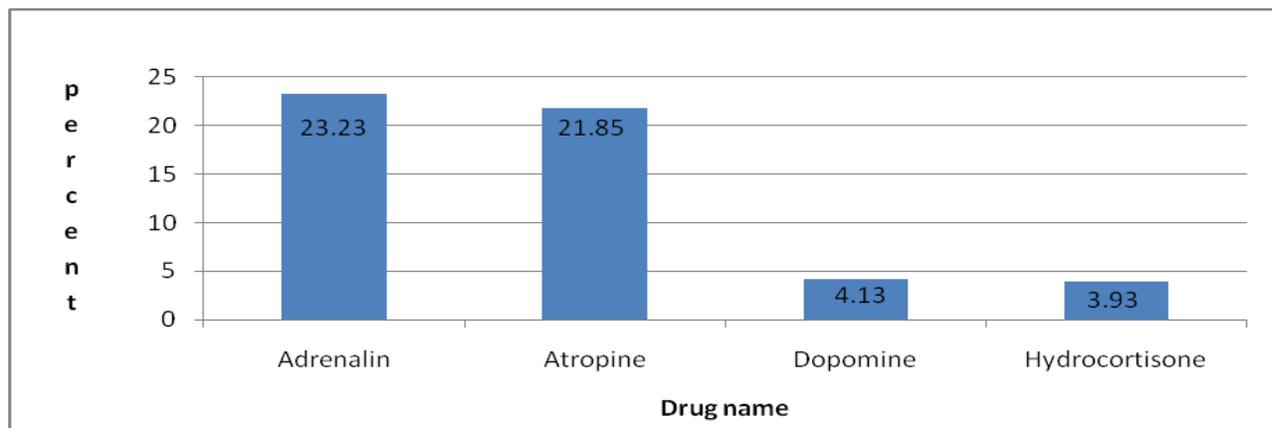


Figure 5.14: Drugs administered during resuscitation attempts – both hospitals

Dyson and Smith (2002:137) cite the retrospective study that Bleske et al (1993:2538) conducted at two hospitals in the UK, in which they reported 18 to 21% incidences of inappropriate drug therapy during resuscitation. The findings of the present study also

indicate that there were occasional incidences of inappropriate drug administration during resuscitation. To balance this, Tsai, Huang, Chang, Chen, Hsu, Hsieh, Yang and Chiang, Ming and Chen (2007:318) report that the administration of hydrocortisone within six minutes after an emergency team's arrival led to an increased return of spontaneous circulation (ROSC). Although these results are encouraging for improving the rates of an increased return of circulation, the widespread use of gluco-corticoids during CPR cannot be recommended until additional studies have been carried out (Varon & Marik 2007: 376).

5.5 AUDITING OF THE PROCEDURE MANUAL

The researcher audited the procedure manuals of the two referral hospitals in order to assess each hospital's policy on CPR. The hospital procedure manual in hospital A was last updated in 1996. The manual number is 324-112-200-201, and although it contains a sentence that states that the emergency team is responsible for responding to a code blue event, no such code system is observed in the hospital. The guidelines that need to be followed during resuscitation and the length of time resuscitation needs to be attempted are not mentioned in the procedure manual. The procedure manual does indeed list the equipment that should be readily available during resuscitation. The procedure manual of hospital B was not available for examination during the auditing period. The hospital management informed the researcher that they were in the process of updating the manual.

5.6 AUDITING OF IN-SERVICE EDUCATION ON CARDIOPULMONARY RESUSCITATION IN THE WARDS

Table 5.3 Auditing of in-service education on CPR in the wards/units

Hospital A	A&E	ICU	MMW	FMW	MSW	FSW	MOW	FOW	GYN	MAT
Date In-service was conducted	Depends on the hospital in-service education	2006	Did not conduct	Did not conduct	Did not conduct for the past one year	Did not conduct for the past one year	Did not conduct	Did not conduct	Did not conduct	Did not conduct
Continuous Education credits awarded	None	None	Did not conduct	Did not conduct	Did not conduct	Did not conduct	Did not conduct	Did not conduct	Did not conduct	Did not conduct
Availability of manikin	None	None	None	None	None	None	None	None	None	None

Hospital B	A&E	ICU	MMW	FMW	MSW	FSW	MOW	FOW	GYN	MAT
Date In-service Was conducted	Depends on the hospital in- service education	2005	Did not conduct							
Continuous Education credits awarded	None	None	None	None	None	None	None	None	None	None
Availability of manikin	None	None	None	None	None	None	None	None	None	None

KEY:

A&E – accident and emergency unit	ICU – intensive care unit
MMW – male medical ward	FMW – female medical ward
MSW – male surgical ward	FSW – female surgical ward
MOW – male orthopaedic ward	FOW – female orthopaedic ward
GYN – gynaecology ward	MAT – maternity ward

The auditing of the in-service records on the wards revealed that no unit in-service education on CPR was being conducted on regular basis in hospital A. All the wards depend for in-service education on CPR on each hospital's in-service education department. The situation is similar in hospital B. According to the Resuscitation Council of the UK (2004:[3]), all nurses should receive regular training in resuscitation because all clinical nurses need to be able to recognise which patients are particularly at risk of cardiac arrests. Boyde and Wotton (2001:248) emphasise that nurses should also be continuously taught methods and techniques of transferring learning because this will enable them to assist their colleagues to apply the knowledge and skills that they themselves have learned in clinical situations. Continuous education also helps nurses to develop critical thinking skills and equips nurses with the ability to function in complex and stressful situations such as during cardiac arrests (Boyde & Wotton 2001:248). The Resuscitation Council of the UK (2005:[3]) and the National Patient Safety Agency of the UK (2008:[5]) both insist that all health care practitioners should possess a thorough knowledge of the latest evidence-based resuscitation guidelines from attending in-service education courses because this enables them to respond appropriately and effectively in emergency situations. The AACN standards of professional practice (2005:[3]) maintain that all nurses are accountable for keeping their knowledge and skills up to date so that they are in a position to offer high-quality clinical performance and promote professional growth.

5.7 AUDITING OF IN-SERVICE EDUCATION RECORDS IN THE TWO REFERRAL HOSPITALS

The researcher audited the in-service education records of the two referral hospitals. The in-service education department attached to hospital A conducted in-service education on BLS in the years 2005 and 2007. A total number of 67 nurses attended these sessions and were duly awarded BLS certificates.

Hospital B conducted in-service education on CPR for nurses in the hospital in 2006 when the course was presented by a trauma team from Norway. This course was attended by 30 nurses from various wards. The Resuscitation Council of the UK (2004: [4]) recommends that all institutions should make provision for their staff to receive adequate and up-to-date in resuscitation skills as an integral part of their employment contract. The present study reveals that there is a great deal of inconsistency in the conducting in-service education at the institutional level at the two referral hospitals of the study.

5.8 APPLICATION OF THE FINDINGS OF THE AUDIT PHASE TO THE AACN SYNERGY MODEL FOR PATIENT CARE

Radical changes in the provision of health care in recent years have resulted in reduced resources in tandem with increased demands for greater efficiency. Health care institutions can utilise efficient systems to maximise the synergy between patients and clinical staff. It can do this by providing nurses with the tools and equipment there they need for resuscitation, by offering them improved facilities for managerial and secretarial support (including the maintenance of hospital records), and by providing thorough training in the most recent resuscitation methods and techniques. Hospitals can also improve the clinical capacity of nurses by organising regular updates and refresher courses and by the appraisal of the standards of performance and the results obtained on a continuous basis.

Support from a system that is efficient and well organised improves the quality of clinical performance and reaction times, and strengthens the clinical and professional capacity of nurses in all their activities as well as in their ability to provide viable responses to resuscitation, which is, after all, an integral and vital part of every nurse's skills and knowledge. It is important for all hospitals to be conscientious about the provision of the

necessary equipment to enable the resuscitation process and to protect the safety and health of the clinical staff. The AACN Synergy Model for Patient Care asserts that successful outcomes for the patient and the nurse are dependent on the characteristics that define a particular health care system. The failure of a hospital system to facilitate a nurturing environment compromises the quality of care and treatment that are offered to patients (AACN 2005:16).

This phase of the study in which the researcher audited important aspects of the system such as the maintenance and availability of resuscitation equipment, death records and hospital policy statements enabled the researcher to arrive at a better understanding of the existing systems that were operative in the two referral hospitals of Botswana. It also enabled the researcher to formulate suggestions and recommendations for improving the system so that it would be in a position to create a synergy between the clinical staff and the quality of patient care that would result in better patient outcomes.

5.9 CONCLUSION

This chapter presented the findings from the researcher's audit of the emergency trolley, from a retrospective audit of the death records of patients, from an audit of the one procedure manual that was available, and a general audit of all the wards/units and hospital in-service records that were available in the two referral hospitals. The researcher analysed the data by means of SPSS (Version 15.0) and Microsoft Excel. The quantitative data was then presented and analysed in terms of the research objectives and questions that formed the basis of this study.

The following chapter (chapter 6: the evaluation phase) will focus on the data analysis of the quasi-experimental research that the researcher conducted among registered nurses about these nurses' existing CPR knowledge and skills.

CHAPTER 6

DATA ANALYSIS AND DISCUSSION: PHASE 3 EVALUATION OF REGISTERED NURSES' CPR KNOWLEDGE AND SKILLS

6.1 INTRODUCTION

This chapter, presents the results from the evaluation phase of the audit (phase 2 of the audit), which reports on the design and conduct of the quasi-experimental research that formed part of the study. The researcher utilised a quasi-experimental research design to determine the existing knowledge of and skills in CPR among the registered nurses who participated in the study. The researcher also utilised a time series analysis to determine the extent to which the nurses had retained their knowledge and skills of CPR three months after the intervention.

6.1.1 Purpose of the study

The purpose of this study (during the evaluation phase of nurses' competencies) was to assess and evaluate how much registered nurses already knew about the theory of CPR (their "existing knowledge") and how skilful they were in the administration of CPR (their "existing skills") in the two referral hospitals in Botswana.

Nurses are skilled professionals who have the ability to save lives and make important contributions to improve patient outcomes. The quality of care that any particular hospital provides for its patients is directly linked to the quality of care that nurses are qualified, able and willing to provide because nurses are the largest group of health care professionals who provide direct patient care in the hospitals of the world (Madden 2007:49). According to the AACN Synergy Model for Patient Care, the characteristics of patients and their families influence and motivate the competencies of nurses (Curley 1998:64). One of the most important nursing competencies is "clinical judgement". *Clinical judgment* means the ability to make clinical decisions – an ability that is derived from the integration that a nurse

makes of her or his formal and informal experiential knowledge with theory and evidence-based guidelines (AACN 2003:[2]).

Clinical judgement also means the ability of nurses to use their clinical knowledge to produce improved patient outcomes (Curley 2007:29). Clinical judgement incorporates clinical decision-making, critical thinking, and an ability to affect an optimal synthesis of theoretical knowledge and practical skills during critical situations. Emergencies such as cardiac arrest and the provision of CPR require nurses to exercise clinical judgement if they are to respond effectively to sudden emergencies such as cardiac arrest. The purpose of this evaluation phase was to assess the existing knowledge of CPR and skills in the practice of CPR among registered nurses in the two referral hospitals.

6.2 DATA ANALYSIS

Data entry and analysis were carried out by means of the SPSS (Version 15.0) computer program, and Microsoft Excel was used to generate figures and graphs. The findings are presented in terms of the study's objectives and questions. The data are displayed in figures and are expressed as percentages and proportions in an attempt to make it easier for readers to understand and conceptualise the results. The most frequently used figures for presenting data are bar charts and tables, and the measure of central tendency was also frequently used in this study.

6.2.1 Analysis of data: Evaluation phase: Quasi-experimental research conducted with registered nurses in the two referral hospitals

This study was conducted in Botswana during April and August of 2008 in hospital A and during June and September of 2008 in hospital B. The researcher used a quasi-experimental research method that used a *pre-test*, training and *post-test* and a *re-test* after three months. The retention of knowledge and skills were assessed after three months in the two referral hospitals. While the initial sample comprised 102 respondents, only 70 respondents of these 102 managed to participate in the re-test that was conducted after three months.

6.2.1.1 Demographic information about the registered nurses

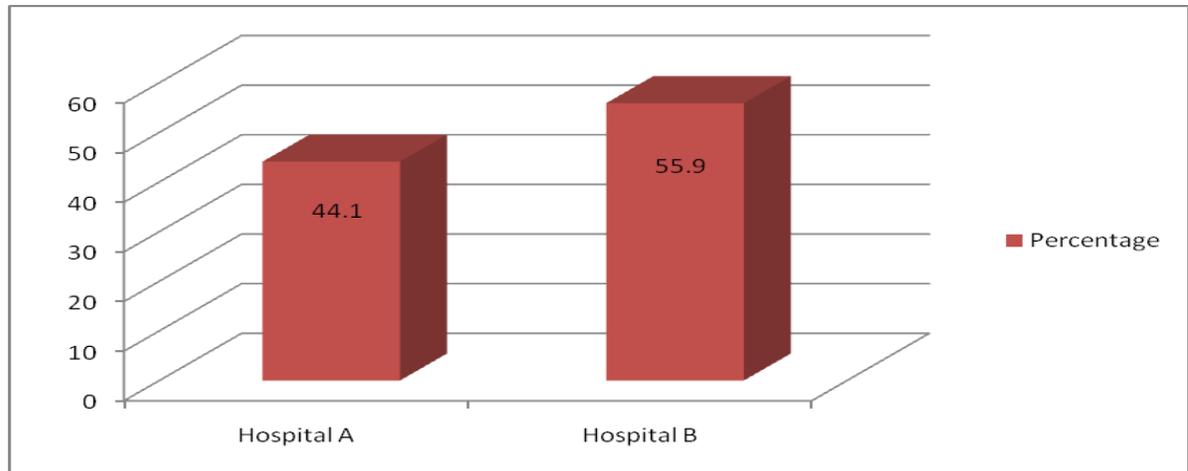


Figure 6.1: Distribution of the respondents in the two referral hospitals (N=102)

The research was conducted in the two referral hospitals of Botswana, namely hospital A and hospital B. For this research, 45 (44.1%) registered nurses from hospital A and 57 (55.9%) registered nurses from hospital B participated during April and June 2008.

6.2.1.2 Gender

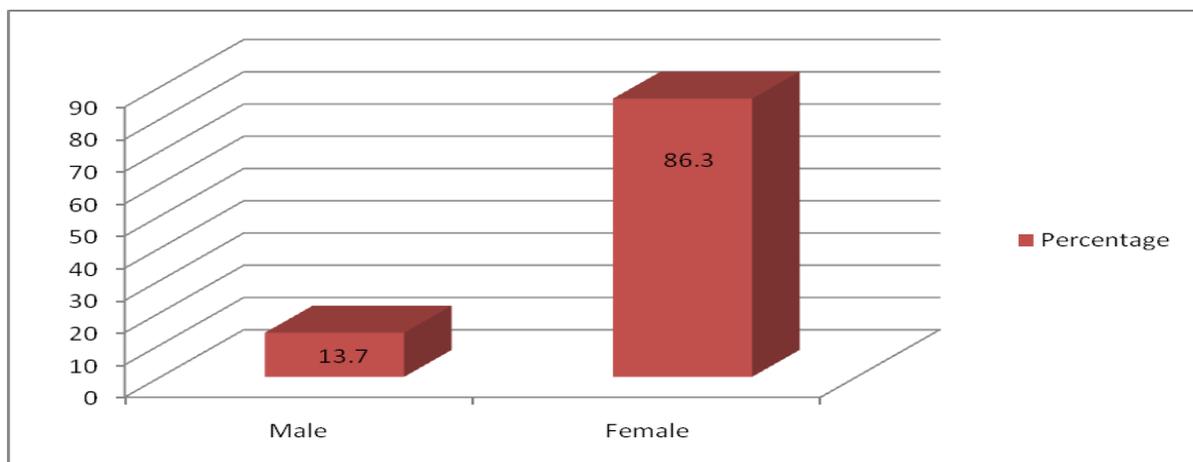


Figure 6.2: Gender of the respondents (N=102)

Figure 6.2 shows the gender distribution of the 102 respondents. Female registered nurses contributed 86.3% (88) of the sample while male registered nurses contributed 13.7% (14) of the sample. This effect can be attributed to the numerical dominance of women in the profession of nursing that dates back to its very beginnings in modern times under the

guidance of its founder, Florence Nightingale (1820-1910). This numerical dominance of females over males continues to be reflected in Botswana. This particular characteristic of the nursing profession could also be a reflection of the fact that women are traditionally regarded in cultures all over the world as primary care givers. It follows therefore that most nurses, whose function it is to be primary care givers in hospitals and other health care settings, are therefore women (Gillespie & Melby 2003:843).

6.2.1.3 Age

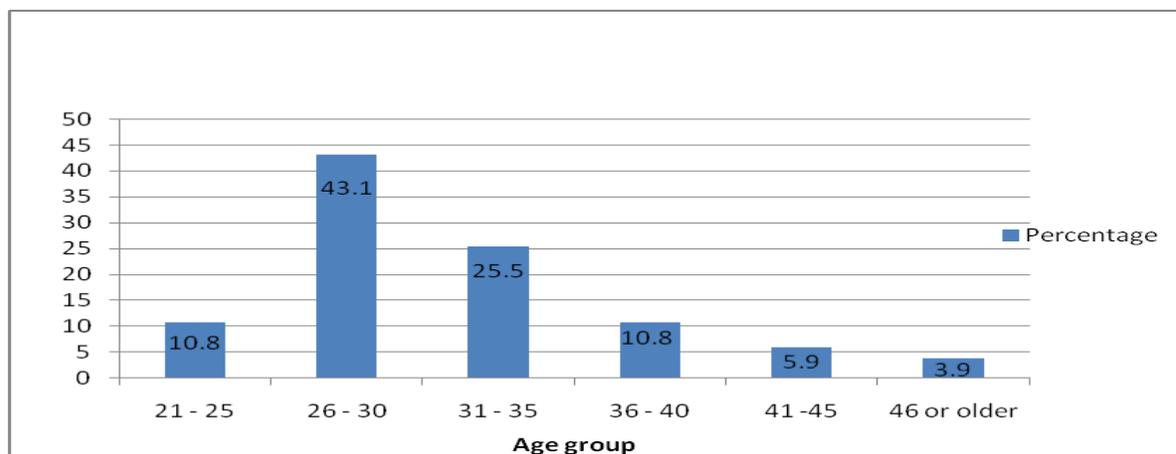


Figure 6.3: Age of the respondents (N=102)

Age is an important variable in interpreting the results of the current study because various age-related factors may influence the initiation and performance of CPR. The mean age of the respondents was 31.5 with a standard deviation of 14.0. As figure 6.3 demonstrates, 44 (43.1%) respondents fell into the 26-30 year age group. This was followed by 26 (25.5%) nurses of ages between 31 to 35, and 11 (10.8%) nurses who were either between 21 to 25 years old or between 36 and 40 years old. In addition to this, 6 (5.9%) respondents were between 41 and 45 years old, and 4 (3.9%) were 46 years old or older. The group of nurses who were between 26 and 35 years old therefore represented the highest proportion of nurses in the study sample. The current study shows that the majority of workers in the health care system (79.4%) fall between 26 and 40 years of age.

6.2.1.4 Academic qualifications

Figure 6.4 illustrates that most respondents were trained to diploma level contributed the from both referral hospitals. Of the 45 respondents from hospital A, 28 (62.2%) had

received their diploma in nursing, 6 (13.3%) had received their diploma in nursing and midwifery, and 11 (24.4%) had possessed bachelor's degrees in nursing science. Among the 57 nurses from hospital B, 44 (77.2%) were registered nurses, 5 (8.8%) were registered nurses/midwives, and 8 (14%) were graduates in nursing science. The ages of the holders of a bachelor's degree in nursing science ranged from 26 to 40.

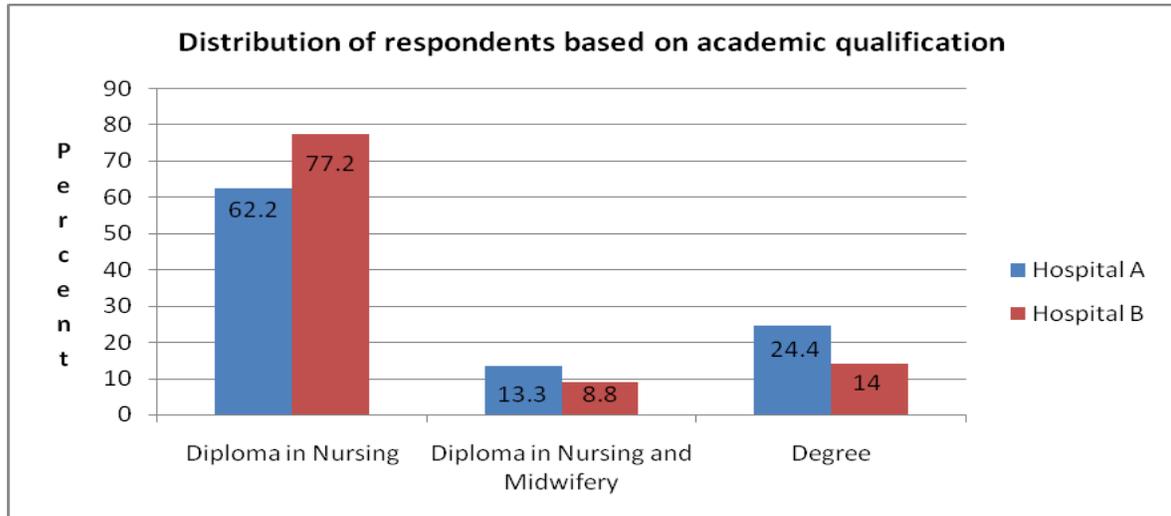


Figure 6.4: Distribution of the respondents based on academic qualification (N=102)

The findings of the study suggest that it is mostly younger registered nurses who are actively interested in upgrading their qualifications. In addition to this, most of the single qualified nurses were those who had just completed their diplomas in nursing.

6.2.1.5 Experience

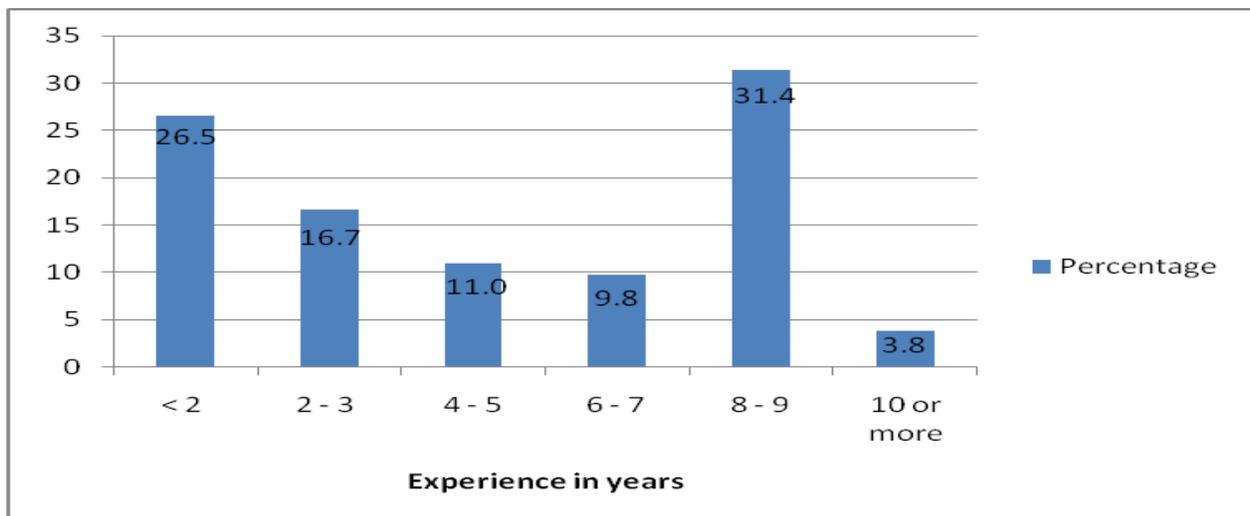


Figure 6.5: Distribution of the respondents in terms of experience (N=102)

Figure 6.5 shows that 27 (26.5%) respondents possessed less than two years of work experience; that 32 (31.4%) had 8 to 9 years of work experience; that 17 (16.7%) had having 2-3 years of work experience; that 12 (11.8%) had 4 - 5 years of work experience; that 10 (9.85) had 6-7 years of work experience, and that 10 (3.8%) of the respondents possessed work experience of 10 years or more. In line with the inclusive criteria for this research, most of the nurses who actively participated in the research possessed work experience of between two and 10 years. The findings of the present study indicate that there is no significant difference in knowledge about CPR between registered nurses with very few years of work experience and those who have accumulated a large number of years of work experience Nyman and Sihvonen (2000:179) note that while work experience may increase the confidence of individual nurses, there is no correlation between years of work experience and competence in the performance of CPR.. Another study conducted by Miotto et al (2008:244) revealed that older health care providers obtained lower scores than younger health care providers during the course of being evaluated for their ALS knowledge.

6.2.1.6 Area of assignment

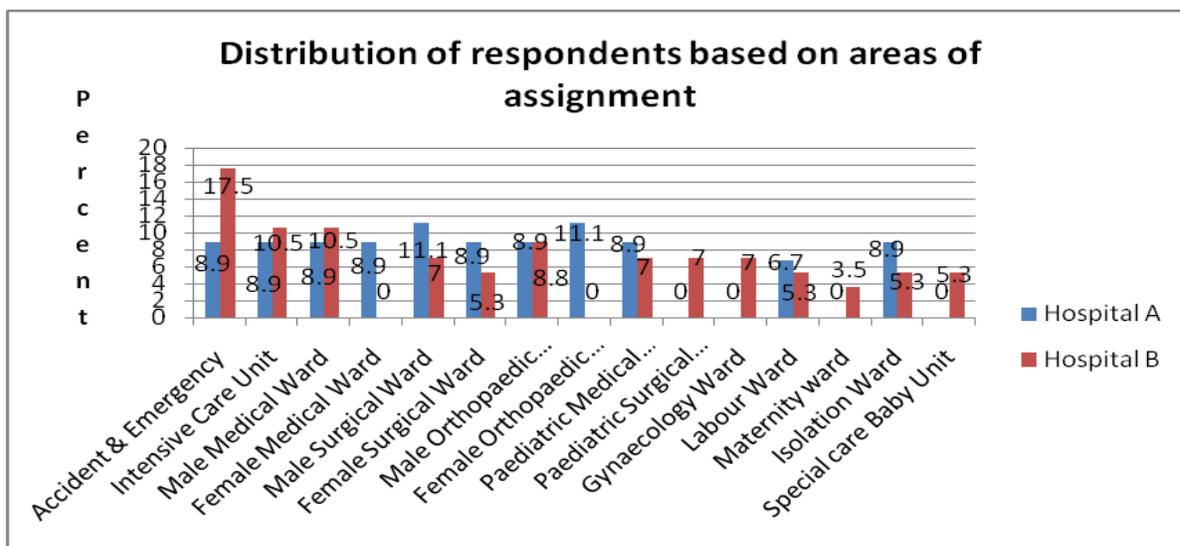


Figure 6.6: Distribution of respondents in terms of area of assignment (N=102)

Out of a total of 102 respondents from both the hospitals, 27 (26.5%) nurses were from A&E units and 19 (19.4%) nurses were from ICUs. There were also 19 (19.4%) nurses from male medical wards and 12 (11.8%) nurses from male surgical wards.

The inclusion of more nurses from ICUs was based on the assumption that nurses who work in such areas are far more frequently expected to manage emergency situations such as cardiac arrests on their own initiative until the arrival of a doctor. Whelan (1997:107) notes that because of their constant proximity to their patients, nurses who work in A&E units have a professional responsibility to ensure that they are always well trained in terms of the best current standards and that they are completely competent to carry out effective BLS. The recent research conducted by Hopstock (2008:425) confirms this finding by demonstrating that nurses who work in high-risk areas and nurses who work continuously in close contact with patients are far more highly motivated to maintain their competence in CPR than other health care professionals.

6.2.1.7 Formal training in CPR

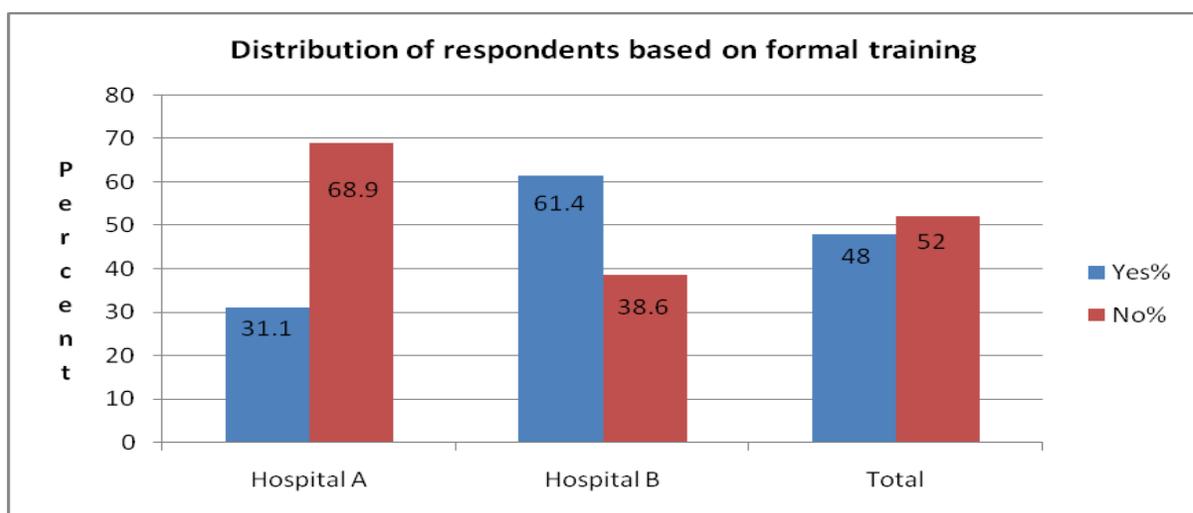


Figure 6.7: Distribution of respondents in terms of their formal training in CPR (N=102)

Figure 6.7 demonstrates the distribution of nurses who were formally trained in the knowledge and skills of CPR during their basic nursing education. Of 45 respondents 14 (31.1%) from hospital A and 35 (61.4%) of the 57 respondents from hospital B had received formal training in CPR. The present study reveals that many nurses (52%) have never had any exposure at all to CPR training during their basic nursing training. This lack of formal training in CPR is most evident among graduate nurses with less than 3 years of experience (19.6%) and among diploma nurses with more than 5 years of experience

(29.4%). Hopstock (2008:425) notes that the greater the awareness of the importance of CPR knowledge and skills for saving human lives, the greater may be the motivation to improve and maintain their CPR knowledge and skills.

6.2.1.8 Additional training in CPR

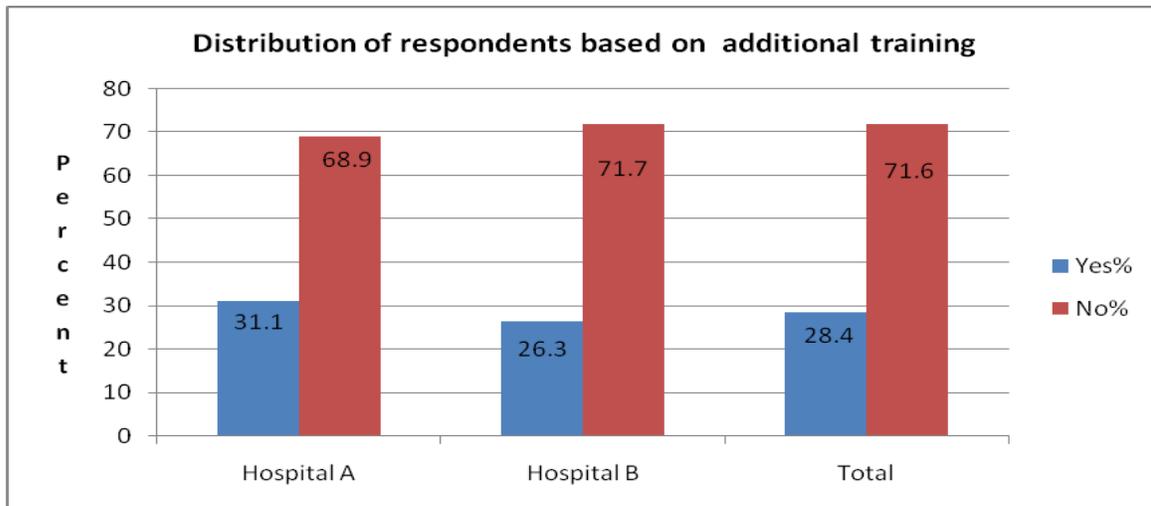


Figure 6.8: Distribution of respondents in terms of additional training in CPR (N=102)

The respondents were all asked whether they had received any additional training such as BLS, ACLS and in-service education after they had qualified as registered nurses. As figure 6.8 shows, 71.9% (n=41) of respondents from hospital B and 68.9% (n=31) of respondents from hospital A never received any additional CPR training after they had qualified. These very high percentages are similar to those that are presented in the research of Finn & Jacobs (2003:470).

According to Finn and Jacobs (2003:470), many Australian hospitals experience various kinds of logistical difficulties and barriers that hinder them from conducting annual updates and the annual recertification of registered nurses in resuscitative procedures. According to Hopstock (2008:425), the motivation and skills of individual registered nurses are directly proportional to the frequency with which they had to deal with cardiac arrests. This means that nurses who work in settings where cardiac arrests are far more likely to occur, were motivated to take additional courses and to refresh their CPR skills whenever possible. In contrast to this, the present study reveals that only 4.9% of the registered nurses who

worked in critical care units had undergone training in BLS or ACLS and that only 2.9% of them had received relevant in-service training. All in all, only 23.5% of the respondents had received any kind of additional training during their period of service in the two referral hospitals. This situation prevails in Botswana because no arrangements have been made by the responsible authorities to update and reinforce the CPR knowledge and skills of registered nurses on an annual basis.

6.2.1.9 Frequency of CPRs performed

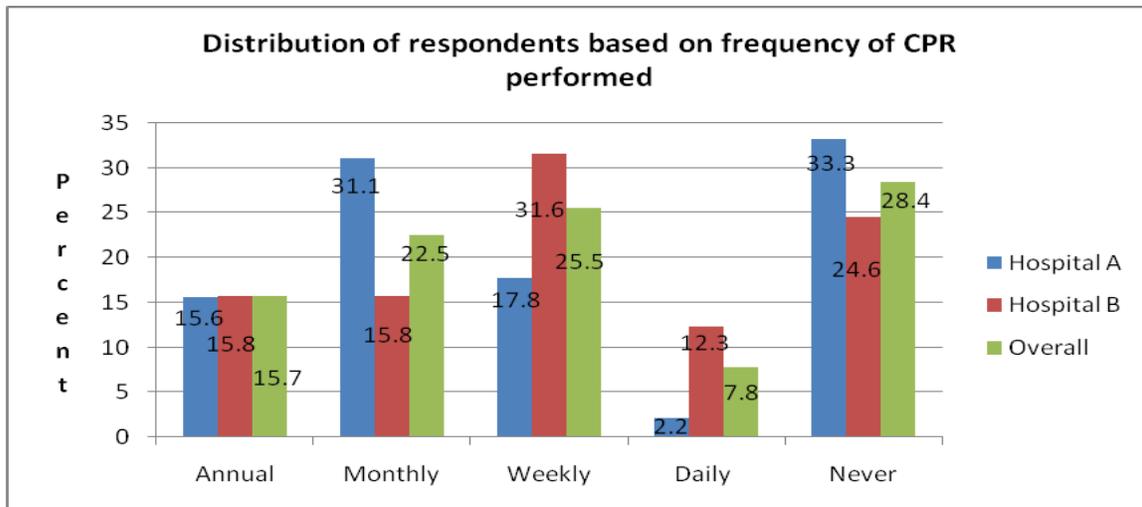


Figure 6.9: Frequency of CPRs performed (N=102)

In order to determine the frequency of CPR attempts, the respondents were asked how often they were required to perform CPR in their clinical settings. The results showed that 7.8% of nurses were performing CPR on a daily basis, 25.5% of performed CPR on a weekly basis, and 22.5% of performed CPR on a monthly basis, and 15.7% performed CPR only once a year, while 28.4% of the nurses claimed that they had never participated in resuscitation attempts at all.

Myrianthefs, Kalafati, Lemonidov, Minagidor, Evagelopoulov, Karatzas and Baltopoulos (2003:43) agrees that the high rate of CPR performance characteristic of ICU is a result of the fact that ICU nurses are constantly engaged in monitoring their patients. They also immediately intervene when a cardiac arrest occurs and instantly call for the assistance of experienced personnel. Among the 28.4% of nurses who had who never performed a CPR, only 1% of the nurses were from ICU.

6.2.1.10 Outcomes of CPRs performed by registered nurses

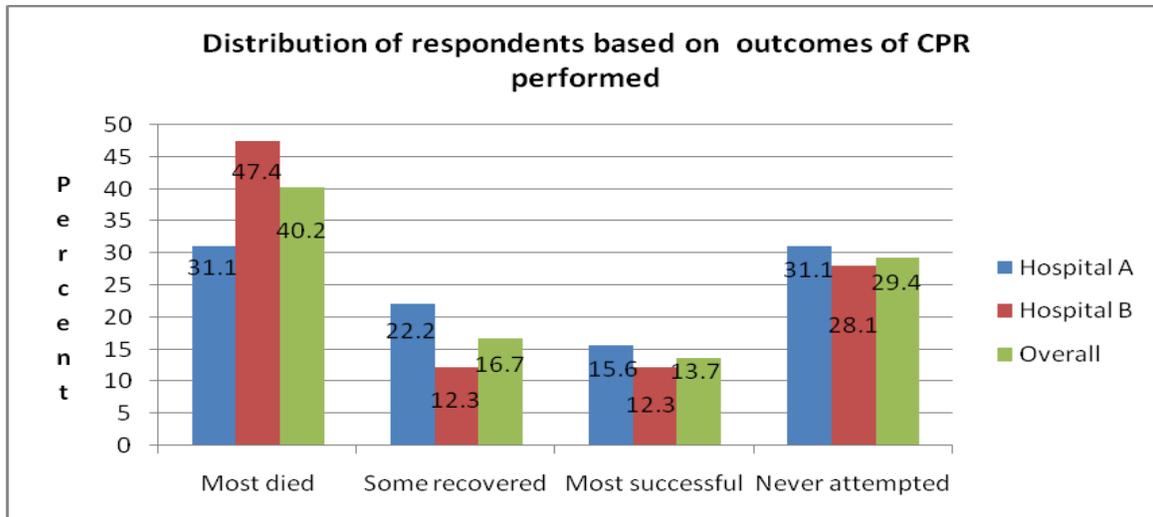


Figure 6.10: Outcomes of CPRs performed (N=102)

Figure 6.10 shows the way in which the registered nurses reported the outcomes of the CPRs. Of the 102 participants, 41 (40.2%) reported that most of the patients had died during resuscitation. Among this number, 14 out of 45 (31.1%) were from hospital A, and 27 out of 57 (47.4%) were hospital B. Of the respondents 30 (29.4% of the total number) claimed that they had never once attempted CPR. Of this number, 14 out of 45 (31.1%) were from hospital A and 16 out of 57 (28.1%) were from hospital B. According to Cooper and Cade (1997:17), survival rates and the outcomes of resuscitation are directly related to physiological and demographic factors and to the overall standard of care in a particular hospital. The survival rates of patients on whom CPR has been pre attempted is also directly related to the knowledge and skills of the registered nurses in the hospital as well as to the availability of resuscitation equipment (Cooper & Cade 1997:17). Stotz, Albrecht, Zwicker, Drewe and Wolfgang (2003:277) agree that the outcomes of CPR depend on the quality of resuscitation efforts, the degree to which an environment is supportive, and also on the amount of time that elapses between the collapse of the patient and the application of the defibrillator shock. According to Jukkala and Henly (2007:78), the loss of skill proficiency and the accompanying deterioration in knowledge about CPR procedures, influence the speed with which CPR is initiated and its overall effectiveness. Factors such as the hospital's resuscitation policy, the clinical conditions in the hospital, the nature of end-stage illnesses, the prevalence of inter-professional conflict, and cultural inhibitions

that hamper the performance of CPR, all influence the quality of the clinical decisions that need to be made and the timely initiation of CPR procedures (Robinson 2007:305).

6.3 DATA ANALYSIS

Quasi-experimental research was conducted by making use of a pre-test, a training programme in CPR and a post-test. The retention of the CPR knowledge and skills of the registered nurses could thus be assessed after three months in the two referral hospitals. While the original sample comprised 102 nurses, only 70 nurses were available to participate in the re-test that the researcher conducted after three months. Nine nurses from hospital A were transferred to different stations in the interim, and 15 nurses from hospital B were unable to participate in the post-test. The management of hospital B declared that they were unable to allow these 15 nurses to participate in the post-test because of an acute shortage of nurses in the hospital – despite the fact that they had been informed of the post-test a month before it took place. In addition to this, eight registered nurses from the original 102 subjects resigned from their positions in government service during the three-month period after the CPR training program.

The data were analysed by means of the SPSS (Version 15) computer program. The researcher used descriptive and inferential statistics to describe and explore the relationships in the data. The tests used for examining the data were the Friedman statistical test, the Chi-square test, and non-parametric tests such as the McNemar test, the Wilcoxon matched pairs signed ranks test and the Mann-Whitney U test. The non-parametric test examines changes that occur between pre-test and post-test measures, and a P-value < 0.05 was considered significant. These tests helped the researcher to assess the magnitude and importance of the changes between the first, second and third set of observations. A professional statistician analysed the data collected during this phase.

6.4 PRESENTATION OF THE FINDINGS

The data that had been analysed was presented in the form of tables, charts and figures so that the data would be more readily accessible and meaningful. The most frequently used

figures for presenting data were bar charts and tables. The measures of central tendency were also used in this study.

6.4.1 Assessment of knowledge on cardio pulmonary resuscitation among the registered nurses in the two referral hospitals

The cognitive knowledge of CPR of the registered nurses in the sample was assessed by means of a 21-item structured multiple-choice questionnaire (Annexure D). The pass mark for this questionnaire was set at 85%, as recommended by the “BLS for health care providers” document of the Resuscitation Council of Southern Africa (2006:[4]) and by the American Heart Association (2006:[6]). The researcher decided to use the grading scores recommended by these two resuscitation councils because there were no standardised guidelines had been in the two referral hospitals in Botswana.

6.4.2 Presentation of the pre-test, post-test and re-test scores

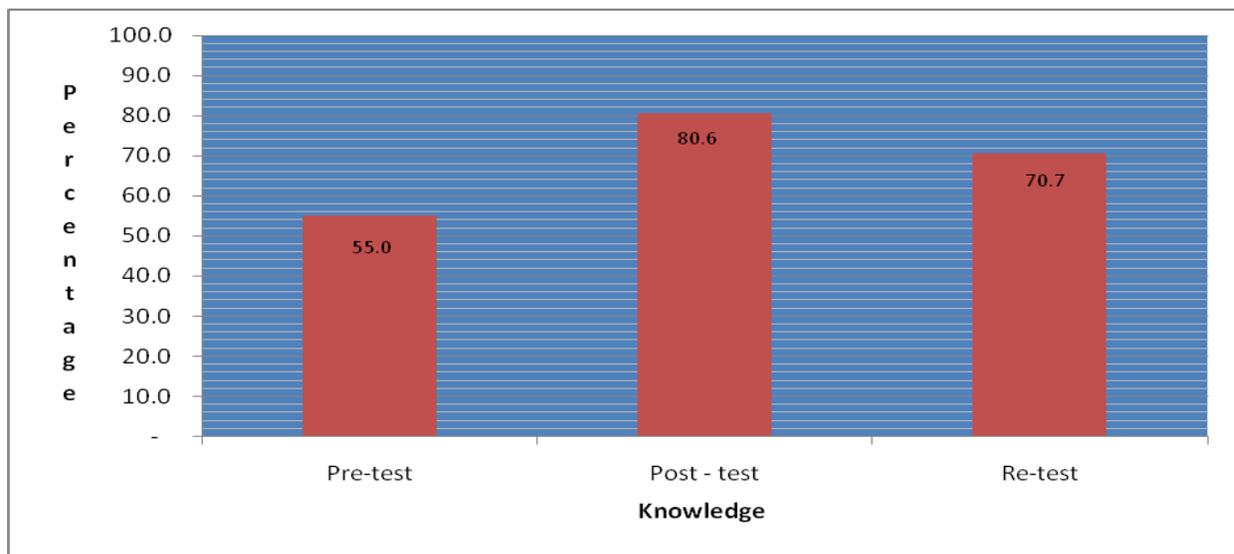


Figure 6.11: Mean scores of the respondents – tests of knowledge about CPR

Figure 6.11 sets out the mean scores achieved by the respondents in the test that assessed their knowledge of CPR. The pre-test mean score on knowledge was 55% (this may be compared with the pass standard of 85% set by the two councils mentioned above). Although there was a considerable improvement in the scores achieved by the registered nurses after the training session, the post-training mean score of 80.6 was still below the pass standard. The mean score achieved by the nurses after three months

decreased to 70.7%. This indicates that the nurses' ability to retain what they had learned from the training session was unsatisfactory and that they had, in fact, experienced a significant deterioration in their cognitive knowledge about CPR. This finding is consistent with that of Moule and Knight (1997:99), who also reported poor knowledge retention rates among nurses after they had been trained in the knowledge and skills that comprise CPR.

Following the CPR training programme, the registered nurses acquired a significant amount of knowledge about CPR. This supports the findings of Broomfield (1996:1016), and Moule and Knight (1997:99), who reported improvements in the knowledge levels of registered nurses about CPR. After three months, the knowledge that the nurses had acquired was once again assessed in a re-test, and the mean score decreased to 70.7% from the immediate post-test score of 80.6%. While this change was found to be statistically significant, the amount of knowledge retained by the respondents after three months of training was found to be comparatively better than the amount of knowledge they had possessed at the time of the pre-test. This finding is consistent with those of Moule and Knight (1997:99) and Madden (2006:218).

6.4.3 Comparison of the scores of pre-test, post-test and re-test assessments of knowledge on CPR

The CPR training session lasted for three hours. The session included explanations of the causes of cardiac and respiratory arrest, instruction about the correct compression/ventilation ratios for single resuscitators, the correct compression/ventilation ratios for children, the correct rate and depth of compressions, the first drug that should be administered during CPR, and the frequency with which the emergency trolley should be checked.

The following table and charts compare the score levels that were obtained for the pre-test, the post-test and the re-test from the individual questions that were used to test knowledge of CPR. The tables and charts also indicate those questions that produced statistically significant results.

Table 6.1 Knowledge: Comparison of scores from the pre-test, the post-test and the re-test

		Percent-age of correct pre-test answers	Percent-age of correct post-test answers	P value Pre-tests/post-tests	Significance Pre-test/post-tests	Percent-age of correct re-test answers	P value Post-tests/re-tests	Significance Post-tests/re-tests
1	Cause of cardiac arrest	76.5	91.2	0.004	S	87.1	0.388	N S
2	Location of the respiratory centre	46.1	50.0	0.597	N S	38.6	0.027	S
3	Brain survival without oxygen	60.8	96.1	0.000	S	80.0	0.007	S
4	Definitive treatment of VF	43.1	51.0	0.229	N S	44.3	0.832	N S
5	Compression and ventilation ratio for single rescuer	15.7	98.0	0.000	S	77.1	0.001	S
6	Compression and ventilation ratio for 2 rescuers/children	32.4	70.6	0.000	S	74.3	0.424	N S
7	Rate of compressions	17.6	79.4	0.000	S	41.4	0.000	S
8	Minimum time interruptions	44.1	95.1	0.000	S	67.1	0.000	S
9	Organ that cannot survive without oxygen	70.6	85.3	0.003	S	84.3	1.000	N S
10	Purpose of CPR	70.6	80.4	0.087	N S	68.6	0.093	N S
11	Chest recoil	57.8	48.0	0.132	N S	50.0	0.557	N S
12	Best way to open airway	89.2	96.1	0.118	N S	91.4	0.508	N S
13	Best way to give mouth-to-mouth breathing	70.6	99.0	0.000	S	95.7	0.625	N S
14	Indication to start chest compressions	47.1	94.1	0.000	S	80.0	0.077	N S
15	Priority of assessment	59.8	87.3	0.000	S	78.6	0.454	N S
16	Least common cause of a respiratory arrest	19.6	11.8	0.115	N S	20.0	0.227	N S
17	Best artery to check	80.4	85.3	0.000	S	85.7	1.000	N S
18	Time to assess pulse	24.5	88.2	0.000	S	61.4	0.000	S
19	Frequency of checking emergency trolley	60.8	90.2	0.000	S	78.6	0.057	N S
20	First drug given during cardiac arrest	80.4	97.1	0.359	N S	95.7	1.000	N S
21	Benefit of minimising interruptions	87.3	98.0	0.003	S	85.7	0.004	S
	Mean	55.0	80.6			70.7		
	Standard Deviation	22.7	22.0			20.8		

Key:

S = Significant

N S= Non-significant

Table 6.1 explains the mean scores attained by registered nurses in the pre-test, post-test and re-test after three months, together with their statistical significance. The mean score of the CPR knowledge of nurses in the pre-test was 55.0%. After they'd attended the CPR

training session, the mean score in the post- test increased to 80.6%. After three months, the mean scores decreased to 70.7%. The Chi-square test established that the difference between the three means was statistically significant ($P=0.000$ was <0.05).

The McNemar test was used to establish whether or not the change before and after training was statistically significant. The null hypothesis was that the results would be the same before and after the training session. The test was performed for each question. The same procedure was followed when comparing the pre-test, post-test and re-test after an interval of three months. The McNemar test compared the number of respondents who answered the questions incorrectly in the pre-test and correctly following post-test, and those who answered correctly in the pre-test and incorrectly in the post-test.

The P value was significant between pre-test and post-test (less than 0.05) for questions 1, 3, 5, 6, 7, 8, 9, 13, 14, 15, 17, 18, 19 and 21. By comparison, it was only for questions 2, 3, 5, 7, 8, 18 and 21 that the P value was significant between the post-test and the re-test after three months (less than 0.05). Overall, the significance was high between the pre-test and post-test scores although there was less significance between the post-test and the re-test after three months even though there was a drop of about 9.9% in the scores achieved after three months.

For the questions on the compression ventilation ratio (Q5), the compression ventilation ratio for children (Q6), the rate of compressions (Q7), the minimum time interruption (Q8), the indication to start chest compressions (Q14) and the correct time to assess the pulse (Q18), the pre-test score on this knowledge was poor. The overall score for these questions was 42.46%. These are critical skills for increasing the survival rate of patients because the primary determinant of a successful neurological outcome is the maintenance of adequate circulatory and respiratory support during prolonged cardiac arrest – something that is only achieved by continual chest compressions (Futterman& Lemberg 2005:83). Ignorance about the correct compression ventilation ratio, about when to assess the pulse, and about how to maintain time interruptions during CPR, reduces the patient's chances of survival during resuscitation. Vernplancke et al (2008:75) also produced evidence from their research about the highly variable quality of CPR performed by registered nurses with shallow and slow compressions.

The overall scores obtained from the tests indicated that the registered nurses in the sample were significantly deficient in CPR knowledge at the time of the pre-test. The pre-test knowledge of the nurses about the compression/ventilation ratio, the compression rate, about when to begin chest compressions and the correct time to assess the pulse, was dangerously deficient. These are all critical areas in which nurses are expected to be meticulously well informed so that they will be in a position to initiate effective CPR when the need arises. This finding is consistent with previous studies performed by Broomfield (1996:1023), Davies and Gould (2000:400); Inwood (1996:33), Young and King (2000:7), and Smith et al (2008:59).

Cooper and Cade (1997:17) report that the immediate survival rate of cardiac arrest patients will be negligible and that any hope that a patient might survive cardiac arrest (even when a patient is surrounded by registered nurses in a hospital) will be a small wherever nurses lack the necessary knowledge and skills of BLS. These findings indicate that it is imperative for nurses to receive regular, periodic in-service education and refresher courses on CPR, and that nurses need to be regularly updated on the latest techniques, technologies and developments in the field of CPR if they are to be of any use at all to patients who have suffered cardiac arrests. The findings of the study make it quite clear that the ability of nurses to perform BLS and to maintain their CPR skills and knowledge are indispensable professional needs for all registered nurses who work in healthcare settings (Hamilton 2005:288).

6.4.4 Scores on test of knowledge before training (pre-test)

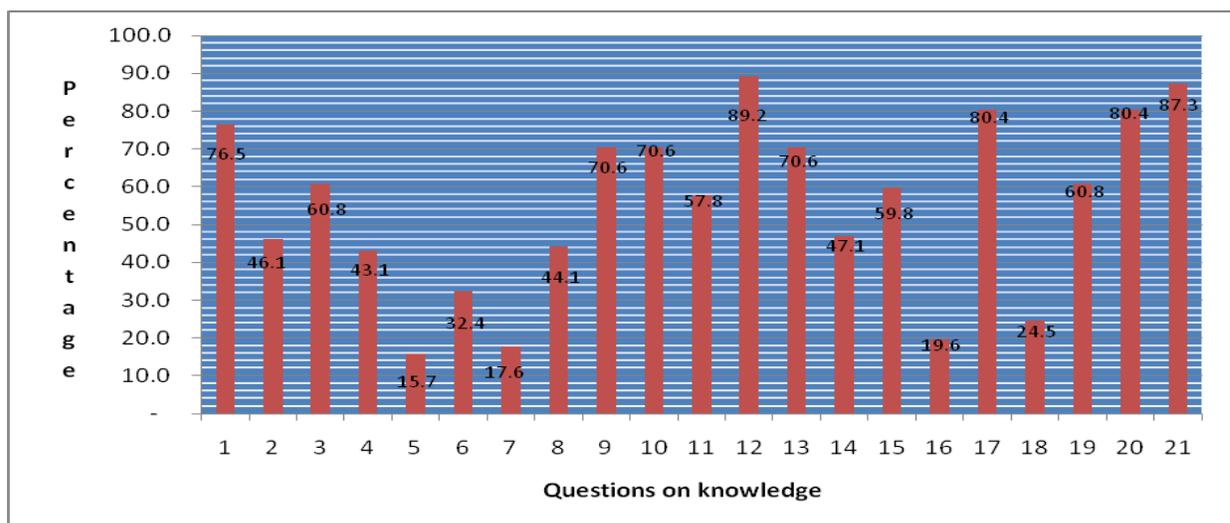


Figure 6.12: Scores of the respondents in the pre-test (questions on knowledge)

Figure 6.12 shows the percentages achieved by the responses to each question before training. The responses to question 12 (89.2%) and to question 21 (87.3%) achieved the highest scores in comparison to the lowest scores that were achieved by the responses to question 5 (15.7%), question 7 (17.6%) and question 16 (19.6%). For question 1 (76.5%), question 9 (70.6%) and question 13 (70.6 %), the scores were ranging from 70.6% to 76.5%.

Questions 4, 5, 6, 7, 8, 16 and 18 were obviously difficult for the participants in comparison to questions 1, 3, 9, 10, 12, 13, 17, 20 and 21. The questions that respondents experienced as difficult focused on the critical concepts of BLS such as the compression/ventilation ratio, the rate of compressions to be delivered in a minute, the minimum time interruption, and the correct time to assess the pulse. The knowledge of respondents was weak in these areas. This finding is consistent with earlier studies conducted by Madden (2006:218), and Handley and Handley (2003:57). Nurses should be knowledgeable about correct standards of care and should also be able to follow the guidelines that have been established for the delivery of care (AACN 2003: [3]). It is noticeable that the questions with which the respondents had most difficulties were the very ones that are likely to compromise the survival of a cardiac arrest patient during the provision of CPR.

6.4.5 Scores on test of knowledge administered after the training session (post-test)

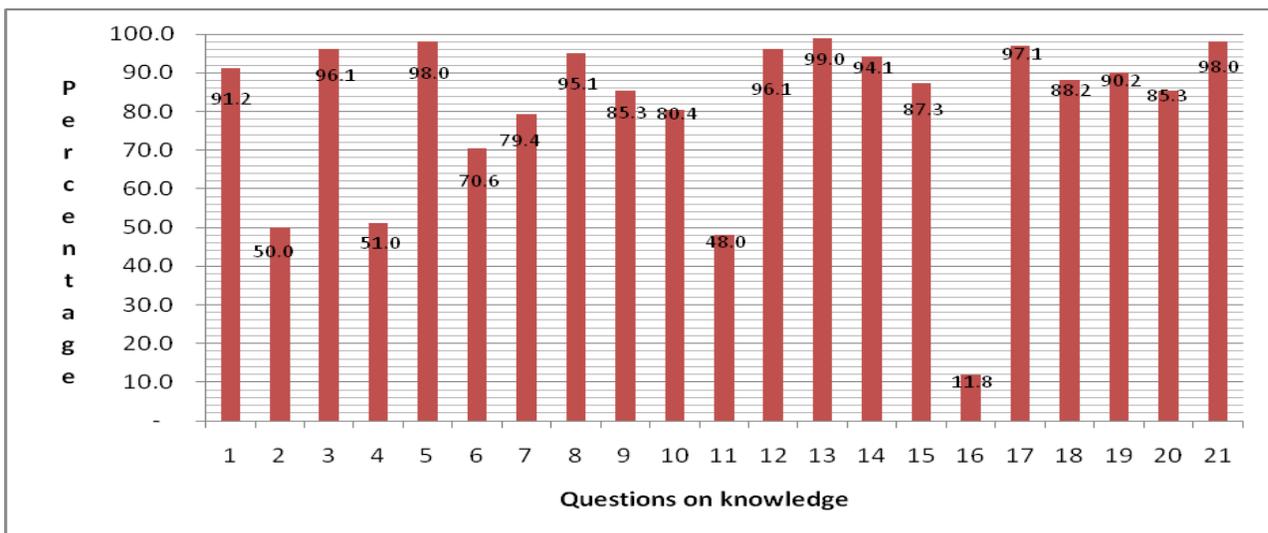


Figure 6.13: Scores of the respondents in the post-test (questions on knowledge)

Figure 6.13 shows that the responses to the test questions increased to a significantly higher level immediately after the training session had ended. The scores ranged from 91.2 % to 98.0 % for questions 1 and 21 respectively. The lowest scores ranged from to 11.8 % to 48.0% for questions 16 and 11 respectively.

Question 16 remained among the few poorly answered questions and more than half of the respondents still incorrectly answered question 11 even after they had attended the training session. The exception in this trend towards improved scores was evident in question 4, for which there was a huge drop in the number of correct answers in comparison to the number of correct answers that were offered in the pre-test. Seven of the questions were correctly answered by more than 95.0% of respondents. The results of the test after the training session had taken place demonstrated that the training had dramatically improved what nurses knew about the administration of CPR, and this confirmed the valuable effect of regular and additional training in CPR for registered nurses. The findings of this study confirm the findings of earlier research carried by Broomfield (1996:1016.23), Madden (2006:218) and Young and King (2000:7).

6.4.6 Scores on test of knowledge administered three months after the training session (re-test)

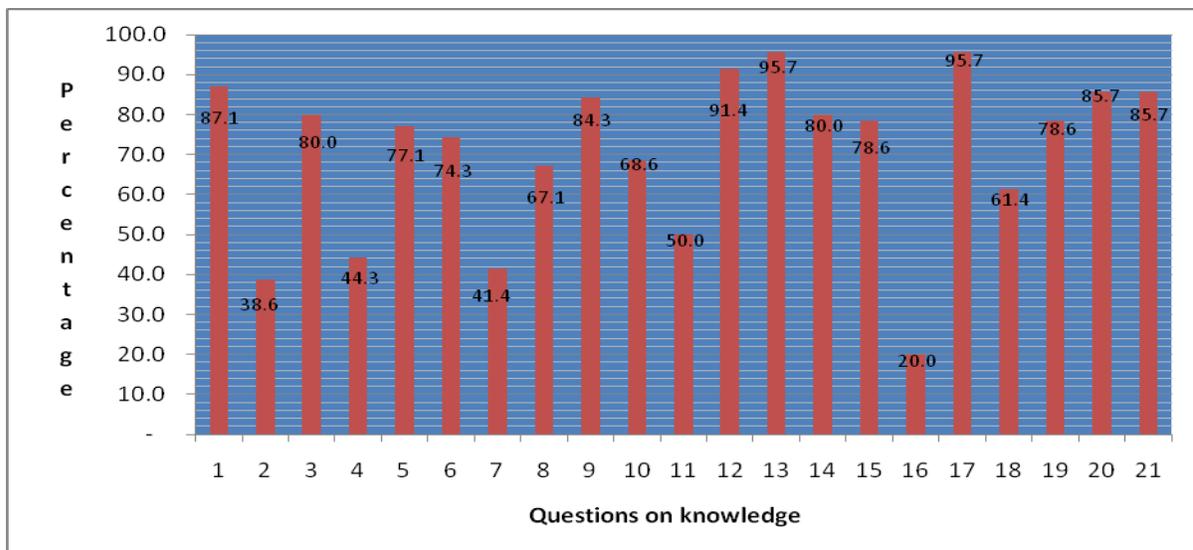


Figure 6.14: Scores of the respondents in the re-test (questions on knowledge)

With few exceptions, the percentage of correct responses was lower in the re-test (conducted three months after the post-test) than the percentage of correct responses in the post-test, although it was still higher than the percentage of correct responses in the pre-test. Questions 2 (38.6%) and 16 (20%) were still answered inadequately by the participants. Questions 13 (95.7%) and 17 (95.7%) both achieved a percentage of correct responses that was more than 95%, while questions 1 (87.1%), 3 (80%), 9 (84.3%), 14 (80%), 20 (85.7%) and 21 (85.7%) all scored a percentage of correct responses that was between 80 and 87%.

6.4.6 Graphic displays: Presentation of responses to individual questions on knowledge about CPR

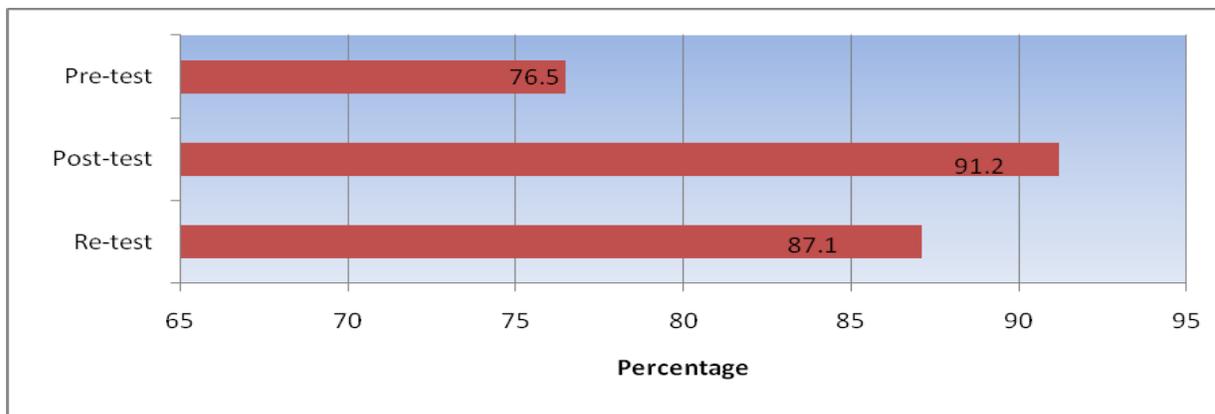


Figure 6.15: Responses to the question on the causes of cardiac arrest

While the pre-test score for question 1 was 76.5% (N=102), and there was some improvement following training (91.2%, N=102), and the retention was even good (87.1%, N=70) after three months.

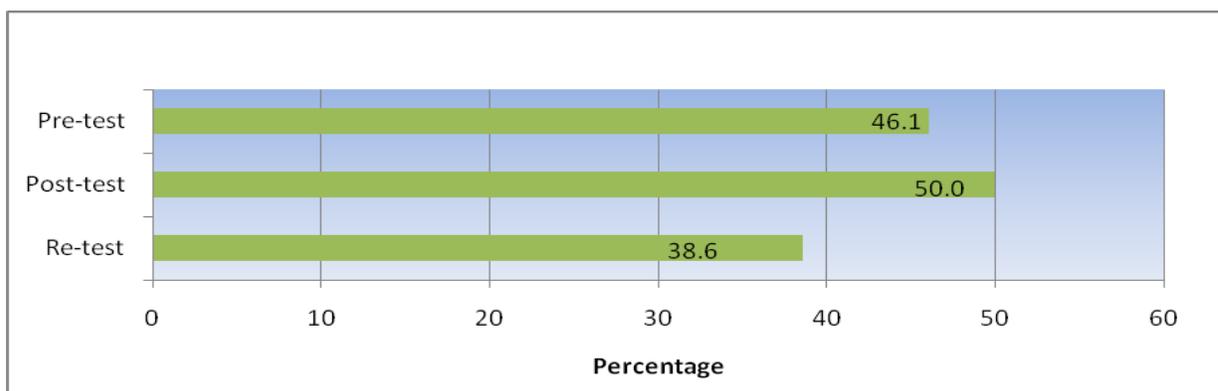


Figure 6.16: Responses to the question on location of respiratory centre

Figure 6.16 shows the percentage of correct responses to the question about the location of the respiratory centre. While the pre-test score was 46.1% (N=102), the post-test score increased to 50% (N=102). After three months, however, the score decreased to 38.6% – lower than it had been before training (N=70).

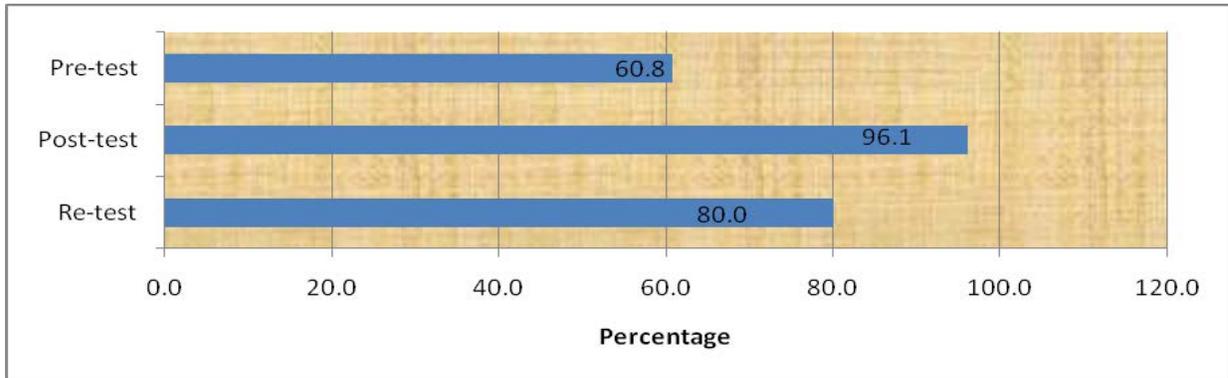


Figure 6.17: Responses to the question about brain survival without oxygen

Figure 6.17 shows that while the pre-test score for question 3 was 60.8% (N=102), the post-test score increased to 96.1% (N=102) and then decreased by 16.1% (N=70) to 80% (n=70) after three months.

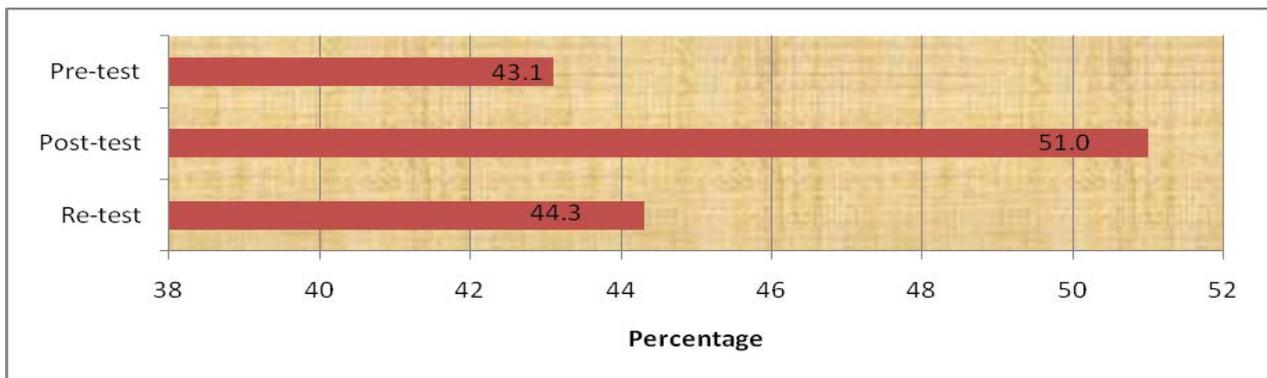


Figure 6.18: Responses to the question on the definitive treatment of ventricular fibrillation

Figure 6.18 shows the responses to the question about the definitive treatment of ventricular fibrillation. While the pre-test score was 43.1% (N=102), it increased to 51% (N=102) after the training but declined to 44.3% (N=70) after an interval of three months.

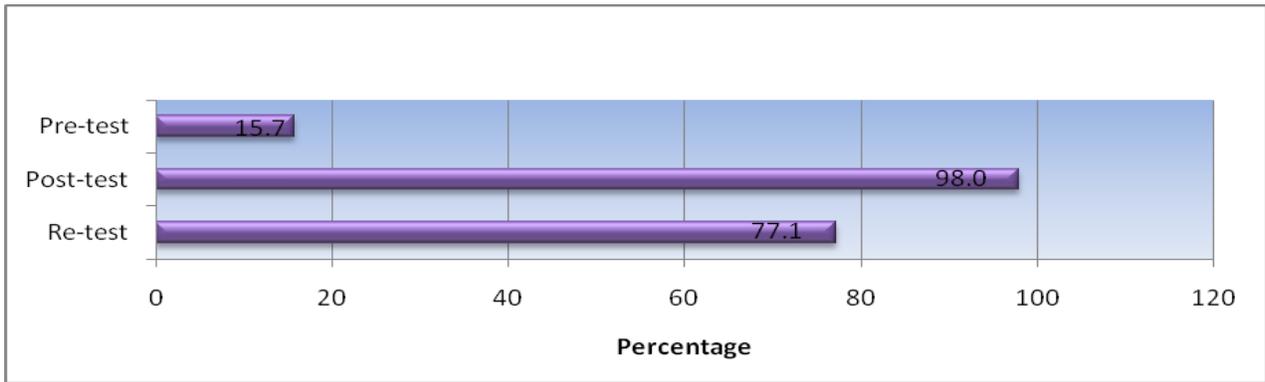


Figure 6.19: Responses to the question about the compression/ventilation ratio for a single rescuer

Only 15.7% (N=102) of the respondents were able to give the correct answer in the pre-test to this question about the proper compression/ventilation ratio for a single resuscitator working alone. After training, the number of correct answers increased to 98.0% (N=102), a good indication of the positive effect of training designed to improve the knowledge and skills of nurses who have already received training in CPR. That there was some memory loss on the part of the respondents in three months is demonstrated by the 21.0% (N=70) drop in the number of correct answers scored by respondents in the post-test.

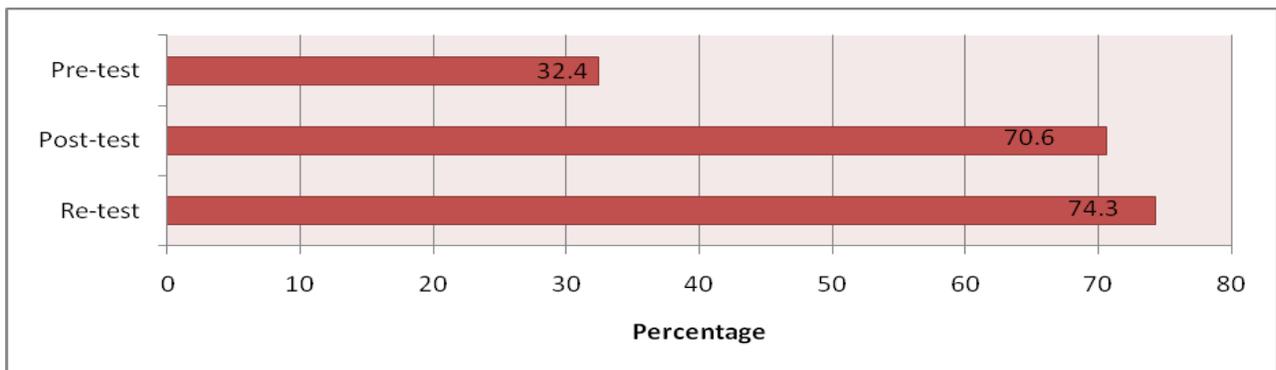


Figure 6.20: Responses to question about compression/ventilation ratio for two rescuers working on children

The number of participants, who gave the correct answer to this question about the correct compression/ventilation ratio for children in the pre-test score, was 32.4% (N=102). The number of respondents supplying the correct answer improved to 70.6% (N=102) after training, and even improved to 74.3% (N=70) in the re-test administered after three months.

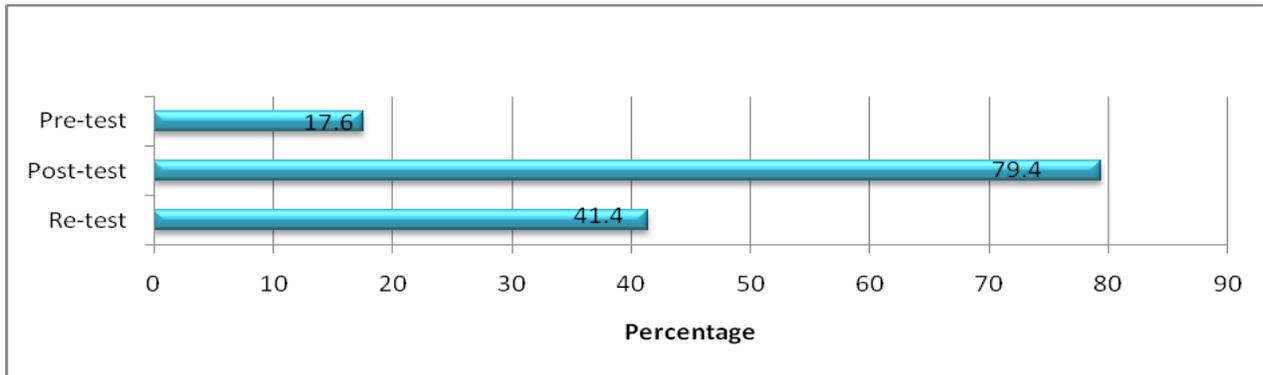


Figure 6.21: Responses to the question about the rate of compression

Figure 6.21 shows how the participants responded to questions about the recommended number of compressions that need to be performed during cardiac arrest resuscitation attempts. Although only 17.6% (N=102) of the nurses could answer this question correctly, the number who gave the correct answer immediately after training increased to 79.4% (N=102) although it declined again to 41.4% (N=70) – a decline that indicates poor retention of some essential knowledge about CPR techniques.

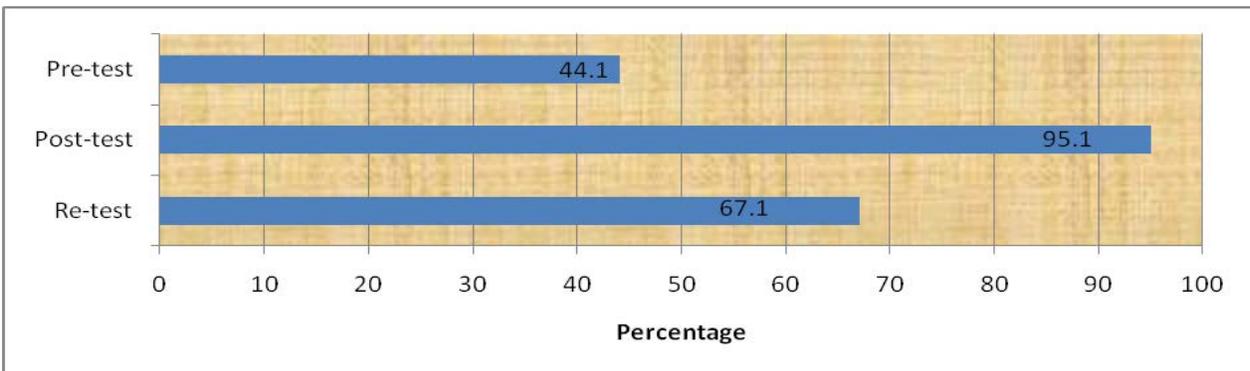


Figure 6.22: Responses to the question about the minimum time interruption during resuscitation

Although the number of nurses in the pre-test who were able to supply the correct answer to this question about minimum time interruption during CPR was 44.1% (N=102), it increased dramatically to 95.1% (N=102) in the post-test but declined substantially to 67.1% (N=70) in the retest after three months. Figure 6.22 graphically sets out the changes in knowledge retention on these three occasions.

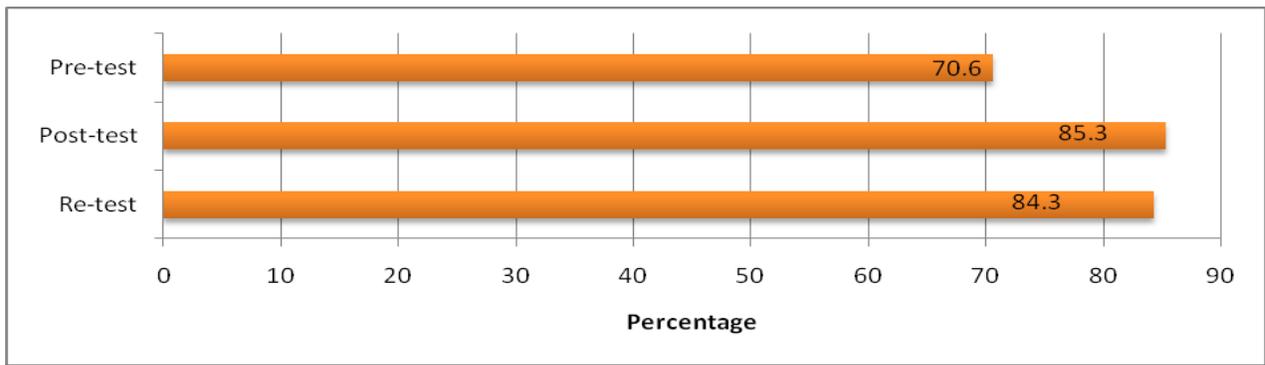


Figure 6.23: Responses to the question about the organ that can survive without oxygen

Although there was a reasonably good response to the question about the organ that can survive without oxygen in the pre-test, the responses improved after training and the retention level in the re-test remained almost the same as it was in the post-test.

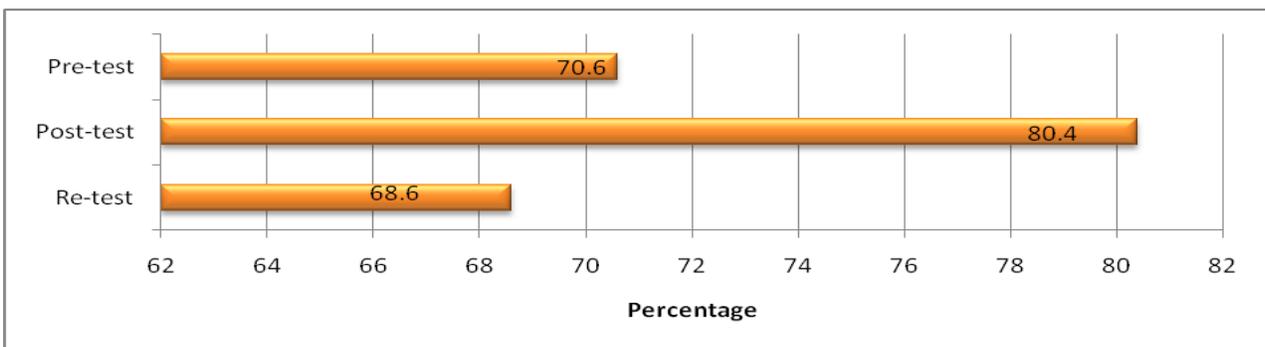


Figure 6.24: Responses to the question about the goal of CPR

Figure 6.24 shows that although the response to the question about the goal of CPR increased from 70.6% (N=102) in the pre-test to 80.4% (N=102) in the post-test, it decreased radically to the even lower level of 68.6% (N=70) in the retest after three months had elapsed.

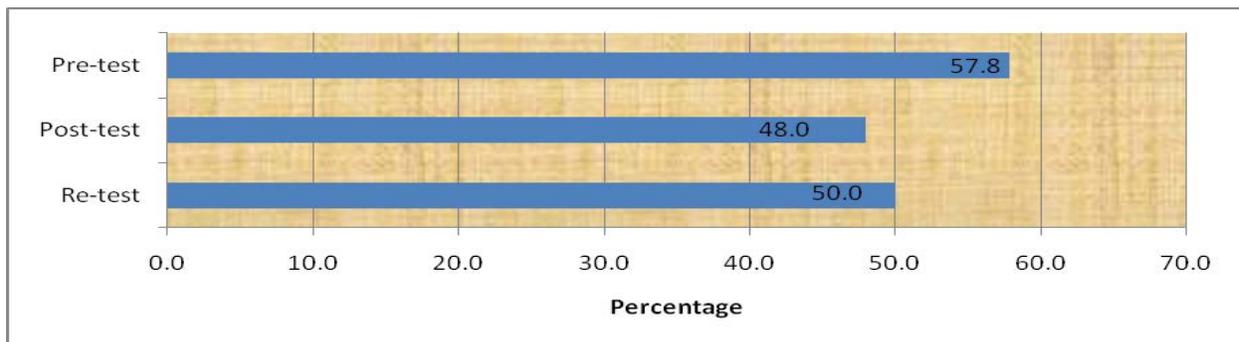


Figure 6.25: Responses to the question about chest recoil

Although 57.8% (N=102) of the respondents were able to give the correct answer to this question about chest recoil in the pre-test, the number of correct answers in the post-test score declined to 48% (N=102) and increased only to 50% (N=70) in the retest after three months – an anomaly that are might merit further investigation.

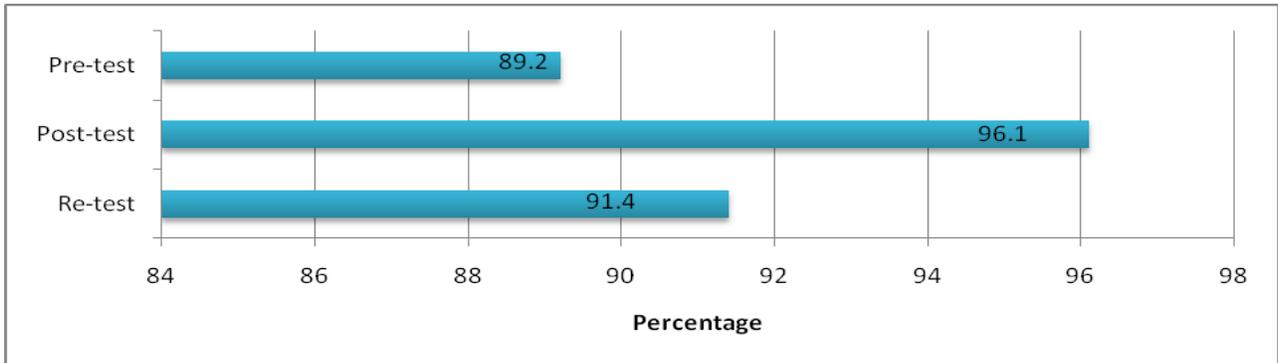


Figure 6.26: Responses to the question about the best way to open the airway

While the knowledge of most of the participants was considered to be adequate in this matter (the pre-test score was 89.2% (N=102), it increased to 96.1% (N=102) after training and was maintained at 91.4% (N=70) in the re-test.

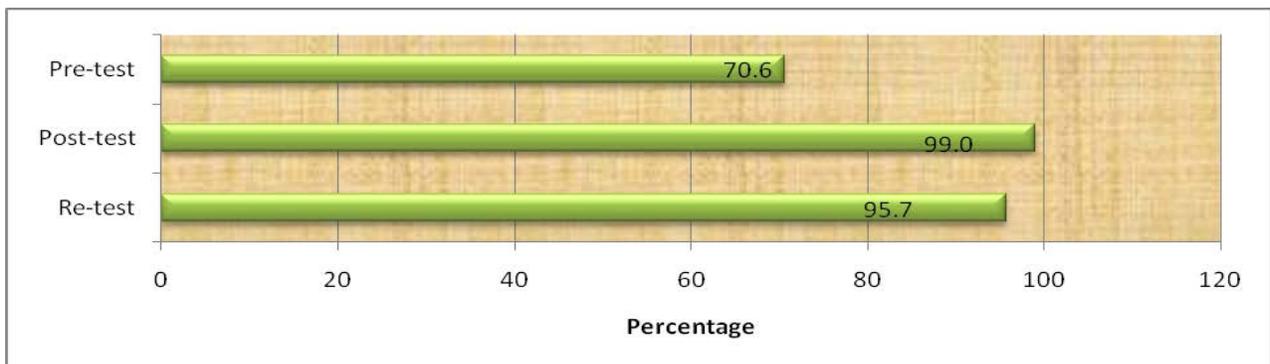


Figure 6.27: Responses to the question about the best way to give mouth-to-mouth resuscitation

While the pre-test score for this question about the best way to give mouth-to-mouth resuscitation was 70.6% (N=102), it increased substantially to to 99.0% (N=102) in the post-test and then dropped only slightly to 95.7% (N=70) in the re-test score

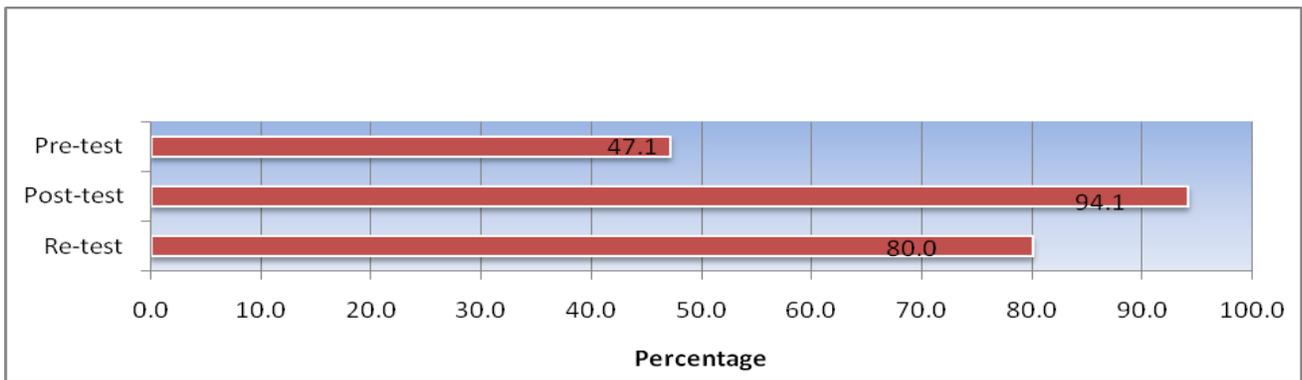


Figure 6.28: Responses to the question about the indication of when to begin chest compressions

Figure 6.28 shows that while the pre-test score was 47.1% (N=102) for this question about the indication of when to begin chest compressions, the score increased dramatically to 94.1% (N=102) in the post-test and declined again to 80.0% (N=70) in the re-test after three months.

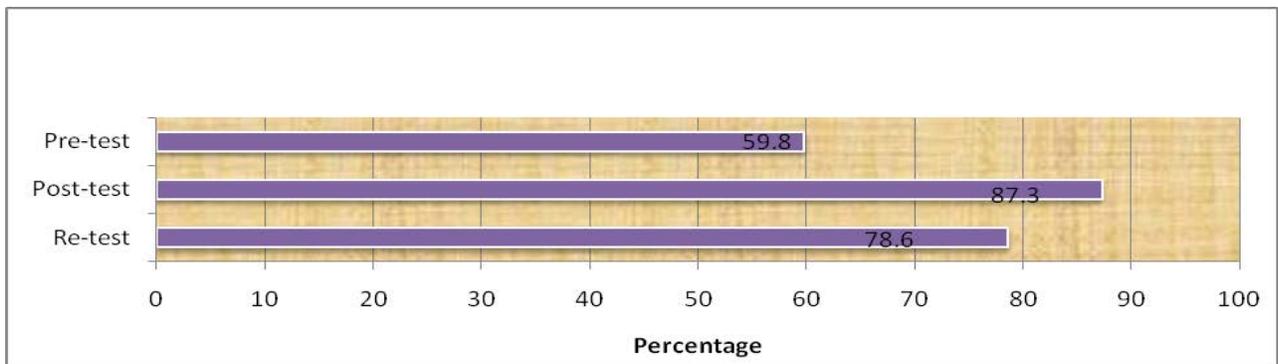


Figure 6.29: Responses to the question about the priority of assessment

While the number of correct answers to this question in the pre-test was 59.8% (N=102), it increased to 87.3% (N=102) after post-test but declined by roughly 10% to 78.6% (N=70) in the re-test after three months.

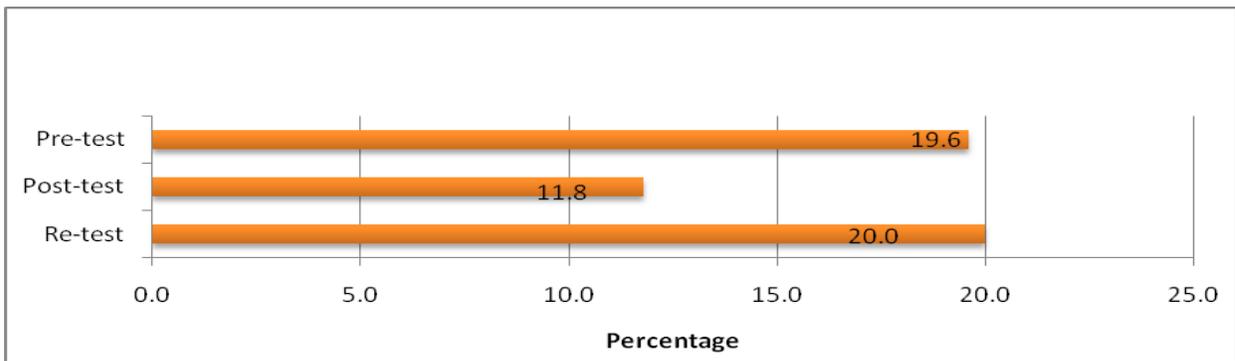


Figure 6.30: Responses to the question on the least cause of respiratory arrest

The number of correct responses to this question actually decreased after the training session from 19.6% (N=102) in the pre-test to 11.8% (N=102) in the post-test. After the re-test administered three months later, the score (20.0%) (N=70) was almost identical to the pre-test score of 19.6%.

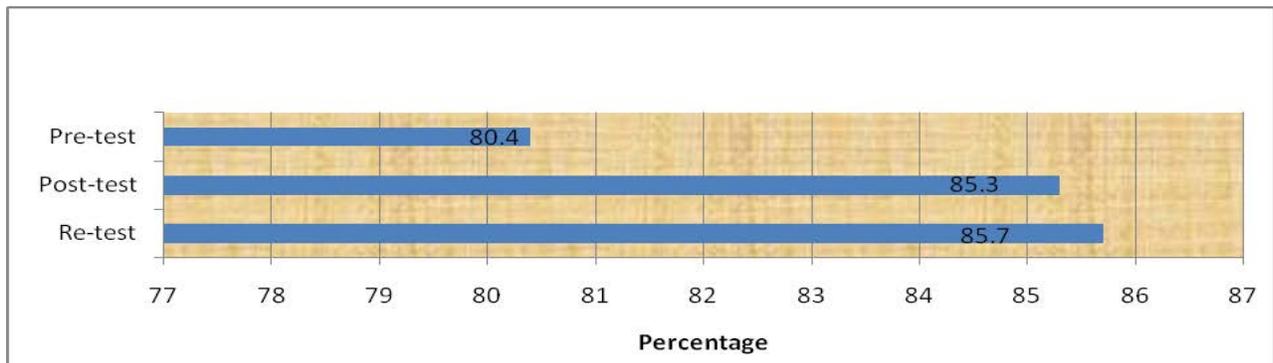


Figure 6.31: Responses to the question about the best artery to check

Although the responses to this question about the best artery to check produced a good score in the pre-test (80.4%, N=102), it improved in the post-test to 85.3% (N=102) and remained almost exactly in the same level (85.7%, N=70) in the retest.

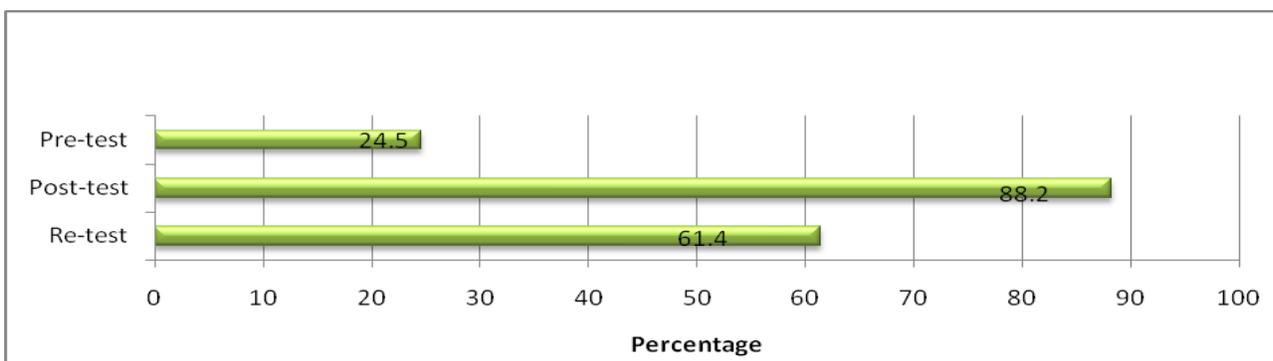


Figure 6.32: Responses to the question on the time to assess pulse

Figure 6.32 shows that the respondents' knowledge about the correct time to assess the pulse was very poor indeed (24.5%, N=102), it improved dramatically after the training to 88.2% (N=102) in the post-test, although it declined once again substantially in the re-test after three months to 61.4% (N=70).

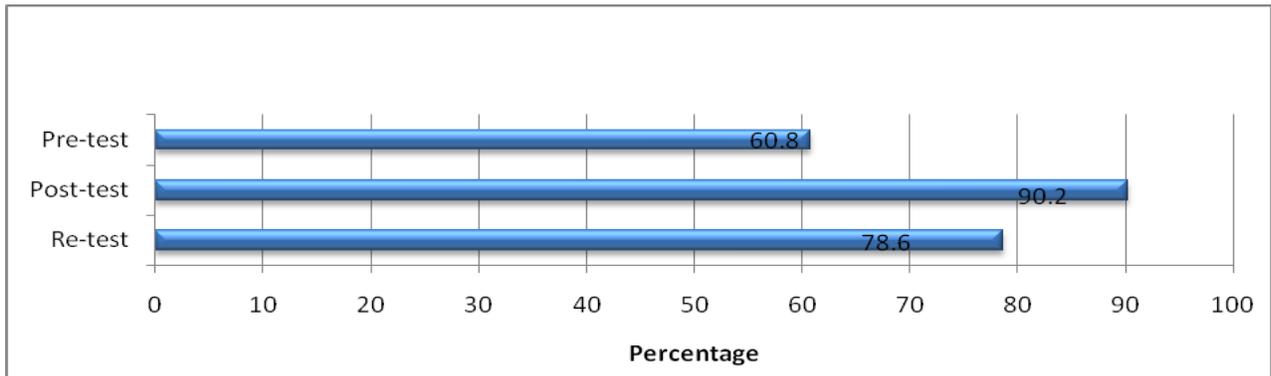


Figure 6.33: Responses to the question about how often the emergency trolley is checked

The responses to a question about the frequency of checking the emergency trolley improved significantly from 60.8% (N=102) in the pre-test to 90.2% (N=102) in the post-test. It declined, however, to 78.6% (N=70) after three months in the re-test.

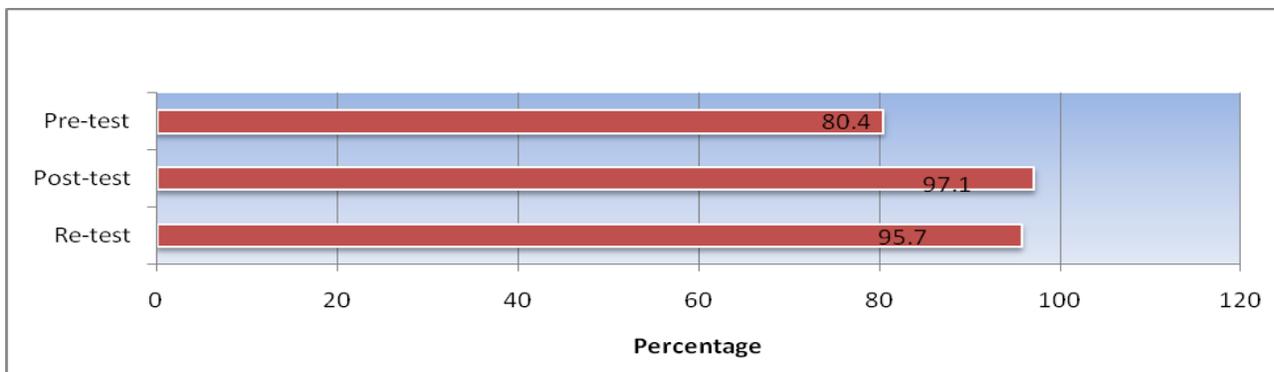


Figure 6.34: Responses to the question about the first drug that should be given during cardiac arrest

The results show that the correct responses to this question about the first drug that should be administered during cardiac arrest increased to 97.1% (N=102) in the post-test from the pre-test score of 80.4% (N=102). This knowledge was successfully retained by the

respondents because it produced correct responses of 95.7% (N=70) after three months in the re-test.

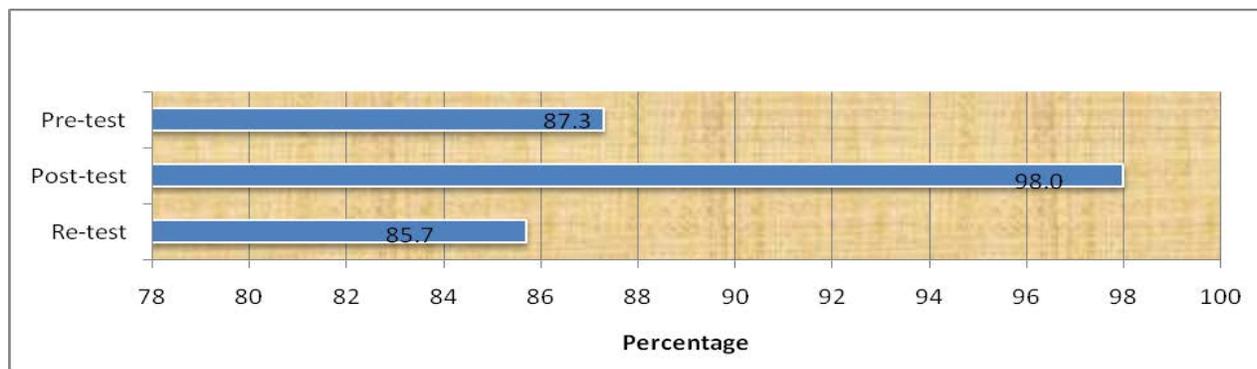


Figure 6.35: Responses to the question about the benefits of minimising interruptions

Although the correct responses to this question about the benefits of minimising interruptions was 87.3% in the pre-test, it increased to 97.1% (N=102) in the post-test but dropped to a *lower* level (85.7%) (N=102) in the re-test after three months than the results that were obtained in the pre-test (87.3%, N=70).

6.4.7 Statistical significance of CPR cognitive knowledge tests

Table 6.2a Knowledge: statistical presentation of test results

Knowledge	N	Minimum	Maximum	Mean	Standard Deviation	Mean Rank
Pre-test	102	23.8	85.7	55.0	11.5	1.19
Post-test	102	61.9	95.2	80.6	7.2	2.71
Re-test	70	42.9	95.2	70.7	10.9	2.10

Table 6.2b Knowledge: Test statistics

Number of respondents (N)	70
Chi-square (χ^2)	86.235
Degrees of freedom	2
Asymptotic Significance (P-value)	.000

The mean score of the CPR knowledge of the participant registered nurses in the pre-test was 55.0 (N=102). After CPR training, the mean score of the CPR knowledge of the participant registered nurses reflected in the post-test scores increased to 80.6% (N=102).

But the mean score the CPR knowledge of the participant registered nurses decreased to 70.7% (N=102) in the re-test that was administered three months after the post-test. The Friedman test was used to determine whether these changes in the means were statistically significant and a Chi-square test was applied to identify the statistical difference. The differences between the pre-test, post-test and re-test scores after 3 months were significant at a 5.0% significance level (Chi square $\chi^2 = 86.235$; degree of freedom $d = 2$; Asymptotic Significance $P = .000$).

6.4.7.1 A comparison of scores on knowledge of the participants from the two referral hospitals

Table 6.3 Knowledge: a comparison of scores achieved by the respondents from the two referral hospitals

Tests on Knowledge	N	Mean	Std. Deviation	Statistical test
Hospital A				
Pre-test	45	52.0	12.5	
Post-test	45	81.2	7.3	
Re-test	36	69.6	12.6	
Hospital B				
Pre-test	57	57.4	10.2	
Post-test	57	80.1	7.2	
Re-test	34	72.0	8.8	
Test statistics	Mann-Whitney U	Wilcoxon	Z	Asymptotic Significance (2- tailed) P-
Pre-test	960.500	1995.500	-2.188	0.029
Post-test	1141.000	2794.000	.976	0.328
Re-test	548.000	1214.000	.761	0.447

Table 6.3 shows that while the mean before training and after three months was higher at hospital B, the mean score was higher at hospital A *after* training. The Mann-Whitney U test was applied to compare the means of the overall scores. A significant difference existed before training (P- value was less than 0.05). But after training and after three months had elapsed, there was no significant difference between the means of the two hospitals (the P- value was larger than 0.05).

6.4.7.2 A comparison of scores on knowledge in terms of gender of the participants

Table 6.4 Knowledge: Comparison of scores in terms of gender

Tests on Knowledge	N	Mean	Std. Deviation	Statistical test
Female				
Pre-test	88	54.7	11.8	
Post-test	88	80.7	7.3	
Re-test	59	70.9	11.7	
Male				
Pre-test	14	57.1	9.5	
Post-test	14	79.9	6.8	
Re-test	11	69.7	5.3	
		Wilcoxon		Asymptotic
Test statistics	Mann-Whitney U	W	Z	Sig. (2-tailed) P-
Pre-test	538.000	4454.000	-765	.444
Post-test	601.500	706.00	-145	.885
Re-test	300.00	366.00	-400	.689

Table 6.4 shows that while the mean scores that reflected the knowledge of CPR of the male respondents' knowledge was slightly higher before training and after training, the mean of the female respondents was higher than that of the male respondents after three months had elapsed. Because the P value is larger than 0.05, there is no significance difference in the means obtained by the males and females in any of these tests.

6.4.7.3 A comparison of scores on knowledge in terms of the age of participants

Table 6.5 Knowledge: comparison of scores in terms of the age of participants

Tests on Knowledge	N	Mean	Std. Deviation	Statistical test
21-30 years				
Pre-test	55	54.7	11.5	
Post-test	55	80.6	6.8	
Re-test	42	71.1	10.2	
31 years and older				
Pre-test	47	55.3	11.7	
Post-test	47	80.5	7.7	
Re-test	28	70.2	12.2	
Test statistics	Mann-	Wilcoxon		Asymptotic

	Whitney U	W	Z	Sig. (2-tailed) P-
Pre-test	1284.500	2824.500	-.054	.957
Post-test	1285.500	2413.500	-.048	.962
Re-test	560.00	966.500	-.333	.739

The researcher grouped the respondents into two different age groups (namely, 21-30 years old, and 31 years and older) with a view to comparing the knowledge of CPR of the respondents in these two groups. While the highest mean score in the age group 21-30 years old was 80.6%, it was 80.5% in the age group 31 years and older. Because the P-value was larger than 0.05, there was no significant difference between the means of the two different age groups that were compared.

6.4.7.4 A comparison of scores on knowledge in terms of years of experience of the participants

Table 6.6 Knowledge: comparison of scores obtained in terms of years of experience

Tests of CPR knowledge	N	Mean	Std. Deviation	Statistical test
3 years or less				
Pre-test	44	54.4	12.3	
Post-test	44	80.3	7.4	
Re-test	33	71.0	8.8	
4 years or more				
Pre-test	58	55.4	11.0	
Post-test	58	80.8	7.2	
Re-test	37	70.5	12.7	
	Mann-	Wilcoxon		Asymptotic
Test statistics	Whitney U	W	Z	Sig. (2-tailed) P-
Pre-test	1247.500	2237.500	-.194	.846
Post-test	1244.500	2234.500	-.218	.827
Re-test	600.500	1303.500	-.119	.905

The various categories of experience were all grouped together because some of the categories had low frequencies. The comparisons were made between the group who had three years or less experience and the group that had four years or more experience. The highest mean for the group that had three years or less experience was 80.3% and the highest mean for the group that had four years or more experience was 80.8%. Because the P-value was higher than 0.05, there was no significant difference between the means

of the two groups who were different in terms of the number of years of experience that they had accumulated as registered nurses. The finding of this study contrasts with the findings of a study conducted by Verplancke et al (2008:75). According to Verplancke et al (2008:75), the higher the number of years of working experience a nurse possessed, the better was his or her knowledge of compression skills.

6.4.9 The significance of differences when comparing the scores on CPR knowledge of participants in terms of age, gender and experience

This study produced no significant difference in scores when considering the CPR knowledge of the respondents in terms of gender, age and experience. These findings are consistent with the findings in the research of Delvin (1999:201). Verplancke et al (2008:75) suggest that “the gender effect” (statistical differences in terms of gender) might well be explained in terms of standard differences between the physical characteristics of the genders such as, for example, average body weight and muscle strength.

6.5 THE SKILLS TEST

6.5.1 Assessment of the CPR skills of registered nurses

One may define a *skill* as “the ability to use one’s knowledge – in performance, dexterity, and in the execution of physical tasks” or as the learned power of doing something competently (*Merriam-Webster Online Medical dictionary* 2009). The core concept of the AACN Synergy Model for Patient Care is that it is the needs of patients that define the required competencies and skills of nurses. The proper care of clients during the administration of CPR requires nurses to possess whatever skills they need to perform CPR properly, to secure better patient outcomes and to deliver the kind of safe and effective care that prevents and minimises patient complications (Curley 2007:14). The prognosis for a patient during cardiac arrest is vastly improved if a nurse has the ability to detect complications and intervene promptly and appropriately (Aiken, Clarke, Cheung, Sloane & Silber 2003:1617). Assessing the existing CPR skills of the registered nurses who participated in the study in the two referral hospitals gave the researcher a better understanding of the various levels of skill that prevailed among the participants.

The skill of each registered nurse was assessed during the pre-test stage in isolation from the remainder of his or her colleagues. The registered nurses were each presented with a scenario in which a victim had suffered a cardiac arrest and asked to simulate the process of resuscitation on the victim. While this was happening, the researcher and the accredited observer marked the performances by using the checklist that the researcher had devised. After all the participants had all been exposed to the CPR training course, the researcher and the observer immediately re-assessed the level of the skills they had acquired as a result of the course as part of the post-test. The re-test was then administered after an interval of three months in order to determine the degree to which the registered nurses had retained the skills that they had learned in the CPR training course three months earlier. In all three of the evaluations, the same manikin, the same data collection instruments and the same procedures were used as had been used for the pre-test. After all the tests had been completed, the researcher debriefed the nurses with regard to their CPR knowledge and skills (see Annexure D).

The researcher drew on the methods used in the research of Berden et al (1992), cited by Madden (2006:218), to develop a scoring system for evaluating the CPR skills of the registered nurses in the experimental sample. In terms of this system, penalty points were awarded for skill errors, and so the best possible attainable score in terms of system was 0. Penalty points were awarded in terms of how the judges assessed the seriousness and severity of the error committed. A total percentage score was calculated to represent the individual achievement score (the best possible score was 100%).

The mean scores attained in the individual tests and the overall scores are set out in table 6.7.

Table 6.7 Comparison of the scores achieved for skills in the pre-test, the post-test and the re-test

S.NO	Test	Maximum penalty points	Pre-test (the test before training)	Post-test (the test after training)	Re-test (the test three months after the post-test)
1	Checking for hazards	5	4.9	0.29	2.5
2	Checking responsiveness	5	3.63	0.34	1.21
3	Calling for help	20	15.25	4.71	6.14

4	Opening the airway; the head tilt (chin lift)	20	14.9	5.2	8.57
5	Checking for breathing	10	9.07	4.36	5.21
6	Giving two slow breaths	20	16.96	4.71	8.07
7	Ventilation volume	20	18.24	4.07	8.36
8	Initial pulse check	10	8.82	2.4	5.21
9	Correct hand position	20	17.79	4.12	6.07
10	The performance of 30 compressions	5	4.8	0.83	1.14
11	The depth of the compressions	20	19.12	3.87	2.43
12	The release of the chest compressions	20	19.56	3.82	2.43
13	The rate of the chest compressions	20	18.82	2.89	3.36
14	Giving slow continuing breaths	5	4.95	1.13	1.5
15	Compression: breathing	5	4.8	0.25	1.07
16	Performing four cycles	5	4.85	0.1	1.07
17	Checking the pulse	5	5.0	0.29	0.86
18	Continuing CPR	5	4.9	0.34	1.29
19	Correct sequencing of actions	20	19.71	7.84	13.21
20	Total penalty points	240	216.1	51.6	79.7
	Overall % score (Positive achievement)	100%	9.4%	78.3%	67.8%

The table 6.7 depicts the total percentage of the score calculated as an achievement score (the best possible score being 100%). It was observed that the penalty points were very high (216.1) before the training commenced. The mean percentage of response score was only 9.4% during the pre-test. After the participants had been exposed to the CPR training session, the mean percentage of response increased to 78.3% (51.6 penalty points). The mean score achieved by the respondents dropped, however, to 67.8% (79.7 penalty points) after three months elapsed. Although the score therefore declined by 10.5% between the post-test and the re-test, a significant improvement (namely, 58.4%) was observable between the pre-test and the re-test that was administered three months after the post-test.

All the nurses performed incompetently in the CPR skills test during the pre-test. The requisite skills, such as giving two slow breaths, the ventilation volume, the correct hand position, the depth and release of compressions, and the appropriate rate of chest compressions were all poorly performed, with no registered nurse meeting the pass criteria during the pre-testing of their CPR skills. If these nurses had been performing CPR on *real* patients who had just suffered cardiac arrest, the outcomes of their CPR for the patients would have been negative (the patients would have died). Although their scores for CPR skills deteriorated by 10.5% in the period between the post-test and the re-test, many of them would have retained a sufficient number of skills to improve their patients' chances of surviving CPR treatment. The findings of this study show that many of the nurses retained their proficiency in a useful number of CPR psychomotor skills.

It was observed that while no single respondent scored an overall score of 0 penalty points in the pre-test, 40 respondents out of 102 scored 0 penalty points in the post-test immediately after the training. The results from the re-test, after three months had elapsed show that 12 respondents out of 70 scored an overall score of 0 penalty points. This indicates a relative decline in the scores of 17 respondents (or 24.0%) among those respondents who achieved 0 penalty points. Although the overall deterioration rate in retention of skills is 10.5%, this particular decline of 24.0% among respondents clearly indicates that the rate of inability on the part of these registered nurses to retain essential skills over a three-month period is both significant and a matter for concern.

It is also worth noting that out of the 12 top scorers only two were employed in ICU during the period in which the study was conducted. Similar findings, namely that nurses who worked in ICU recorded higher failure rates in the performance of CPR, were identified in the research carried out by Marsch et al in Switzerland (2004:51). While failure to perform any of the skill components correctly resulted in overall failure, this clearly does not mean that *every* aspect of CPR practice demonstrated by the nurses was below standard – especially in the re-test. The scoring system was deliberately designed to permit varying degrees of efficiency in performance to be identified within the population.

The Friedman test was used to test for differences between the mean scores for skills test before training, after training and after three months on each variable (n=70). Since the P value was less than 0.05 in all the components of the skills tested, it was concluded that the three mean scores were significantly different.

6.5.2 Statistical significance of assessment of tests of CPR skills

Table 6.8a Skills: statistical presentation of the remainder of the results

Tests on Skills	N	Minimum	Maximum	Mean	Std. Deviation
Skills % before training	102	.00	47.92	9.42	9.82
Skills % after training	102	.00	100.00	78.31	17.52
Skills % after 3 months	70	25.00	100.00	67.82	20.17

Table 6.8b The Wilcoxon Signed Ranks test

Wilcoxon Signed Ranks test	Skills % Post-test Skills % Pre-test	Skills % Re-test – Total Skills % Post-test – Total
Z	-8.771(a)	-3.628(b)
Asymp. Sig. (2-tailed)	.000 (a= based on negative ranks)	.000 (b= based on positive ranks)

Since the mean score of the nurses' skills in CPR before training was 9.42% (SD=9.82), this indicates a low overall level of competence. After the nurses had been retrained in the post-test, the mean score increased to 78.31% (SD=17.52) but dropped again to 67.82% (SD= 20.17) after an interval of three months had elapsed before the re-test. The Wilcoxon Signed Ranks test was used to assess the statistical significance. The P value was significant at < 0.05 between the pre-test and the post-test, and again between the post-test and the re-test that was administered after three months. One may therefore conclude that the CPR skills of registered nurses in the sample had already begun to decline in the 12 weeks subsequent to their CPR training before the post-test.

Since only 70 subjects participated in the re-evaluation after three months, a comparative statistical analysis was made with the three evaluations of only those 70.

6.5.2.1 Statistical significance of the results for the 70 participants who completed all three tests

Table 6.9a Skills: Statistical results from the pre-test, post-test and re-test for the 70 respondents

Test on Skills	N	Minimum	Maximum	Mean	Std. Deviation
Skills % before training (pre-test)	70	.00	47.92	10.33	10.51
Skills % after training (post-test)	70	.00	100.00	76.55	18.27
Skills % after 3 months (re-test)	70	25.00	100.00	66.82	20.17

Table 6.9b Wilcoxon Signed Ranks Test

Wilcoxon Signed Ranks test	Skills % Post-test - Skills % Pre-test	Skills% Re-test – Total Skills % Post-test – Total
Z	-7.267(a)	-3.413(b)
Asymp. Sig. (2-tailed)	.000 (a= based on negative ranks)	.001 (b= based on positive ranks)

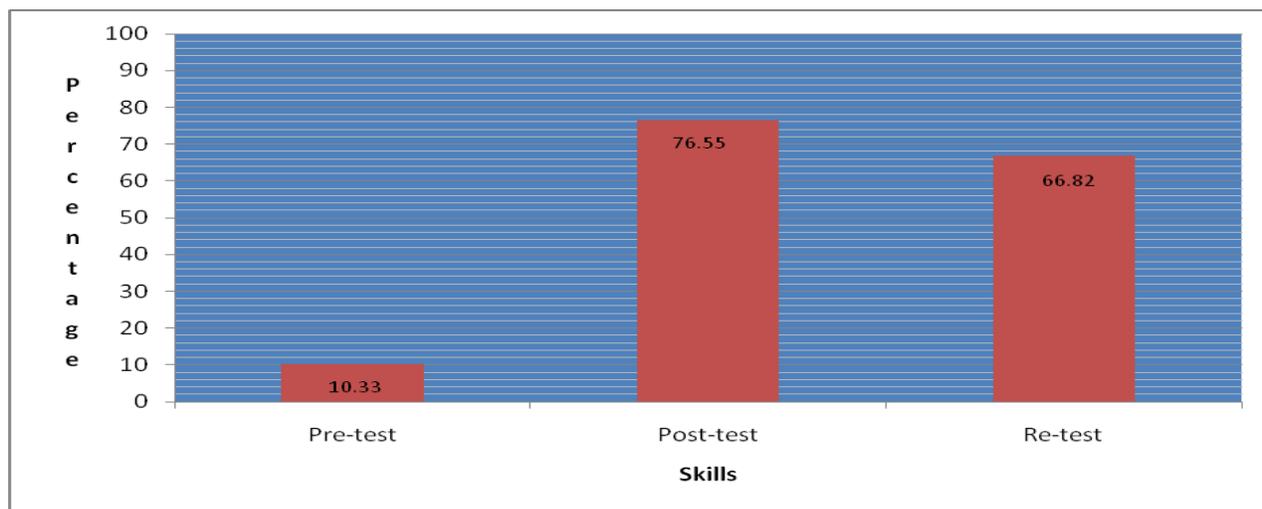


Figure 6.36: Mean scores achieved by 70 participants in three tests of their CPR skills

Only 10.33% of the 70 respondents who attended all three of the testing sessions managed to obtain less than the minimum penalty scores. While a considerable improvement was observed immediately after training in the post-test (76.55%), the retention level of the participants dropped by nearly 10% according to the results of the re-test three months after the post-test (66.82%).

The results of the CPR *skills* tests administered to the registered nurses in the study produced considerably lower scores than the results of the CPR *knowledge* tests. Table 6.4 shows that although that there had been no major deviation in the poor performances among the participants in the pre-test (SD=10.51), there was a considerable deviation in the post-test (SD=18.27) and in re-test after three months (SD=20.17). This indicates that the overall skills were more uniformly deficient among the nurses before the training that was provided as part of the quasi-experimental design study carried out the by the researcher.

A comparative statistical analysis of the performance of the same 70 subjects in the three tests revealed that there was a considerable degree of significance ($P < 0.05$) – an indication of definite changes in the levels of skills between the three evaluations. While the pre-assessment means score on skills level was 10.33%, the mean score increased to 76.55% after training.

6.5.2.2 Penalty scores in the test of CPR skills before training (pre-test)

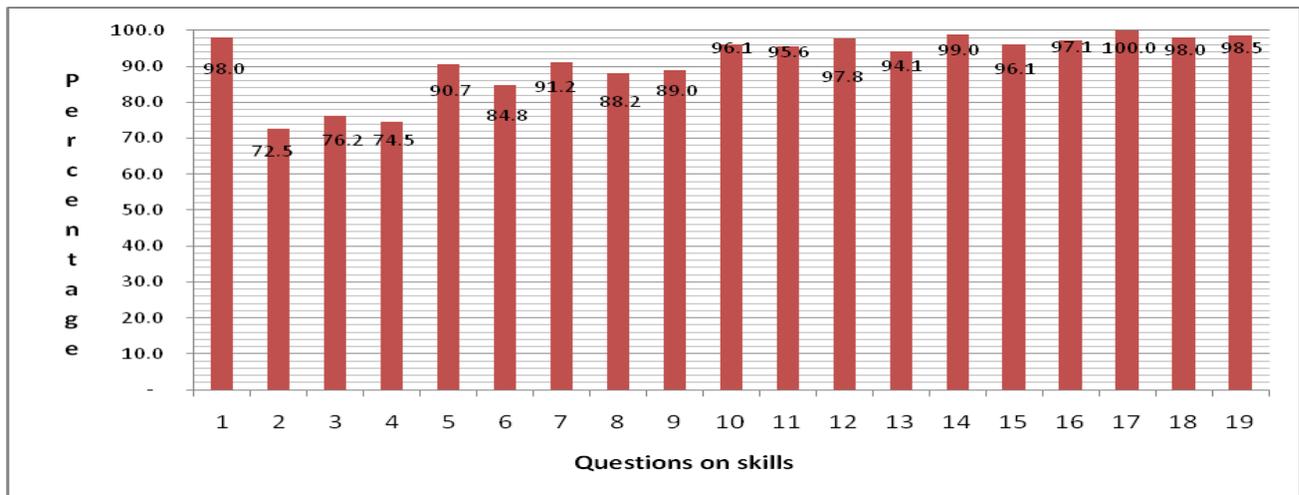


Figure 6.36(a): Penalty scores in the test of CPR skills before training (pre-test)

Figure 6.36(a) shows the percentage of incorrect responses to each question about skills before the training took place. Table 6.10 (below) sets out the details of how this happened.

Table 6.10 Skills: Pre-test – a statistical analysis on individual questions

Scores on test of CPR skills	N	Minimum	Maximum	Mean	Std. Deviation
Checking for hazards	102	0	5	4.90	.70
Checking responsiveness	102	0	5	3.63	2.24
Calling for help	102	0	20	15.25	8.45
Open airway – the head tilt and chin lift	102	0	20	14.90	5.93
Checking for breathing – looking and listening	102	0	10	9.07	2.34
Giving two slow breaths	102	10	20	16.96	4.62
Ventilation volume	102	5	20	18.24	4.28
Initial pulse check	102	5	10	8.82	3.55
Correct hand position	102	5	20	17.79	4.71
Performance of 30 compressions	102	0	5	4.80	2.84
Depth of compressions	102	0	20	19.12	3.18
The release of chest compressions	102	5	20	19.56	2.24
The rate of chest compressions	102	0	20	18.82	4.17
Giving slow, continuous breaths	102	0	5	4.95	2.15
The compression-ventilation ratio	102	0	5	4.80	0.98
Performing four complete cycles	102	0	5	4.85	0.85
Checking the pulse	102	5	5	5.00	0.00
Continuing CPR	102	0	5	4.90	0.70
Following the correct sequence	102	10	20	19.71	1.70

According to table 6.10, the mean score of the penalty points during the pre-test was 19.71 against a maximum of 20 (SD=1.70). This indicates that no registered nurse was able to achieve a pass score.

The standard deviation data indicates that (with the exception of one question – the one about calling for help, SD=8.45), there was no great variation in the responses and score levels among the nurses in the pre-test. The 19th activity, entitled “Following the correct sequence”, is actually a summarised version of all the earlier 18 activities that were tested in the skills test, scoring penalty points between 0 and 20 based on the responses to the 18 skill test questions/activities. With the overall score level of correct sequence touching a penalty score of 19.71 in the context of a maximum of 20, and a standard deviation score of 1.70, one may say that the testing of the CPR skill components produced results that were uniformly poor.

6.5.2.3 Penalty scores in the test of CPR skills after training (post-test)

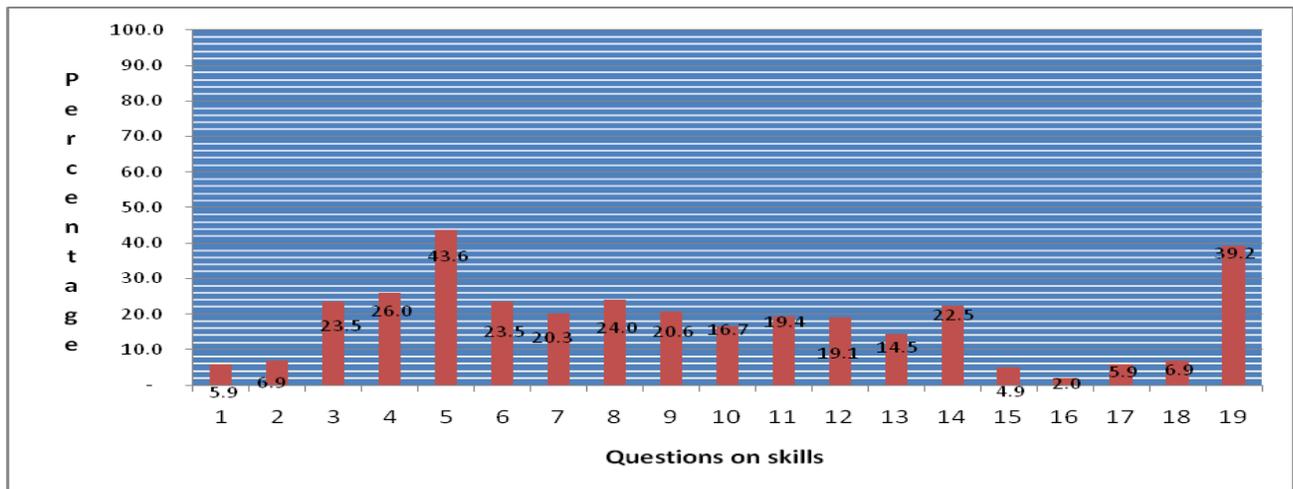


Figure 6.36(b): Scores obtained in the post-test after training in CPR skills

Figure 6.36(b) shows the percentage of incorrect responses for each question about skills before the nurses attended the training session. Table 6.11 provides a detailed analysis.

Table 6.11 Skills: Post-test – statistical analysis of individual questions

Scores on test of skills	N	Minimum	Maximum	Mean	Std. Deviation
Checking for hazards	102	0	5	0.29	1.18
Checking responsiveness	102	0	5	0.34	1.27
Calling for help	102	0	20	4.71	8.53

Open airway – the head tilt and chin lift	102	0	20	5.20	6.85
Checking for breathing – looking and listening	102	0	10	4.36	4.20
Giving two slow breaths	102	0	20	4.71	6.52
Ventilation volume	102	0	20	4.07	6.01
Initial pulse check	102	0	10	2.40	3.50
Correct hand position	102	0	20	4.12	5.28
Performing 30 compressions	102	0	5	0.83	3.04
Depth of compressions	102	0	20	3.87	5.26
The release of chest compressions	102	0	20	3.82	5.64
The rate of chest compressions	102	0	20	2.89	5.99
Giving slow, continuous breaths	102	0	5	1.13	2.98
The compression-ventilation ratio	102	0	5	0.25	1.08
Performing four complete cycles	102	0	5	0.10	0.70
Checking the pulse	102	0	5	0.29	1.18
Continuing CPR	102	0	5	0.34	1.27
Following the correct sequence	102	0	20	7.84	7.53

Table 6.11 depicts the means scores immediately after the training session. A considerable improvement in CPR skills was observable in results of the post-test, and it is worth noting that their performances were impressive on many of the CPR skills that were tested in the post-test. But it cannot be claimed that the overall performance was impressive because out of the 18 component skills that were assessed, the nurses were expected to perform well in at least 15 in order to obtain a 0 penalty rating. Most of the respondents did not achieve such a score. Even the overall penalty score was at 7.84 out of a maximum of 20.

6.5.2.4 Penalty scores in the test of CPR skills three months after training (re-test)

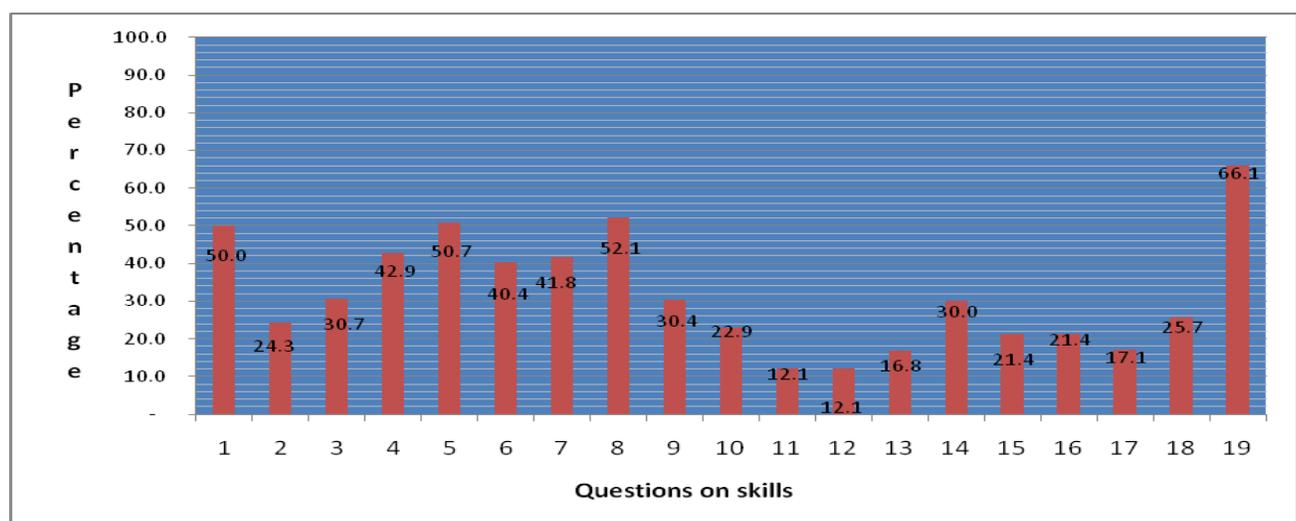


Figure 6.36(c): Scores obtained in the re-test of CPR of skills three months after the post-test

Figure 6.36(c) shows the percentage of incorrect responses returned for each question about CPR skills three months after training. Table 6.12 sets out the details.

Table 6.12 Skills: Re-test – statistical analysis of individual questions

Scores on test of skills	N	Minimum	Maximum	Mean	Std. Deviation
Checking for hazards	70	0	5	2.50	2.52
Checking responsiveness	70	0	5	1.21	3.00
Calling for help	70	0	20	6.14	9.21
Open airway – the head tilt and the chin lift	70	0	20	8.57	8.39
Checking for breathing – looking and listening	70	0	10	5.21	4.77
Giving two slow breaths	70	0	20	8.07	7.86
Ventilation volume	70	0	20	8.36	7.62
Initial pulse check	70	0	10	5.21	4.12
Correct hand position	70	0	20	6.07	5.95
Performing 30 compressions	70	0	5	1.14	2.47
Depth of compressions	70	0	20	2.43	4.94
The release of chest compressions	70	0	20	2.43	4.64
The rate of chest compressions	70	0	20	3.36	6.95
Giving slow, continuous breaths	70	0	5	1.50	3.11
The compression-ventilation ratio	70	0	5	1.07	2.07
Performing four complete cycles	70	0	5	1.07	2.07
Checking the pulse	70	0	5	0.86	1.90
Continuing CPR	70	0	5	1.29	3.03
Following the correct sequence	70	0	20	13.21	7.80

According to table 6.12, the mean penalty score 12 weeks after training at 13.21 (66.82%) proved that the retention of skills after that period was about 85.0% of that acquired immediately after training (mean penalty score 7.84, 76.55%). Notwithstanding this fact, there is considerable acquisition of skills compared to their performance before training.

6.5.3 Graphical displays: presentation of scores obtained for various CPR skills in the pre-test, post-test and re-test

The following 19 bar charts illustrate the scores obtained by the participant registered nurses in 19 of the critical skills of CPR performance.

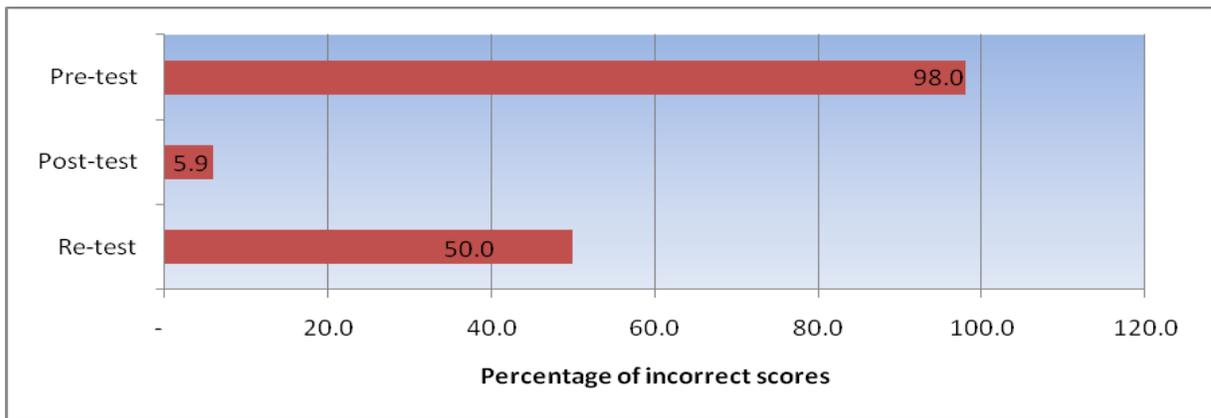


Figure 6.37: Percentage of incorrect scores – Question 1: Checking for hazards

The AHA (2006: [6]) and the Resuscitation Council of Southern Africa (2006: [4]) state that the very first action to be performed during the primary assessment is “checking for hazards”. The scene of the incident should be assessed so as to ensure that everyone’s personal safety is not in any immediate danger from any kind of hazard that may be present on the scene (such as explosives, broken glass or flammable liquids) or that is operating in the immediate vicinity (such as the proximity of uncontrolled speeding traffic). According to Denton and Giddins (2009:49), the current guidelines (Resuscitation Council of the United Kingdom 2005:[4]) suggest that the rescuer should assess the scene for the hazards before actually approaching the victim. In this study, the psychomotor skills of the nurses were assessed by means of structured observation of how well the nurses performed standard CPR skills on a Resusci Anne manikin.

There was a vast improvement in the scores immediately after training (from 98.0% incorrect responses in the pre-test to only 5.9% incorrect responses in the post-test). However, the retest after three months had elapsed showed that retention of this knowledge by nurses was low (with an average of 50.0)% incorrect responses).

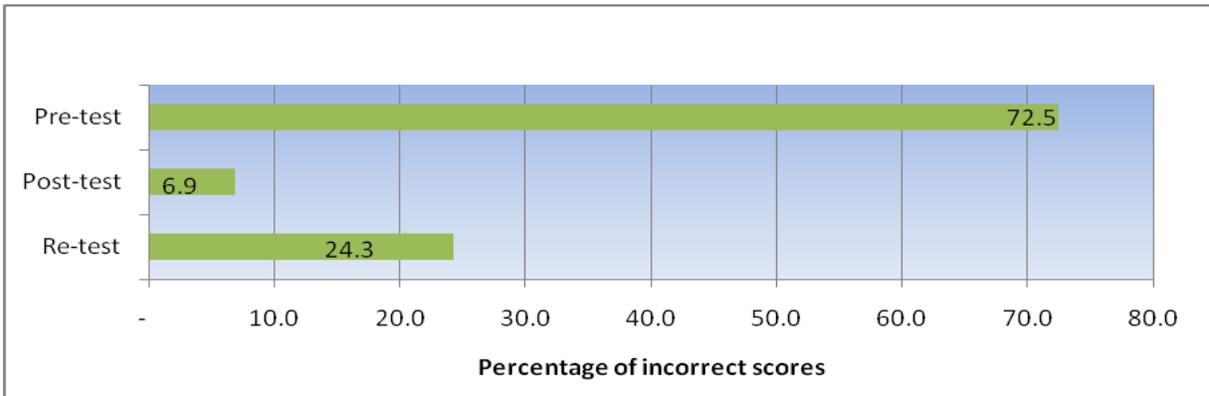


Figure 6.38: Percentage of incorrect scores – Question 2: Checking the responsiveness of the victim

According to the AHA (2006:[6]) and the Resuscitation Council of Southern Africa (2006:[4]) guidelines on BLS, the rescuer needs to check the responsiveness of the client. The researchers in the study conducted by Madden (2006:220) took similar steps to assess the nurses' CPR skills. An unresponsive patient is critically ill and requires prompt action. Although there was a vast improvement in the scores immediately after training (from a rate of 72.5% incorrect responses in the pre-test to only 6.9% incorrect responses in the post-test), the retention level after three months was only moderate (with a score of 24.3% incorrect responses).

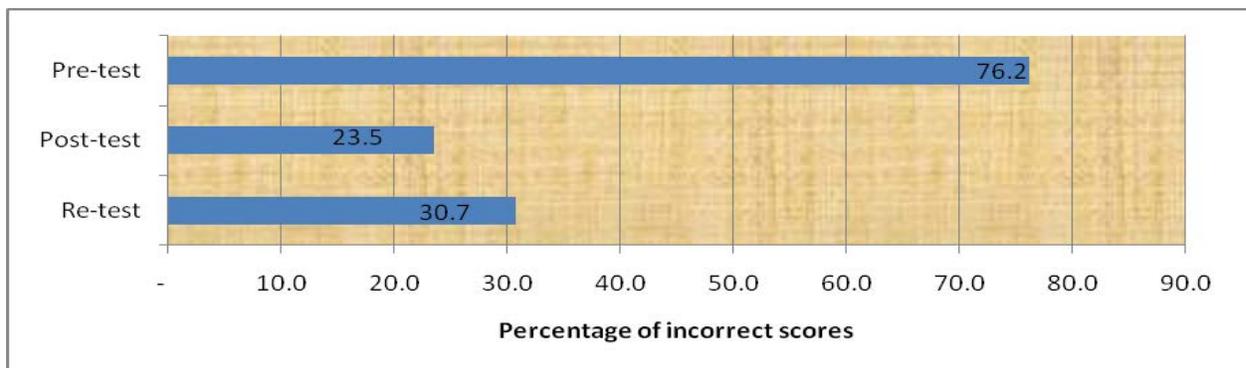


Figure 6.39: Percentage of incorrect scores – Question 3: Calling for help

The AHA (2006:[6]) (2005) and the Resuscitation Council of Southern Africa (2006:[4]) guidelines on BLS both emphasise that a rescuer should immediately summon help after the responsiveness of the client has been established. While there was a considerable improvement in the scores immediately after training (from 76.2% incorrect responses in the pre-test to 23.5% incorrect responses in the post-test), the retention level was low (with

a score of 30.7% incorrect responses). Similar findings were identified in a research in the USA (Leighton & Scholl 2009:e190) in which it was observed that respondents did not call for assistance until all the other steps had been completed.

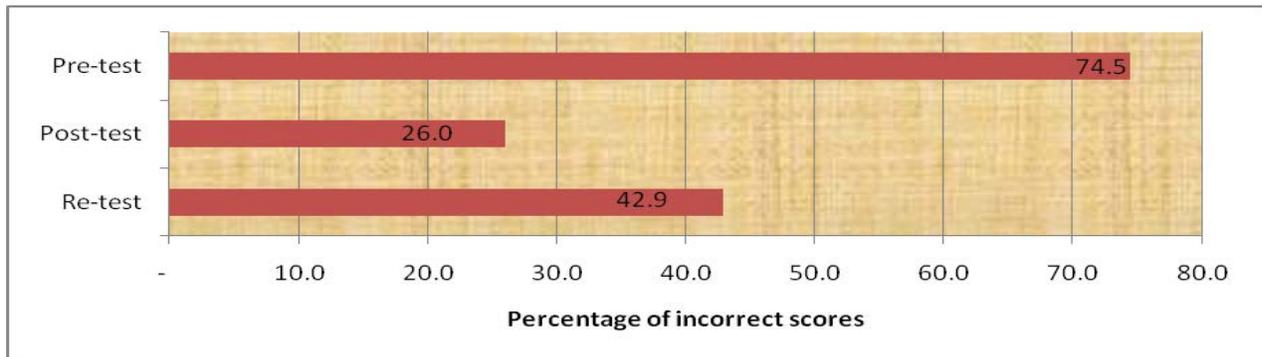


Figure 6.40: Percentage of incorrect scores – Question 4: Opening the airway – the head tilt and the chin lift

The AHA (2006:[7]) and the Resuscitation Council of Southern Africa (2006:[4]) emphasised that the correct way for a rescuer to open the airway of a client is by to apply the head tilt or chin lift – provided that no neck injury is suspected.

Figure 6.40 shows the skill that the nurses demonstrated when opening the airway by using the head tilt and chin lift technique. This skill was assessed on three separate occasions. The initial skill recorded in the pre-test prior to training was very poor with 14.9 penalty points (74.5%). After training, an increase in the ability to perform this skill was reflected by a lower number of penalty points (5.2) (26.0%). After three months, the nurses' proficiency in this skill decreased only slightly to 8.6 (42.9%). According to Edgren and Adamson, in the USA (2009:e79), none of the student nurses in their sample were able to perform any of the key components skills for standard CPR.

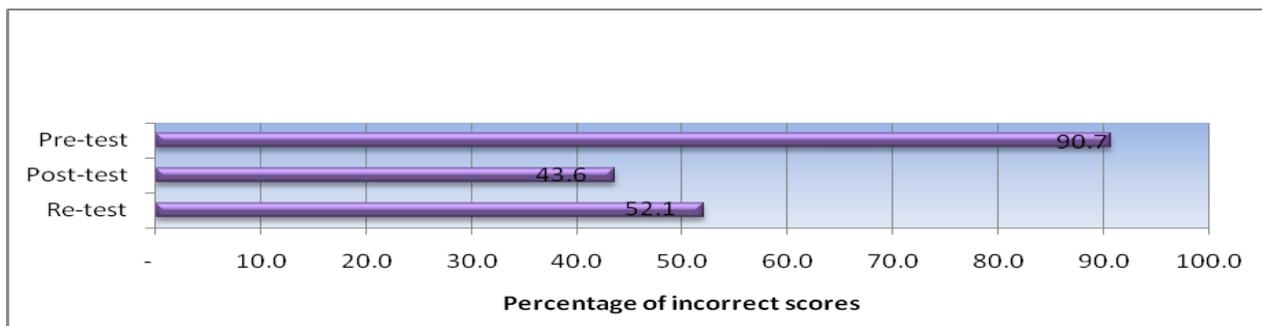


Figure 6.41: Percentage of incorrect scores – Question 5: Checking breathing by looking, listening and feeling

The AHA (2006:[7]) and the Resuscitation Council of Southern Africa (2006:[4]) guidelines suggest that the rescuer check the patient's breathing by *looking* at the chest movement, *listening* to breathing and *feeling* the respiration by keeping the chin closer to the patient's nostrils for not more than 10 seconds. Although the skill required to check the patient's breathing by looking, listening and feeling three different aspects of the patient's condition were extremely unsatisfactory (90.7%-in correct answers) during the pre-testing, the ability to perform this skill improved to 43.6 % (in correct answers) immediately after training. According to figure 6.41, the ability to perform this skill returned to the lower level of 52.1 % (in correct answers) – a figure that indicates the extent of the degradation of the skill after an interval of three months. These findings are consistent with those of earlier studies that were conducted by Davies and Gould (2000:400), Madden (2006:218), and Edgren and Adamson (2009:e79).

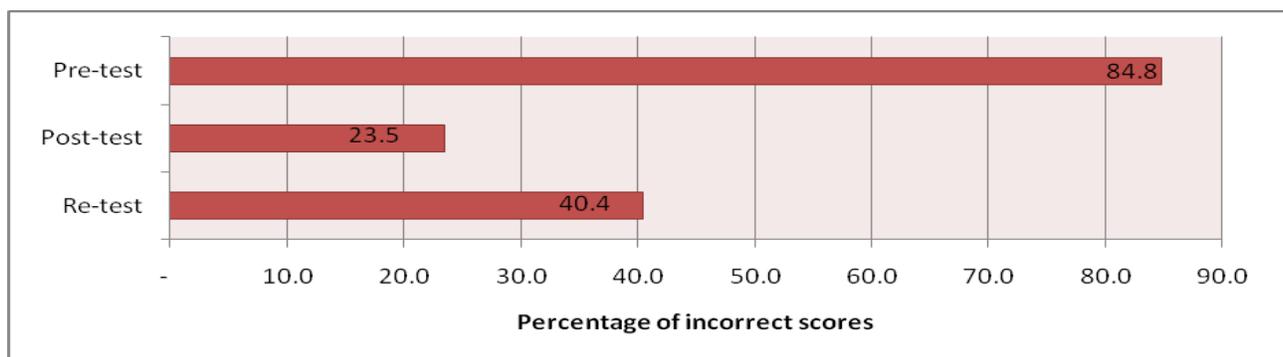


Figure 6.42: Percentage of incorrect scores – Question 6: Giving two slow rescue breaths

The AHA (2006:[9]) and the Resuscitation Council of Southern Africa (2006:[4]) recommend that the rescuer should deliver two rescue breaths before locating the pulse. While the skill of demonstrating the two slow rescue breaths was extremely poorly performed before training – the nurses scored 17 penalty points out of a possible maximum of 20 (84.8%), it improved greatly immediately after training to 4.7 penalty points (23.5%) but decreased once more to 8.7 penalty points (40.4%) in the re-test evaluation that was administered after three months. The current research findings are very similar to those produced by the study undertaken by Madden (2006: 218).

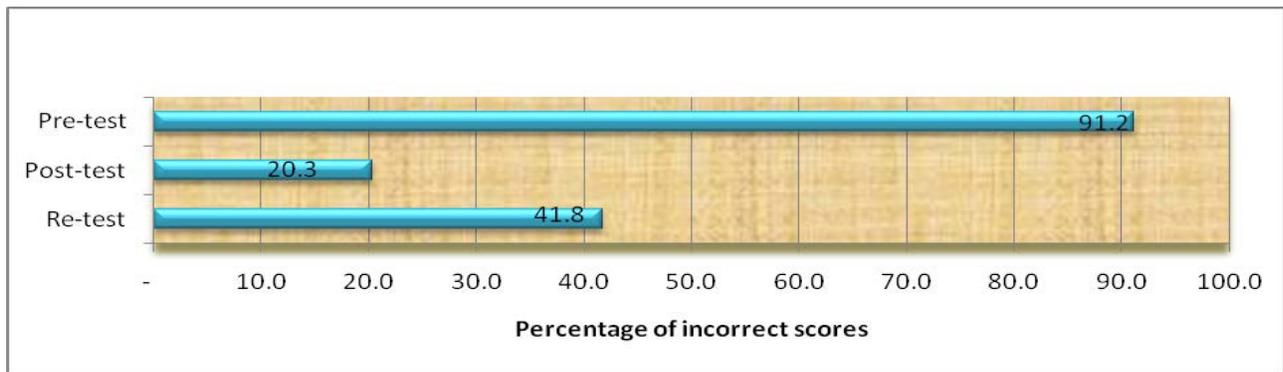


Figure 6.43: Percentage of incorrect scores – Question 7: Ventilation volume

The AHA (2006:[9]) and the Resuscitation Council of Southern Africa (2006:[4]) require a rescuer to supply an adequate volume of air in order to raise the victim's chest. This particular skill was very poorly performed before training. According to the results, the nurses scored penalty points of 18.24 (91.2%) out of a possible 20. After training, the levels of skill improved to 4.07 (20.3%) but decreased once again to 8.36 (41.8%) after three months – a figure that reveals a considerable loss in the retention of this skill. Madden (2006:218) reported that the skill that was most poorly performed in their research was this requirement for ventilation volume. Madden's report notes that not a single respondent in their sample was able to demonstrate this skill.

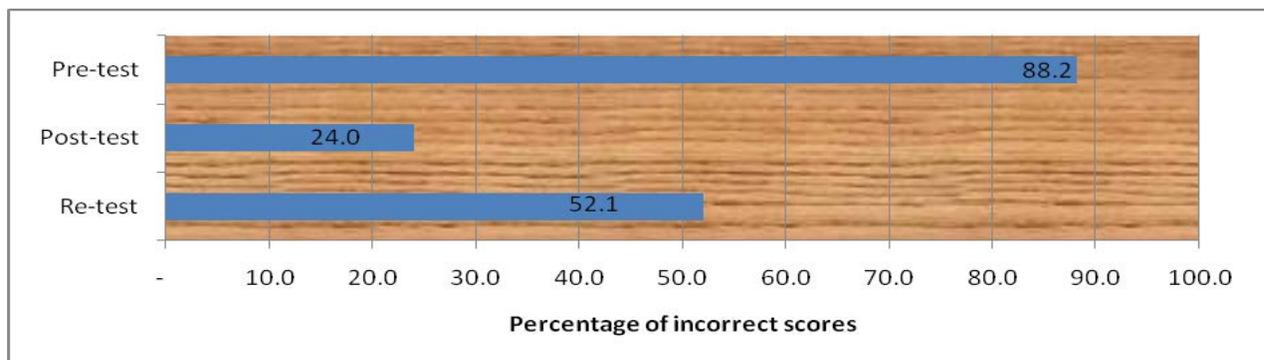


Figure 6.44: Percentage of incorrect scores – Question 8: The initial pulse check

The AHA (2006:[9]) and the Resuscitation Council of Southern Africa (2006:[4]) recommend that health care professionals should check the carotid pulse within five seconds but no later than 10 seconds after a witnessed cardiac arrest. Figure 6.44 (above) shows the responses that indicated how well the nurses in the sample were able to perform the "initial pulse check" produced 88.2% incorrect responses. After training, the levels of skill improved to a point where only 24.0% incorrect responses were recorded, but

decreased once again to 52.1% after a time interval of three months. This indicates that there was a considerable loss in retention of this skill only three months after training had taken place. These findings are consistent with those of Madden (2006:218) and Leighton and Scholl (2009:e187).

According Leighton and Scholl (2009:e187), among ten groups of participants in their research project, only one group was able correctly to check the carotid pulse. The remaining eight groups mistakenly checked the state of radial pulse, and one group did not perform any pulse check at all.

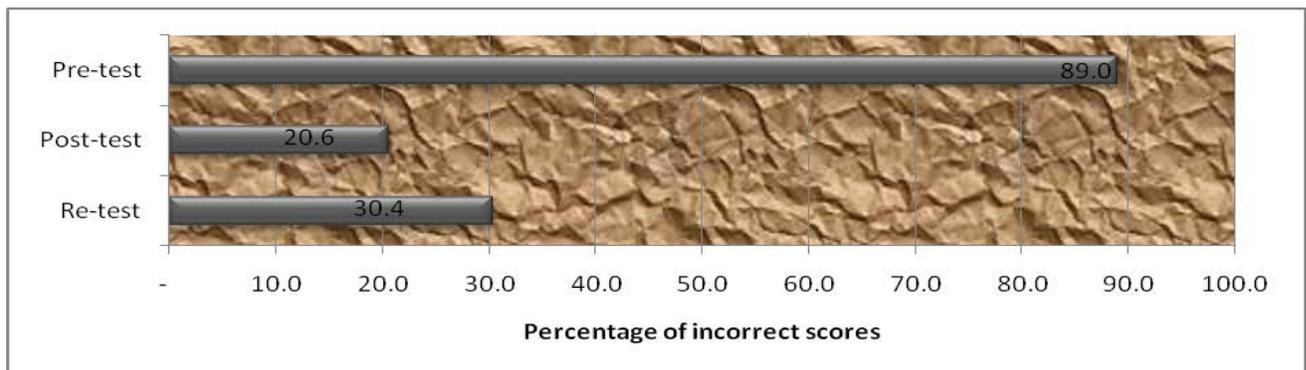


Figure 6.45: Percentage of incorrect scores – Question 9: The correct hand position

The AHA (2006:[9]) and the Resuscitation Council of Southern Africa (2006:[4]) indicate that the correct placement of the resuscitator's hand involves placing the heel of one hand on the centre of the victim's bare chest between the nipples (see figure 3.3). Figure 6.45 shows how well the registered nurses performed the skill of maintaining the correct hand position during the provision of CPR. Although this skill was initially very poorly demonstrated with a score of 17.9 on a 20-point penalty scale (89%) before training, it improved significantly after training to 4.12 (20.6%). But the confidence with which this skill was practised declined somewhat after three months to 6.07 penalty points (30.4%), indicating that there was some retention of skill after the three-month time lapse. These findings are consistent with those found in the study conducted by Edgren and Adamson (2009:e79) and Castle et al (2007:664), in which none of respondents were able to demonstrate the correct hand placement in order to perform a compressions.

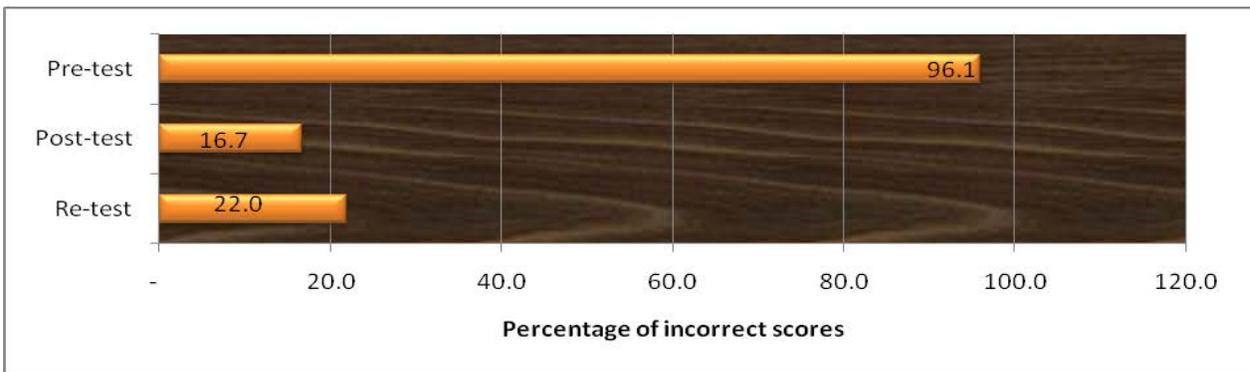


Figure 6.46: Percentage of incorrect scores – Question 10: Performing 30 compressions

The AHA (2006:[10]) and the Resuscitation Council of Southern Africa (2006:[5]) guidelines advocate a lone rescuer should use a universal compression-ventilation ratio of 30 compressions to two breaths when delivering CPR to victims of all ages (with the exception of neonates). Figure 6.46 shows that this skill could not be correctly demonstrated by most of the participants in the pre-test. They achieved a score of 4.8 out of a possible five penalty points (96.1%). While the scores improved after training to 0.83 (16.7%), a slight decline in the scores obtained were observed after three months when a score of 1.14 (22%) was achieved. Similar findings were identified in research conducted by Nikandish et al (2007:321) and Castle et al (2007:664).

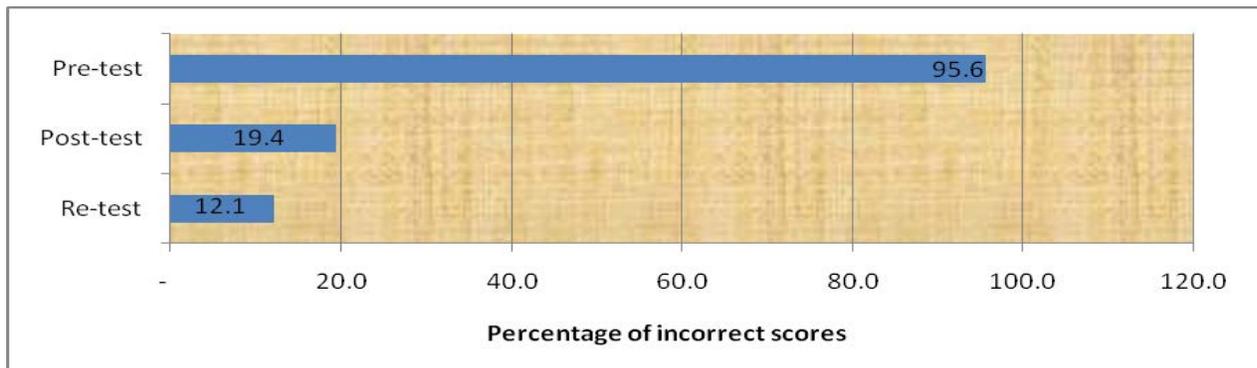


Figure 6.47: Percentage of incorrect scores – Question 11: The depth of compressions

The AHA (2006:[10]) and the Resuscitation Council of Southern Africa (2006:[6]) guidelines note that it is correct when treating an adult victim for the rescuer to press the chest down by a distance of between 1½ and 2 inches with each compression. In addition to this, it is necessary for the resuscitator to push hard and deep on the chest. The ability of the nurses

to identify the correct depth of compressions was poor before training with 19.12 penalty points (95.6%) although this improved significantly after training to 3.87 (19.4%) but decreased slightly once again to 2.43 (12.1%) after three months. These results indicate an excellent degree of retention of this skill among the participants in the research. Other findings were reported in research conducted by Abella et al in the USA (2005:305) and Madden in Ireland (2006:218). In their research, the respondents performed shallow and slow compressions. The performance of this skill was therefore rated as the second-worst of all the CPR skills that their respondents performed.

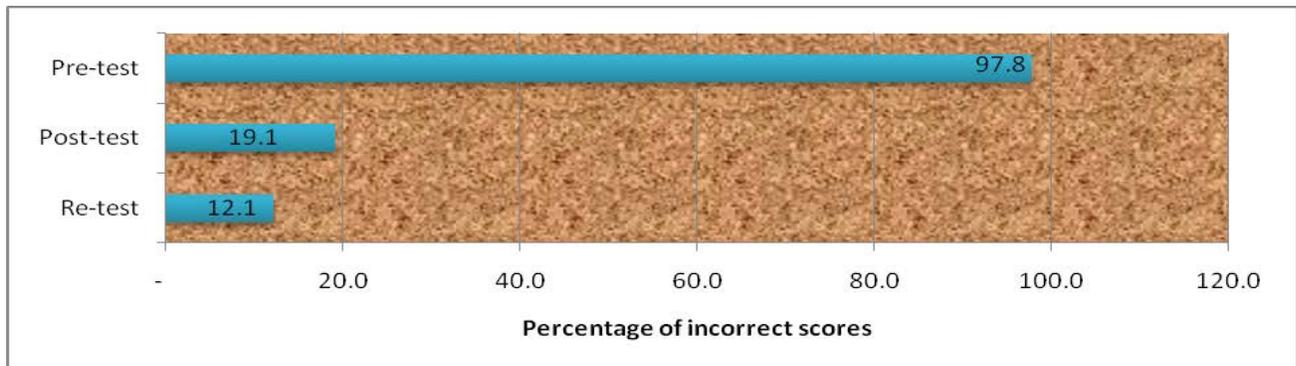


Figure 6.48: Percentage of incorrect scores – Question 12: – The release of chest compressions

The AHA (2006:[11]) and the Resuscitation Council of Southern Africa (2006:[6]) guidelines state that rescuers should allow the chest to recoil completely after each compression so that the refilling of the heart can be maximised. The pre-test scores obtained by the participants for this skill were very poor indeed 19.56 (97.8%) although they improved substantially after training at 3.82 (19.1%). The participating nurses attained even better scores – 2.43 (12.1%) – in a post-test after an interval of three months. In a study conducted by Abella et al (2005:305), the chest compressions were observed to be too shallow while the ventilation rates were high. The performance by qualified health professionals also showed increased length of the pause to an extent that increased the no-flow fraction above the acceptable level.

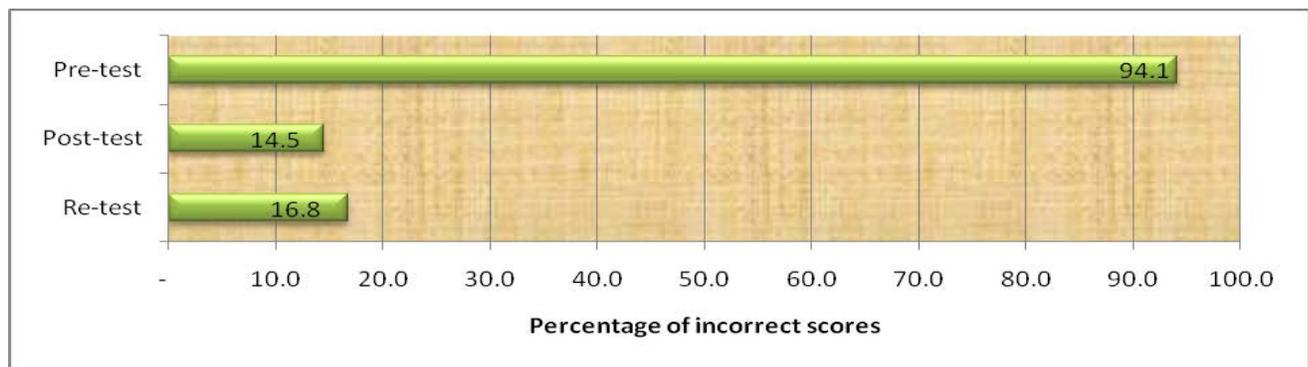


Figure 6.49: Percentage of incorrect scores – Question 13: The rate of compressions

The AHA (2006:[11]) and the Resuscitation Council of Southern Africa (2006:[7]) guidelines recommend that a minimum of 100 compressions should be performed by the rescuer in a minute and that the compressions should be performed in an uninterrupted and rhythmic manner.

Figure 6.49 shows how well the participant nurses performed the rate of compressions at various stages. Their skills were very poor before training – 18.82 (94.1%), although they improved after training to 2.89 (14.5%) and decreased once again after the three-month interval to 3.36 (16.8%). Similar findings were reported in the research undertaken by Nikandish et al (2007:321) and by Castle et al (2007:664).

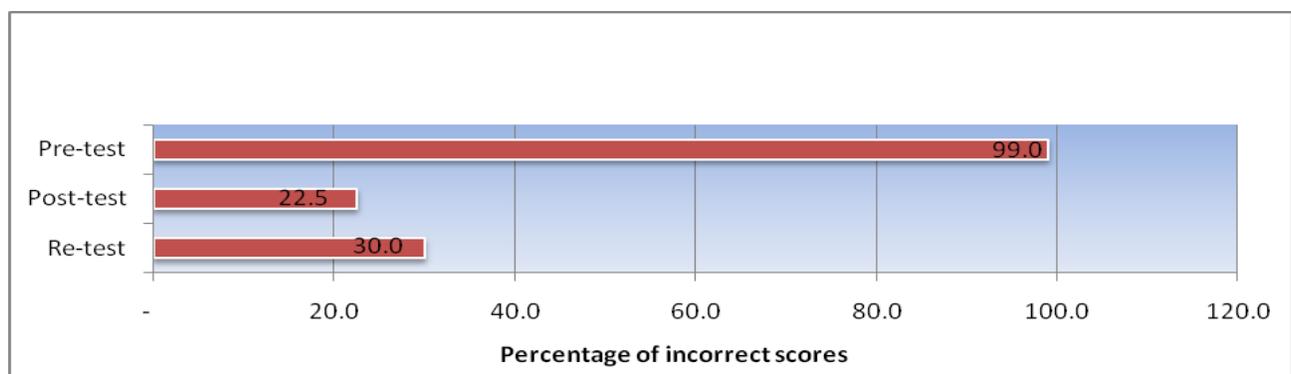


Figure 6.50: Percentage of incorrect scores – Question 14: Giving slow, continuous breaths

The AHA (2006:[10]) and the Resuscitation Council of Southern Africa (2006:[7]) guidelines recommend that the rescuer should continue to effect between 10 and 12 breaths per minute, and that each breath should cause a visible rise in the level of the

victim's chest. Although the pre-test scores obtained by the respondents in this skill were very poor indeed (99.0%), they improved substantially after training (22.5%), and improved more even after three months had elapsed (30.0%).

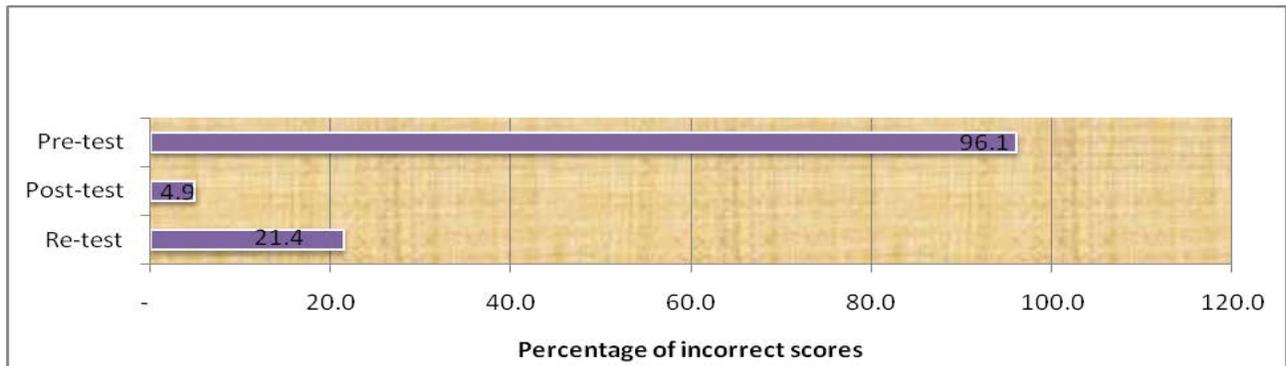


Figure 6.51: Percentage of incorrect scores – Question 15: The compression-ventilation ratio

According to the AHA (2006:[7]) and the Resuscitation Council of Southern Africa (2006:[7]) guidelines, the compression-ventilation ratio should be 30 compressions to 2 breaths in those cases in which a lone rescuer is responsible for resuscitating the victim. Although the scores attained by the respondents in the pre-test were very poor (96.1%), they improved substantially after training (4.9%) and they remained reasonably good even after the three-month interval (21.4%). The skill of knowing the correct compression-breathing ratio was poorly demonstrated by most of the participants in the pre-test before the training. According to Castle et al (2007:665), the participants in their study performed compressions that were too slow and applied an incorrect compression-ventilation ratio.

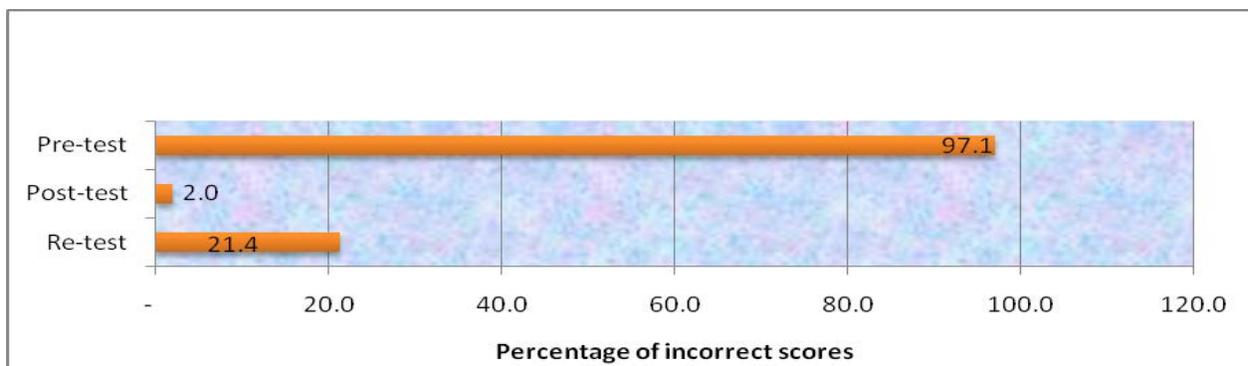


Figure 6.52: Percentage of incorrect scores – Question 16: Performing five complete cycles

The AHA (2006:[10]) and the Resuscitation Council of Southern Africa (2006:[7]) guidelines recommend that a resuscitator resume CPR for five cycles if a shockable rhythm exists. If a shockable rhythm exists, the resuscitator should apply one shock and then resume CPR for five cycles. These results for possessing correct knowledge about the CPR of skill were very low indeed. But even though the participants scored 97.1% incorrect responses, the number of post-test incorrect responses decreased to an impressive 2.0% and the number of incorrect responses for the re-test rose to 21.4% – still a “pass” mark. Poor BLS skills have been recorded across a range of health care professionals. Studies have shown that although knowledge is well retained on the whole, resuscitation performance skills degrade very quickly (Madden 2006:218; Smith et al 2008:59).

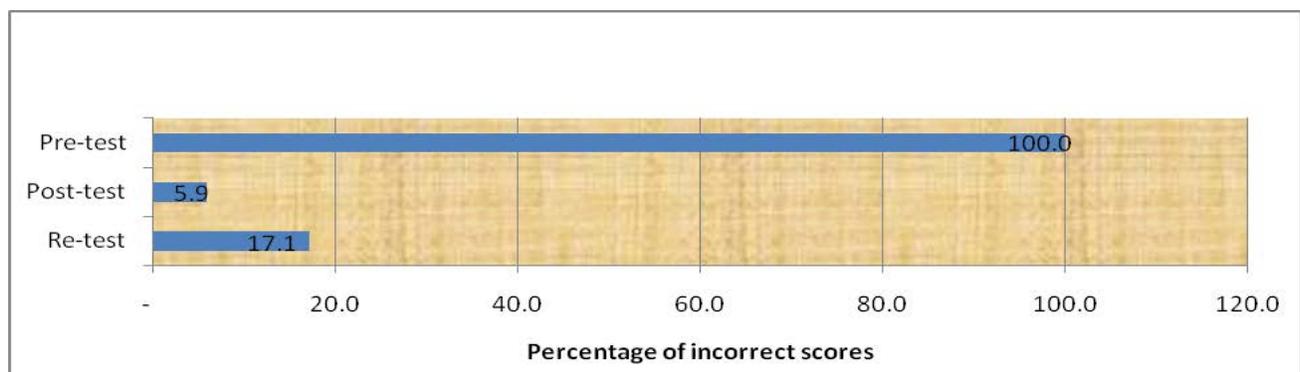


Figure 6.53: Percentage of incorrect scores – Question 17: Checking the pulse

For the pulse check skill component, the penalty points attained in the pre-test were 100% – the worst possible result for this skill (checking the pulse). The number of penalty points decreased to a very positive 5.9% immediately after training and increased somewhat to 17.1% in the re-test after three months.

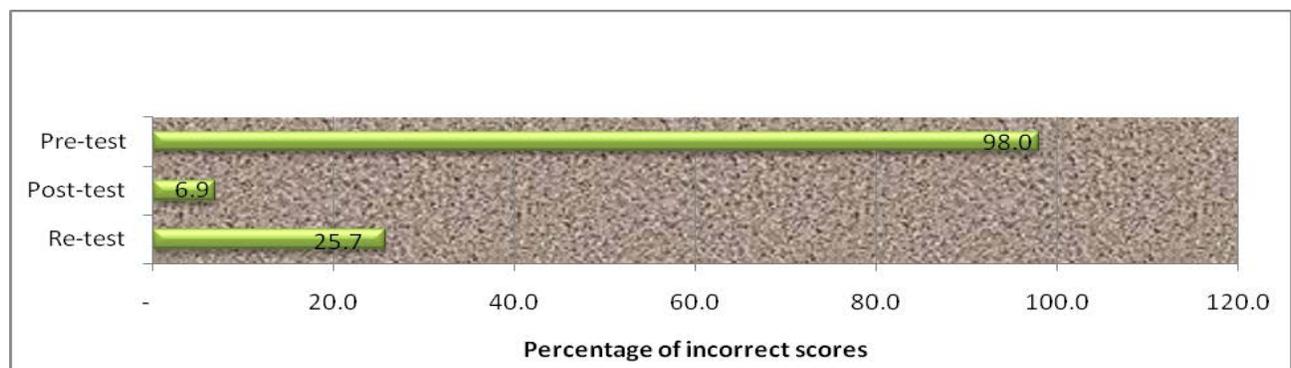


Figure 6.54: Percentage of incorrect scores – Question 18: Continuing CPR

The AHA (2006:[10]) and the Resuscitation Council of Southern Africa (2006:[7]) advocate that rescuer should continue CPR until ALS providers become available to take over the procedure or until the victim begins to move. Although the assessment of this CPR skill generated incorrect responses of 98% during the pre-test, it decreased during the post-test to 6.9% and then increased once again to 25.7% after three months.

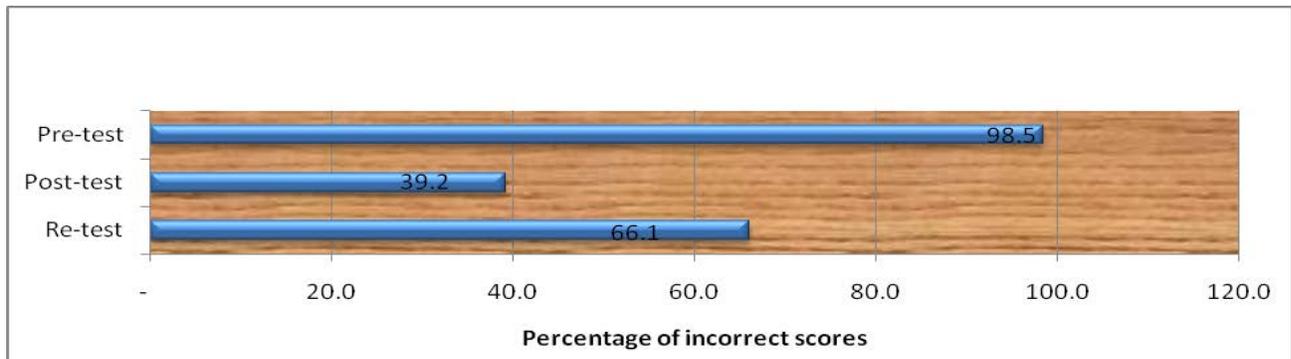


Figure 6.55: Percentage of incorrect scores – Question 19: Following the correct sequence

The AHA (2006:[11]) recommends that a rescuer should continue with 30 compressions to every two breaths without any interruption to the rhythm of chest compressions and breathing when administering CPR to an adult victim. Figure 6.55 show that while this skill produced very poor results indeed before training (the incorrect responses recorded were 98.5%), there was an improvement in this skill after training (when the incorrect responses were 39.2%). This improvement did not, however, represent a “pass” score in the skills test because a pass score is set at a 15% rate of incorrect responses. The score for this skill decreased to 66.1% incorrect responses after three months – a clear indication that both the training and the retention were inadequate.

6.6 DISCUSSION OF THE FINDINGS

6.6.1 Acquisition and retention of cognitive knowledge of CPR

The findings of the current research indicate that the registered nurses in the two referral hospitals lacked adequate CPR skills and knowledge despite the fact that some of the registered nurses who had only recently qualified (in < 5 years) had received formal education in CPR during their basic nursing training. Even so, these findings are more or

less consistent with the findings from other earlier studies undertaken by Broomfield (1996:1016), Inwood (1996:33), Madden (2006:218) and Smith et al (2008:59).

The results also show that in the aftermath of the CPR training programme, there was a significant increase in the acquisition of cognitive knowledge and skills on the part of the registered nurses in the sample. This also confirms the findings of Broomfield (1996:1016) and Madden (2006:218) and seems to suggest that a properly designed training programme can exert a beneficial effect on the CPR preparedness of registered nurses. The overall results indicate that although the knowledge and skills of the registered nurses in the sample displayed a noteworthy improvement after the three-hour training session in CPR, a significant degradation of these knowledge and skills occurred after the twelve-week (three-month) period between the initial post-test and the re-test after three months. These findings are consistent with those of Inwood (1996:33), Moule and Knight (1997:99) and Edgren and Adamson (2009:e79), who all reported poor retention rates in their nurses' skills and knowledge of CPR following CPR training. The present study confirms that nurses are able to demonstrate significant improvements in their CPR skills and knowledge retention rates after training when one compares their initial results in the pre-test to the results obtained in the re-test. A study undertaken by Elif and Zeynep in Turkey (2003:187) confirmed that training helps nurses to refresh and retain their theoretical knowledge of BLS.

6.6.2 Acquisition and retention of CPR psychomotor skills

It has already been noted that the CPR skills levels of the registered nurses in the two referral hospitals were poor during the pre-test. The present research identified the fact that none of the individual nurses was able to demonstrate CPR skills that could be awarded a pass standard. This is consistent with findings in earlier research performed by Grieg et al (1996:28) and Delvin (1999:201). In the present study, the worst performing skills in which none of the participant nurses was able to obtain a pass, were those that related to the opening of the airway, the ventilation volume, the initial pulse check, the correct positioning and placement of the hand during CPR, the required number of compressions per minute, and the correct rate of compressions.

While the CPR skills of the nurses improved by 67.8% after the CPR training session, there was a significant deterioration of the CPR skills of the registered nurses in the twelve weeks following the training session. These findings are confirmed in the research performed by Broomfield (1996:1016), Madden (2006:218) and **Regge, Calle, Paepe, & Monsieurs et al** (2008:283). It is important that this decline in the CPR performance skills of nurses should not be regarded as a total loss of skills because the findings of the present study indicate a positive retention of most of the CPR psychomotor skills. But Leary and Abella (2008:1) sound a note of warning in this regard. They both point out that when lengthy intervals occur between the periodic CPR refresher training courses that all nurses should be compelled to attend as part of their in-service professional training, one should expect to be able to identify a life-threatening deterioration in a number of the vitally important CPR skills that nurses are able to perform. Broomfield (1996:1016) notes that there is no significant difference between the rates at which CPR skills and knowledge deteriorate. On the contrary, Young and King (2000:7) demonstrated that the total scores of registered nurses who had been trained in ALS practical skills declined to 84% within the first six-week period after the completion of the course.

6.6.3 A comparison of CPR skill scores obtained by the participants from the two referral hospitals

Table 6.13 Skills: Comparison of the CPR skill scores obtained by the participants from the two hospitals

Hospital	Observation	N	Minimum	Maximum	Mean	Std. Deviation
Hospital A	Skills % - Pre-test	45	.0	43.8	9.6	10.0
	Skills % - Post-test	45	39.6	100.0	79.0	14.1
	Skills % - Re-test	36	25.0	100.0	62.4	19.4
Hospital B	Skills % - Pre-test	57	.0	47.9	9.2	9.7
	Skills % - Post-test	57	.0	100.0	76.0	19.8
	Skills % - Re-test	34	25.0	100.0	71.4	20.2

Test Statistics

	Skills % - Pre-test	Skills % - Post-test	Skills % - Re-test
Mann-Whitney U	1261.500	1216.500	444.000
Wilcoxon W	2914.500	2869.500	1110.000
Z (cumulative normal distribution)	-.143	-.446	-1.976
Asymptotic Significance (2-tailed) P value	0.886	0.656	0.048

According to these figures, the mean score obtained for skills by participants from hospital A prior to training was 9.6%, and this increased to 79% immediately after training. But after three months, the mean score of these nurses decreased to 62.4%. By comparison, the skills before training by registered nurses from hospital B were 9.2%, and this increased to 76% after the training. The mean skills rate after three months was therefore higher at hospital B (71.4%) than at hospital A (62.4%).

The P value for skills and knowledge in pre-training and immediately after training was not significant. The difference became significant only after three months (P=0.048). According to Miotto et al (2008:244), the healthcare providers who worked in hospitals obtained better pre-test and retention scores than post-test scores. By contrast, this study found that both the hospitals in the study revealed poor pre-test skills, improved post-test skills and reduced skill scores after three months.

6.6.3.1 A comparison of CPR skills scores in terms of gender

Table 6.14 Skills: Comparison of CPR skill scores in terms of gender

CPR Skills (comparison in terms of gender)	N	Minimum	Maximum	Mean	Std. Deviation
Female					
Skills % - Pre-test	88	.0	47.9	9.0	10.3
Skills % - Post-test	88	25.0	100.0	78.0	15.8
Skills % - Re-test	59	25.0	100.0	67.7	21.3
Male					
Skills % - Pre-test	14	.0	18.8	11.8	5.5
Skills % - Post-test	14	.0	100.0	72.9	26.4
Skills % - Re-test	11	50.0	91.7	62.3	12.6

Test Statistics

Tests on skills in terms of gender	Skills % - Pre-test	Skills % - Post-test	Skills % - Re-test
Mann-Whitney U	404.000	584.500	261.500
Wilcoxon W	4320.000	689.500	327.500
Z (cumulative normal distribution)	-2.084	-.307	-1.018
Asymptotic Significance (2-tailed) P	0.037	0.759	0.309

Since the P-value was > 0.05, these findings were not statistically significant, and this finding is consistent with those of previous studies such as those performed by Tok et al (2004:265) and Verplancke et al (2008:75).

6.6.3.2 A comparison of CPR skill scores in terms of age of participants

Because the P-value was more than 0.05, it was not statistically significant. A study by Miotto et al (2008:244) showed that older healthcare providers achieved lower scores during the assessment of the ACLS course.

Table 6.15 Comparison of CPR skill scores in terms of age

Comparison of CPR skills in terms of age groups	N	Minimum	Maximum	Mean	Std. Deviation
21-30 years					
Skills % - Pre-test	55	.0	43.8	9.8	9.7
Skills % - Post-test	55	.0	100.0	76.2	17.4
Skills % - Re-test	42	25.0	100.0	68.8	19.0
31 years and older					
Skills % - Pre-test	47	.0	47.9	9.0	10.1
Skills % - Post-test	47	25.0	100.0	78.6	17.8
Skills % - Re-test	28	25.0	100.0	63.8	21.8

Test Statistics

Tests on Skills – Gender	Skills % - Pre-test	Skills % - Post-test	Skills % - Re-test
Mann-Whitney U	1191.000	1145.500	497.000
Wilcoxon W	2319.000	2685.500	903.000
Z (cumulative normal distribution)	-.689	-.989	-1.092
Asymptotic Significance(2-tailed) P	0.491	0.323	0.275

6.6.3.3 A comparison of CPR skill in terms of participants' years of experience

Table 6.16 Skills: Comparison of CPR skills in terms of years of experience

Comparison of CPR skills in terms of years of experience	N	Minimum	Maximum	Mean	Std. Deviation
3 years or less					
Skills % - Pre-test	44	.0	29.2	9.1	7.8
Skills % - Post-test	44	.0	100.0	75.9	18.4
Skills % - Re-test	33	25.0	100.0	69.0	19.9

4 years or more					
Skills % - Pre-test	58	.0	47.9	9.6	11.2
Skills % - Post-test	58	25.0	100.0	78.4	16.9
Skills % - Re-test	37	25.0	91.7	64.9	20.5

Test Statistics

Comparison of CPR skills in terms of years of experience	Skills % - Pre-test	Skills % - Post-test	Skills % - Re-test
Mann-Whitney U	1185.000	1176.500	534.000
Wilcoxon W	2896.000	2166.500	1237.000
Z (cumulative normal distribution)	-.622	-.674	-.901
Asymptotic Significance (2-tailed) P	0.534	0.501	0.368

Table 6.16 indicates the level of skills in terms of the number of years of experience accumulated by individual respondents. Since the P-value was more than 0.05, the experience was not statistically significant. A study by Verplancke et al (2008: 75) demonstrated that accumulated work experience was associated with improved skills.

6.7 SUMMARY OF THE DATA ANALYSIS OF THE QUASI-EXPERIMENTAL RESEARCH CONDUCTED AMONG REGISTERED NURSES IN THE TWO REFERRAL HOSPITALS

The main objective in phase 2 of the present study was to identify the existing levels of CPR knowledge and skills among registered nurses in the two referral hospitals of Botswana. The researcher assessed the CPR knowledge of the respondents by means of self-administered questionnaires, and assessed the CPR skills by directly observing the way in which the participants performed the required skills on a Laerdal manikin.

6.7.1 Demographic characteristics of the respondents

This chapter examined the results in terms of the gender, age, professional status, highest academic qualification, and years of accumulated work experience, current area of assignment, formal training in CPR, additional training in CPR, frequency of CPR performed and outcomes of the CPRs performed. A larger percentage of the respondents were female than male. Most of the respondents were between 25 and 40 years old, and there were more nurses with diplomas than nurses with post-diploma qualifications in the sample. It showed that 52.0% (N=102) of respondents never had any formal training in

CPR and that 70.0% (N=102) of the nurses had never received any additional training in CPR. While some of the respondents (31.6%, N=102) performed CPR on a weekly basis, 31.1% (N=102) performed CPR on a monthly basis. With regard to the outcomes of CPR, most of the respondents said that the patients on whom resuscitation had been attempted had died.

6.7.2 Knowledge about CPR

The extent of the CPR knowledge of the registered nurses was assessed by means of 21 self-administered questions that assessed the 102 respondents. While the mean score was 55% (N=102) before training, it increased to 80.6% (N=102) immediately after the three-hour training course in CPR knowledge and skills that was given to the nurses after they had been tested in the pre-test. The knowledge level of 70 of the respondents decreased to 70.7% in the re-evaluation of knowledge that was conducted 12 weeks after the training course. When the Friedman test was applied, the difference in the two sets of results was statistically significant and the P-value (.000) was less than 0.05 between the three mean scores.

6.7.3 Skills in CPR

The CPR skills of each individual participant were assessed in isolation when the researcher asked each of the respondents to perform various CPR skills on a Laerdal manikin. The researcher then developed a scoring system for evaluating the CPR skills of registered nurses by adapting an approach that had been used by Berden et al (1992), cited by Madden (2006:218). This scoring system awarded *penalty points* for each CPR skill error. Thus, for example, if the skill component was performed correctly, a penalty point of 0 was awarded, but if the registered nurse performed the skill incorrectly, she or he was awarded 5, 10 or 20 penalty points – depending on the severity of the mistake.

During the pre-assessment prior to the training course, the mean penalty point's score for the 102 respondents was 19.71 out of a maximum number of penalty points of 20. This mean score decreased to 7.84 in the evaluation immediately after the training session had taken place, and this demonstrated how a suitably designed training course can increase the CPR skills of registered nurses. By the time of the re-evaluation that took place three

months after the training session, the mean penalty score of the 70 participants was 13.71, which revealed that a significant decline in CPR skills had occurred in the meantime.

6.7.4 Statistical interpretation of the CPR knowledge and skills of the respondents

While the CPR knowledge of the registered nurses in the two referral hospitals before training was 55% (SD=11.5), it increased to 80.6% (SD=7.2) immediately after the training session. Three months after the training session, the CPR knowledge and skills of the registered nurses had decreased to 70.7% (SD=10.9). The Friedman test was used and the P-value was less than 0.05. The difference between the three means was therefore statistically significant.

While the CPR skills of the registered nurses in the two referral hospitals before training was 9.4% (SD=8.4), the scores increased to 78.3% (SD=18.2) after the training session but decreased to 67.8% (14.9) after three months had elapsed. The Friedman test was used to test for differences between the mean scores per skill before training, after training and after three months had elapsed. All the components of the skills test had a P-value of less than 0.05% and this proved that the three means were significantly different.

In phase 3 of the study, the researcher conducted focus group discussions with the registered nurses who had participated in the quasi-experimental research. The findings from phase 3 of the study will be discussed in chapter 7.

6.8 APPLICATION OF THE FINDINGS OF THE EVALUATION PHASE TO THE AACN SYNERGY MODEL FOR PATIENT CARE

Managing critical situations such as cardiopulmonary arrest and resuscitation constitute an enormous challenge to nurses because nurses in hospitals are nearly always the first people to witness a cardiac arrest before the arrival of the resuscitation team. According to Hardin and Kaplow (2005:130), the actions of nurses at this stage are designed to help patients make the transition from their initial state of cardiopulmonary arrest to the outcome state in which they are being resuscitated. During the actual process of cardiopulmonary resuscitation, the ability of a nurse to make effective clinical judgments are of paramount importance because it is a nurse's ability to make well-informed decisions as well as the

state of her/his skills and knowledge that play a crucial role in increasing a patient's negligible chances of survival after a cardiac arrest episode. Nurses are both responsible and accountable for making the right decisions at the right moments in time so as to ensure an outcome for the patient and the patient's family, as well as a safe passage through the health care system (Hardin & Stannard 2005:57).

During the evaluation phase, the nurses' existing level of CPR knowledge and skills were assessed by means of a pre-test, a three-hour refresher course in CPR skills and knowledge, a post-test administered immediately after the training, and a re-test that was administered three months after the post-test. The pre-test revealed that the nurses' CPR knowledge and skills were totally inadequate. After they had attended the training course, the post-test revealed that the CPR knowledge and skills of a participant nurses increased significantly. The re-evaluation of the nurse CPR knowledge and skills after a period of three months had elapsed revealed that their CPR knowledge and skills had deteriorated in varying degrees in comparison to their CPR knowledge and skills after they had participated in the post-test immediately after the training session.

The skills of the nurses were conducted on a manikin in a controlled environment. In a simulated situation in which cues are given to the nurses, such nurses may be able to make accurate clinical judgements. But when nurses are required to perform CPR in a chaotic situation in the real world on a real patient, any lack of knowledge, skills and experience among such registered nurses would exert a negative effect on patient outcome. Dunn (2004:15) has pointed out how important it is for CPR learners to learn to apply their knowledge and skills and make sound clinical judgments in chaotic, complex and anxiety-provoking circumstances. An ability to integrate knowledge, skills, attitudes and understanding and to understand the impact of multisystem influences on a patient and a patient's family is indispensable for being able to make sound clinical judgements. According to the AACN Synergy Model for Patient Care, the competency of the nurses is a pivotal element in the provision of optimal care for critically ill clients. As patient care becomes more complex and nurses take on themselves a greater responsibilities for the care of their patients, the profession has a social and ethical obligation to produce competent nurses who are able to use their clinical judgement skills and their critical thinking abilities in order to obtain in the best possible outcome. The importance of prompt and effective treatment of all patients by registered nurses in various settings cannot be

underestimated. It is only when nurses are well equipped with the requisite knowledge and skills of BLS and ALS that patients can expect the best possible care (Alspach 2009:12).

6.9 CONCLUSION

This chapter presented the findings of the evaluation phase of this study. It discussed the existing levels of CPR knowledge and skills among a sample of registered nurses in the two referral hospitals in Botswana.

Chapter 7 will present the findings that had emerged from the discussion phase that contains the focus group discussion with registered nurses who participated in this study and the semi-structured interviews with nurse managers.

CHAPTER 7

ANALYSIS AND DISCUSSION OF QUALITATIVE DATA: FOCUS GROUP DISCUSSIONS (A) AND SEMI-STRUCTURED INTERVIEWS(B)

7.A.1 INTRODUCTION

This chapter interprets the results obtained from phase 3 of the research, which involved focus group discussions with the registered nurses who participated in the quasi-experimental research (indicated as 7A) and the semi-structured interviews with the nurse managers (indicated as 7B). The researcher presents the results obtained from phase 3 of the study according to the categories that have been identified. The data from this phase was duly coded, and themes were created that were backed up with relevant quotations from the transcribed focus group discussions. The researcher used the focus group discussions to obtain information about the experience of the registered nurses, as well as their perceptions, observations and personal needs with regard to CPR. The format of the semi-structured interviews enabled the researcher accurately to identify the perceptions and observations about CPR of the registered nurses. The researcher conducted two focus group discussions and two semi-structured interviews in hospital A and in hospital B respectively. The researcher then combined the data from the two levels of the focus group discussions and the two semi-structured interviews and presented her findings in this chapter in two separate sections.

7.A.2 THE PURPOSE OF PHASE 3-A OF THE STUDY

Nurses are qualified to provide a surveillance system for the early detection of health crises, complications and errors. The quality of the nursing care provided is determined by individual nurses and by the health care system in terms of which a hospital operates. Impaired decision-making, failures to comprehend the true significance of what might be happening to patients in the ward environment, breakdowns in interpersonal communication, and a lack of necessary resources all generate crises that endanger the safety of patients in the health care system. Significant changes in patterns of health care

have resulted in reduced resources and in an increased demand for greater efficiency in nursing care and on the part of nurses themselves (Madden 2007:49).

Curley (2007:4) points out that the absence of an optimal environment in which to provide patient care affects patient care outcomes on three levels. While adequate organisational and managerial support lowers the probability of poor patient outcomes, unhealthy and substandard work environments contribute to medical errors, ineffective delivery of care, and an increase in the degree of conflict and stress experienced by health professionals. According to the AACN (2005:4) the creation and maintenance of healthy work environments is therefore imperative for ensuring the safety of patients, for maximising staff recruitment and retention, and for maintaining the financial viability of an organisation.

The researcher used this discussion phase to assess the perceptions and needs of the nurses in the sample and to identify the barriers that hindered the optimal use of the health care system to support CPR in the two referral hospitals.

The two objectives for phase 3 were:

- collect in-depth information from the registered nurses about their perceptions and opinions about the barriers that hindered them in the performance of CPR and the needs that they experienced when they were required to perform CPR (Section A of this chapter)
- collect in-depth information from the nurse managers on what they perceived as barriers that hindered the registered nurses to perform CPR and needs of the registered nurses when they were required to perform CPR (Section B of this chapter)

7.A.3 THE PROFILE OF THE PARTICIPANTS

The participants in the quasi-experimental research were used as a pool from which to draw participants for the focus group discussions. Twelve registered nurses, each of whom represented a different type of ward, participated in the focus group discussions. Thus a total of 24 registered nurses participated in the two FGDs.

7.A.3.1 Demographic characteristics of the participants

Table 7.A.1 Focus group discussions – Demographic characteristics of the participants

Categories	Hospital A	Hospital B
Gender		
Male	3	2
Female	9	10
Professional qualifications		
Registered Nurse	10	11
Registered Nurse/Midwife	2	1
Academic qualification		
Diploma in Nursing	8	10
BSc Nursing	4	2
Work experience		
2-15 years	12	12

The demographic information presented in this section (table 7.A.1), includes information about gender, professional qualifications, academic qualification and work experience of the participants.

The results summarised in the table 7.A.1 show that a majority of the participants were female. Out of 24 focus group discussion participants, 21 participants were registered nurses, and three participants were registered nurses and midwives. Among 24 participants, 18 had a diploma in nursing and six of them had degrees in nursing. The work experience of the participants ranged from 2-15 years.

7.A.4 PRESENTATION OF THE QUESTIONS

The following series of questions were used during the FGDs to stimulate discussions about the perceptions, barriers and needs experienced by the registered nurses during the provision of CPR. The opening question was used as an “ice-breaker” to stimulate discussion and to help the participants to feel at ease so that they would be more inclined to interact in a normal and natural manner with the facilitator.

Opening question (Ice-breaker question)

Is there any interesting experience you would like to share with us about a CPR that happened in your clinical setting?

1. Introductory questions

- a. Describe the training in CPR that you received during your basic nursing training.
- b. What further refresher courses in CPR have you undergone since you completed your basic nursing qualification?

2. Questions on perceptions (system and nurse)

- a. What factors influence your performance when you provide CPR?
- b. What barriers do you experience in your work area when you perform CPR?
- c. Please explain what you learned about CPR during your basic training and describe what is being practised in your current clinical setting.

3. Questions on barriers (system and nurse)

- a. Explain whether you would feel *competent* enough to perform CPR during a sudden cardiac arrest.
- b. Explain whether you feel *confident* enough to perform CPR during a sudden cardiac arrest.
- c. From what you have observed, describe the factors that have kept other nurses from functioning at their best during CPR.
- d. Please describe the support that you receive from your colleagues during CPR.
- e. Why do you feel that CPR is a stressful situation?
- f. How would you feel if you had to perform CPR on a client who is known to be infected with HIV-AIDS?

4. Questions on needs (system, nurse and patient)

- a. What are the institutional policies that govern CPR in your hospital?
- b. Why is it necessary to participate in a debriefing session following CPR in the ward?
- c. What is your opinion about the possibility of an annual CPR certification as a mandatory requirement for nurses practising in Botswana?

5. End question (system, nurse and patient)

- a. What suggestions would you like to make for improving the provision of CPR in your hospital setting?

7.A.5 DATA ANALYSIS FOR PHASE 3-A OF THE STUDY

Focus group discussions produce rich, layered and complex data (Polit & Beck 2006:292). The data analysis of this study began with developing the kind of questions and facilitating the kind of groups that would encourage all the nurses involved in the study to participate in the best of their ability. The data sources included field notes, summaries of impressions made by the facilitators of both the discussions and the processes, and verbatim transcriptions. Data analysis therefore occurred simultaneously with data collection and required the researcher to clarify vague, inconsistent and cryptic comments by the probing of meanings and the documentation of field notes (Gillis & Jackson 2002:230).

7.A.5.1 Organising and cleaning the data

The analysis of the focus group data comprised the following steps:

- The researcher participated in an immediate debriefing after each FGDs with the facilitator and with the observer. Debriefing notes that included comments about the focus group process and the significance of data were compiled.
- The researcher, together with the recorder, listened to the audiotapes and transcribed the contents of the tape.
- The researcher reviewed the transcripts while listening to the tape and compared them with the field notes in order to clean the transcript data.
- The researcher checked the contents of the tape with the observer and any potentially significant non-verbal behaviour was duly noted and recorded. Transcribing and checking the contents of the transcription with the observer helped the researcher to make sense of parts of words and non-verbal communications, gestures and behaviours. The transcripts and audiotapes were reviewed a number of times in order to identify the most significant statements.

The researcher and the observer from Medical Rescue International (Botswana) recorded the contents of the each session as well as emotional reactions of the group, in both focus group discussions held at the two referral hospitals. The observer was a nurse from MRI (Botswana) who attended the two focus group discussions and helped the researcher by taking notes and by observing the non-verbal behaviour of the participants during the focus group discussions. The observer was not personally known to the participants.

7.A.5.2 Data analysis

The methods that the researcher used to categorise the focus group data were adapted from the approaches to qualitative content analysis that are discussed by Graneheim and Lundman (2004:105) and from the discussion on focus group data analysis by Stewart et al (2007:110). According to Burns and Grove (2005:548), coding is a form of categorizing. A code is a symbol or abbreviation that the researcher uses to classify words or phrases that recurrently appear in the data. Codes may be generated for the data at the time of the data collection, when entering the data into the computer, or during a later examination of the data (Burns & Grove 2005:548).

In order to create the relevant codes, the researcher scrutinised the transcripts line by line and paragraph by paragraph while keeping an eye open for significant statements and for the kind of codes that would enable her to categorise the topics that had been addressed. The researcher placed the codes during a later examination of the data. The coding was undertaken manually by making use of highlighter pens of different colours for each category during the reading and re-reading of the interview transcripts. The researcher followed the advice of Stewart et al (2007:120) by using three different levels of coding. The three levels of coding that she selected were regarded as both appropriate and adequate for the coding of the data.

Level 1 coding was derived from a line-for-line examination of the data. All the codes at this level were extracted from the responses of the participants who had attended the focus group discussion.

During level 2 coding, the researcher compared the coded data with other data and created categories. Categories are coded data that cluster together logically, semantically and

philosophically, and often derived from a condensation of the codes that constantly recur during the level 1 coding process (Graneheim & Lundman 2004:106).

During level 3 coding, the researcher formulated the themes that emerged from the categories. Polit and Beck (2006:404) cited Desantis and Ugarriza (2000:362) define a theme as an idea, statement or heading that “captures and unifies the nature or basis of the experience into a meaningful whole”.

7.A.6 PRESENTATION OF THEMES, CATEGORIES AND CODING SYSTEM

In this study, the qualitative data analysis led to the emergence of four themes from the focus group data. These four themes all related to the perceptions, opinions and experiences that had been obtained from the registered nurses, and may be summed up in the following four statements.

- There is a lack of organisational and systemic support and resources to assist nurses in the performance of CPR.
- There is a perceived lack of competence and readiness among nurses who are required to perform CPR.
- CPR generates stress and ethical dilemmas for nurses because it is associated with end-of-life experiences for patients who are terminally ill.
- There is a perceived need for nurses to be trained and educated in CPR as an essential part of their ongoing professional development.

7.A.6.1 The lack of organisational and systemic support, and of the resources from the healthcare system

This theme emerged strongly from the two focus group discussions in which the registered nurses described the difficulties that they had experienced during the provision of CPR. Almost all the registered nurses identified the presence of a lack of proper training for nurses and doctors, a lack of functional equipment and a lack of incentives for staff to attend educational development programmes.

Theme 1: Lack of organisational and systemic support, and of resources from the health care system that should assist nurses in the performance of CPR

Table 7.A.2 Theme 1: Lack of organisational and systemic support, and of resources from the health care system

Codes (meaning units)	Categories	Theme
<ul style="list-style-type: none"> • Lack of knowledge and skills • Lack of training, in-service education, educational development programmes. • Lack of policies and standards for resuscitation • Lack of processes to follow (who gives medications during resuscitation, whom to call, how to resuscitate in different conditions) • Inadequate/non-functioning equipment • Delay in communicating about the emergency situation • Inadequate staffing and increased work load • Inconsistent practice and inconsistent teaching 	<ul style="list-style-type: none"> • Feeling incompetent (training issues) • Inadequate guidelines (policy issues) • Administrative issues • Theory-practice gap 	<ul style="list-style-type: none"> • Lack of organizational and systemic support and resources from the health care system to assist with CPR

7.A.6.1.1 Verbatim evidence from the focus group discussions – 1

One of the participants said:

This hospital does not have any course or in service programme. For the past 10 years no in-service was conducted on CPR in a practice setting. We take 10 years without attending training.

Nurses from the two focus group discussions stated that there were no standard guidelines to follow during resuscitation. The literature cited below supports these statements.

In a study conducted in the USA, Verplancke et al (2008:75) report that non-critical care nurses reported that 59 months (on average) had elapsed since their last experience with CPR and that 18 months (on average) had elapsed since their last CPR training experience. It is indeed plausible that extended intervals between sessions of training and actual experiences do exist in many settings, and that such gaps are certain to lead to deterioration in important skills and knowledge (Verplancke et al 2008:75).

In support of the above study as by Verplancke et al (2008:75), another participant expressed the following statement:

In ICU there is no standard or protocols. It depends on the anaesthetist or medical officer. Some say they give adrenaline or atropine.

It depends on whom you are with during the CPR. Some doctors say 10 compressions, some say 15. So we are confused.

The National Institute for Health and Clinical Excellence of the UK (2007:13) recommends that the guidelines are designed for all staff who works in the health care settings, and that those who use them should develop the necessary skills and competencies to interpret the guidelines correctly and respond accordingly.

One participant shared the following information about communication:

Well...some medical officers delay to come for CPR. No direct phone line. Paging the doctor takes time.

A deep concern about the inadequacy of the staff and a lack of essential equipment was expressed by most of the participants. One participant said:

Most of the time there is shortage of staff. Sometimes [there is in] every shift two nurses for 70 patients [and this] makes it difficult for nurses to do anything. If the medical officer takes time to come, aah ... it takes time to provide CPR.

A study conducted by Needleman, Buerhaus, Maltke, Stewart and Zelevinsky (2002:1715) supports this statement. They found that in those cases where the ratio between registered nurses and patients was more favourable to the patients (and nurses were therefore able to work shorter and more normal shifts), the incidence of CPR failure over time was lower. The research conducted by Aiken, Clarke and Douglas (2002:5) identified a similar phenomenon: the higher the patient-to-nurse

ratio (in those cases where fewer nurses were required to care for more patients), the higher were the mortality rates within the surgical ward in which the study was conducted.

Another nurse expressed the following opinion:

... again lack of equipment is a problem. Things are not replaced. You have to run around and ask for the things from one ward to another. In addition to the lack of equipment, there is no hard board on the beds to resuscitate the patients [and this has the effect of] inhibiting effective compressions.

Another nurse expressed similar opinions about the same issue:

We need to improvise a lot instead of using proper equipment. We use one suction machine and improvise the use of drugs and equipment.

In the circumstances in which Meerabeau and Page (1999:29) conducted a study, equipment problems were chronic and widespread during several arrest situations, and this deficiency proved to be a decisive factor in the failure to manage an arrest more competently on more than one occasion. Strzyzewski (2006:13) also reports that simple tasks (such as not knowing where all the necessary equipment is stored and being unable to locate the emergency trolley) affect the quality of critical thinking during an emergency.

Alspach (2008:12) cited the Joint Commission on Accreditation of Healthcare Organisations. This commission has pointed out that a healthcare facility cannot fulfil its mission to meet the needs of patients unless its staff members are competent to do so.

The AACN Synergy Model for Patient Care echoes these concerns by pointing out that, optimal care of a critically ill patient is best achieved when the needs of a patient are effectively matched by the complementary set of nurse competencies that are necessary for meeting those needs. The implication of this is that the necessity of continuing education for in-service registered nurses cannot be underestimated in this technologically driven area of nursing practice. Even experienced health care professionals require continuous training and assessment of their competencies if they wish to ensure patient

safety and the improvement and maintenance of performance standards (Jeffcott & Mackenzie 2008:188).

7.A.6.2 Perceived lack of competence and readiness to perform CPR

The theme encapsulated in the words “a perceived lack of competence and readiness to perform CPR by the nurses and doctors, and a lack of team work” emerged from the two focus group discussions. Most of the participants in these discussions were able to relate incidents that demonstrated the various ways in which the nurses lacked the necessary competence and confidence to perform CPR. In contrast to this, it was evident that the registered nurses who worked in intensive care units felt more confident in their performance of CPR.

Theme 2: Perceived lack of competence and readiness to perform CPR on the part of the nurses and doctors

Table 7.A.3 Perceived lack of competence and readiness to perform CPR on the part of the nurses and doctors

Code	Categories	Theme
<ul style="list-style-type: none"> • No on-the-job training, especially for nurses in the ward. • No clear CPR expertise evident among the staff and in and no mentoring • Perceived incompetency of the doctors by the nurses • A lack of readiness and required attitudes on the part of nurses and doctors who needed to perform CPR • Personal beliefs 	<ul style="list-style-type: none"> • Inadequate practice • A lack of expertise • An absence of professional accountability • Lack of team work • Conflict of roles • Counterproductive attitudes 	<p>Perceived lack of competence and readiness to perform CPR on the part of the nurses and doctors.</p>

7.A.6.2.1 Verbatim evidence from the focus group discussions – 2

The theme “a perceived lack of competence and readiness to perform CPR” emerged from the focus group discussion, as is evident by the following quotations from participants.

One participant said:

I did not undergo any training. When I was working in A&E, no formal training [was given]. We were just oriented during the work and shown the equipment. If the resuscitation comes, we are supposed to be there and deliver appropriate care.

Another nurse added:

Even if I know, I am not confident and do not know what to do in the absence of doctor. We cannot give drugs when the doctor is not there. There is no policy or law. Otherwise we will be questioned.

The issue of “feeling confident” was expressed in the following way by a nurse:

Yes. I am confident. Resuscitation is a team work. You can't work alone. In ICU there is no protocol. No emergency response team or code. I perform CPR since I am a critical care nurse, a nurse anaesthetist and a family nurse practitioner.

One nurse added the following information to the category of professional accountability:

One time during emergency, a senior nurse on duty did not help. I think lack of support from the senior nurses occurs due to lack of knowledge. What if I also walk away without helping the patient? Ward conferences should be used to discuss the non-involvement of the senior nurses.

Another nurse noted:

Well, in medical ward some medical officers may not resuscitate the patient with HIV/AIDS. They are very stereotyped. Some medical officers are not confident in performing CPR yet expect to be a team leader.

Some doctors feel that nurses do not want to help them. They will be shouting and running around. Most of the times, we are tense during the resuscitation.

The theme “lack of team work” was exemplified by the following information from a participant nurse:

Sometimes nurses don't have interest in participating in CPR. In one ward a few days ago a need for CPR arose. One nurse continued giving medicines and [did not respond] to a call to assist the colleague. Unit manager on round assisted the nurse but it was late for the patient. Lack of cooperation from the co-workers and no understanding of the meaning of CPR.

Yet another nurse made the following comments about the lack of proper leadership during the performance of CPR:

Some doctors shout at you instead of telling what to do. When they shout, you tend to do lot of mistakes. A lot of adrenaline rush during CPR. I always think whom I am resuscitating and with which doctor.

The literature strongly supports the indispensability of teamwork and sound leadership during resuscitation. Meerabeau and Page (1999:35) confirm the importance of this issue when they note that an absence of communication and a lack of leadership in CPR teams create anxiety, confusion, anger, frustration and fear. The historical structure and culture of health care organisations can also act as a barrier to effective team work. Carthey (2003:ii3) asserts that it is a combination of negative inputs from individuals, members of the team and organisational precursors that lead to breakdowns in team communication and coordination.

Accumulated evidence demonstrates that the BLS skills of some hospital staff are limited, inadequate and incomplete. Such individual deficits in necessary skills will affect how each health care worker performs professionally within a group (Barrett & Squire 2004:39). In all cardiac arrest situations, the ability to prioritise and maximise the speed with which care is delivered may mean the difference between life and death. Wherever health care workers have been given the opportunity to assess and understand their own particular responsibilities and one another's roles and limitations, one finds that this enhances the ability of a team to work purposively and effectively together. While Wood, Douglas and Priest (2004:159) came to the conclusion that the provision of acute care is

multidisciplinary, they also noted that practitioners from a wide range of professional backgrounds are inadequately informed and prepared to assess and manage the needs of acutely ill clients.

The roles played by personal beliefs, past experiences and the different attitudes displayed by nurses and doctors were expressed by another nurse in the following words:

Most of our CPR is unsuccessful, so nurse gets opinion and hinders the whole process of CPR. Consciously nurses know that the resuscitation is not going to be successful.

A similar opinion was expressed by another nurse:

You know in the ward people are not taking resuscitation seriously. Even the doctor will say, "Ah, let him rest". The doctor will say, "It is bed 15. Let him rest". Doctors do not seem to be responsible. No support.

However, such an attitude does not prevail in all wards. Another nurse expressed this difference in attitude by saying:

In paediatric, it is different. Doctors are there always. Most of the nurses we exchange and rotate during resuscitation. We get good team support.

Hayward (1999:810) reports that the expectation entertained by most nurses that CPR will be successful is both unrealistic and out of touch with the harsh realities that determine CPR survival rates. Preconceived beliefs about CPR outcome may affect the attitudes of participants either positively or negatively. Dwyer and Williams (2002:85) point out that, in terms of the theory of reasoned action, either a positive or negative attitude towards the survival rates of in-hospital arrests will determine a nurse's attitude towards the performance of CPR. Dwyer and Williams, cited Thorns and Ellershaw (1999:225), emphasised that resuscitation education should not focus only on the procedure itself but also on staff attitudes towards survival and outcomes, on past experience and on perceived issues of control such as a realistic estimation of the actual ability of a nurse to influence the situation, and on ethical considerations.

The AACN (2005:10) stipulate that the ability of staff to deliver appropriate forms of patient care areas requires an effective match between patient needs and nurse competencies. The pivotal role that is accorded to staff competency serves to ensure the provision of optimal and safe patient care (Alspach 2008:12). The AACN (2002: [17]) asserts that the attainment of professional competence by nurses reflects the profession's responsibility to protect the public from harm and negligence, and that this responsibility is shared among the various regulatory bodies, the nursing profession, individual nurses and other stakeholders. Curley (2007:25) supports this statement by maintaining that the underlying principle of all professional nursing practice is based upon a nurse's collaboration with physicians, other health care professionals, with other nurses, and with the families of patients and significant others with whom a patient may be in a close relationship. Verbatim evidence collected during the course of this study revealed that the participants perceived varying degrees of incompetence in the performance of CPR among nurses and doctors, as well as ineffective team support and a lack of professional accountability. According to Leonard, Graham and Bonacum (2004:i85), communication failure and an absence of teamwork and collaboration are the leading causes of unfavourable outcomes for patients.

7.A.6.3 The stress and ethical dilemmas generated by CPR are associated with the end-of-life experiences that are a feature of the performance of CPR

Since most of the participants in this study agreed that they had experienced varying degrees of stress during the performance of CPR, they felt the need for explicit ethical guidelines that would enable them to regulate and justify their actions. Ranse and Arbon (2008:39), cited Laws (2001:76) and Page and Meerabeau (1996:317), state that because participation in resuscitation events is both emotionally and physically demanding, the competencies of all who are involved are openly exposed to public view, and this creates situations in which efficiency in performance and favourable outcomes are highly prized. Researchers have acknowledged that both internal and external stressors are associated with the resuscitation experience. Internal stressors relate to the feelings of uncertainty that are generated by the CPR of experience, to the lack of composure that frequently afflicts resuscitators and to the moral conflict to which the CPR process gives rise. External stressors, on the other hand, are generated by feelings of oppression and anxiety, of being

challenged by the probability of failure to resuscitate a patient, and by the frequent failure of the CPR process that is reflected in most statistics (Cole et al 2001:281).

Theme 3: The stress and ethical dilemmas generated by CPR are associated with the end-of-life experiences that are a feature of the performance of CPR

Table 7.A.4 The stress and ethical dilemmas generated by CPR are associated with the end-of-life experiences that are a feature of the performance of CPR

Code	Categories	Theme
<ul style="list-style-type: none"> • Stressful event and manoeuvre • Being haunted by feelings of guilt • Stress caused by a situations and conditions • Emotional disturbances • Stress caused by family reactions • Conflicting perceptions • Stress caused by a lack of proper guidelines • A lack of clear direction from doctors with regard to the conditions that govern the DNAR policy • A fear of contracting infection during the resuscitation of a client with HIV/AIDS • The lack of debriefing and support for nurses after they have participated in a resuscitation 	<ul style="list-style-type: none"> • Emotional stress • Feelings of guilt • Situational stressors • Inadequate policy • Ethical dilemmas • Inadequate communication 	<p>End-of-life experiences generate the stress and ethical dilemmas that are associated with CPR.</p>

7.A.6.3.1 Verbatim evidence from the focus group discussions – 3a

The theme “stress and ethical dilemmas are associated with the end-of-life experiences that are generated by CPR” emerged from the focus group discussion.

One of the nurses said:

Well, to say, it is tiring. It is a stressful manoeuvre and event. It is somebody’s life is in your hand and you are responsible for the outcome. You feel guilty that much was not done.

Another nurse expressed her views in the following words:

It is emotionally devastating. You spend four hours with the patient. It is a haunting feeling. I have done so many times. You go home with the same

feelings. Had neither I done this nor that if the anaesthetist came in my time. I also think what if he is my relative.

One nurse felt that the amount of stress the nurse suffered depended on how ill the patient was before the cardiac arrest incident occurred.

If the patient was chronically ill and if the relatives accept the condition, prognosis of the stress level differs. You will be more stressed if you receive a client who gets admitted and suddenly dies.

Another nurse expressed her distress in the following words:

Stress comes after the patient dies. You put [in] your best but [there is] no response. Even the relative says, "They were just running here and there". The outcome causes a lot of stress.

Death and dying issues are the most prevalent stressors that nurses face in their jobs (Hamaideh, Mrayyan, Mudallal, Faouri & Kshsawneh 2008:40). According to French, Lenton, Walters and Eyles (2000:161), workplace stress for nurses can be traced to a variety of causes that include having to deal with the imminence of death, with dying patients, conflict with physicians, problems with peers and supervisors, excessive workloads, discrimination, and uncertainties about particular treatments.

The fear of contracting HIV during resuscitation creates a dilemma for some nurses, and this fear was expressed by some of the participants. When a patient is already in an advanced stage of AIDS, his or her condition will affect the performance of some members of the CPR team. When a patient is also in the final stages of AIDS, the CPR of team will be required to make a decision about whether it might be advisable to let the patient die or whether the performance of CPR would serve any useful purpose.

Another nurse expressed the following opinion:

Policy or written document is not available to guide us to decide on whether to resuscitate or not. One nurse mentioned since there is ARV, there is hope. Patient should be resuscitated.

The opinion of one of the other nurses was different from those expressed above:

We are stereotyped. First we are disturbed psychologically and have the fear at the back of your mind always. Usually depends on the severity of the disease the patient should be allowed to rest. Majority of the nurses mentioned they are comfortable to perform CPR on HIV/AIDS clients as long as mouth-to-mouth resuscitation is not involved.

Various factors such as cultural conditioning, religious beliefs, individual values and legal constraints influence the way in which nurses deliver care to terminally ill patients (Latour 2003:84)

Oyeyemi, Oyeyemi & Bello (2008:15) conducted a study in Nigeria to assess the extent to which nurses are comfortable with various performing procedures on patients suffering from HIV/AIDS. Among the 277 nurses in the sample, 161 (58.1%) were “very uncomfortable” while 44 (15.9%) felt uncomfortable administering mouth-to-mouth resuscitation on people infected by HIV or in the last stages of AIDS. The deeper reasons why nurses feel uncomfortable about performing a procedure that poses little or no risk of transmission, remains unclear. According to the theory of reasoned action, *intentions* are the key determinants of behaviour (Dwyer & Williams 2002: 85). Nurses who therefore anticipate various degrees of discomfort while performing mouth-to mouth ventilations might feel reluctant to initiate the treatment at all (Oyeyemi et al 2008:15).

Since HIV infection and AIDS have become a worldwide pandemic, even BLS instructors are concerned about the possible risk of infection. A study conducted by Boucek et al (2009:849) revealed that there was even reluctance among BLS instructors to perform mouth-to-mouth ventilations in simulated conditions. The research of Boucek et al (2009:849) indicates that HIV infection is not the only condition that makes rescuers hesitate to perform mouth-to-mouth ventilation. Complete avoidance of contact with secretions requires bag-valve-mask and a barrier device in situations in which registered

nurses may be called upon to resuscitate apnoea patients. What is clear is that healthcare providers need to be properly informed about the possibilities and likelihood of risk and approving measures to prevent infection so that they will be in a position to improve the quality of care for patients who are HIV positive (Adebajo, Bamgbala & Oyedrian 2003:103). Interventions can be designed to improve the ways in which nurses perceive barriers in organisational culture. This would enable them to improve the quality of their patient care.

With regard to the category of conflicting policies and a lack of clear direction from doctors with regard to DNAR, one nurse commented:

I don't know what to say. Here it is funny and you can't discontinue the machine. In a government set up you can't terminate life. In private set up, you need two consultants and [need to] explain the situation to the relatives. In the same country there are different policies and disparities. I would admit to say there should be a policy. Sudden arrest and chronic illness if they write DNAR for brain dead we should understand. Where I come from, two consultants discuss and disconnect the life support of someone who is in brain dead.

Another nurse added:

Hey, it is quite controversial. I have mixed feelings. I am looking at the situation where there is a patient with brain dead and giving medications, which may have been reserved for another person. Depend on the patient condition we should have a policy. The policy should be defined. There should be conditions attached. For example brain dead patient cannot be resuscitated.

One of the nurses had different opinions from those expressed above. She said:

There is no policy. But I don't support it. My colleagues enjoy the policy because they don't want to do CPR. Relatives have to give permission and consulted before DNAR (Do Not Attempt Resuscitation). Attitude of the nurse

changes it; it is put it in writing. Relatives should take decision. Miracles do happen.

Most of the participants had mixed feelings on this issue.

One nurse said:

I would say in front of God everybody is equal and it is a constitutional right. I would not be a part of developing [such a] policy. I need to save life. I don't need the policy.

The one view that was widely expressed by most of the participants in the focus group discussion was that there should always be some form of debriefing or support for nurses who have been involved in an unsuccessful resuscitation.

Doctors criticise what nurses have done but they are not available when needed. Debriefing helps to solve the conflicts.

Another participant added:

During resuscitation doctors shout us. If they come and explain after the resuscitation it relieves our stress. They should explain why they came late or why he did shout us.

Another nurse expressed the distress that she experienced from the death of one of her patients in the following way:

For a patient who came with fractured ribs I gave Injection Pethidine 50 mg twice since he was restless. When the patient died, I could not sleep. I felt as if my hand was going away from me. I couldn't sleep during the night. If I could have spoken to somebody, it would have eased me.

The AACN position statement on moral distress (AACN 2006:1) emphasises that moral distress is a significant cause of emotional suffering among nurses and that it weighs

heavily in the decisions of nurses to leave the workforce. But chronic moral distress also undermines the quality of patient care that any nurse is able to deliver.

Most of the participants agreed that debriefing helped to reduce stress and that it therefore performed a therapeutic function. They also felt that the debriefing process helped them to evaluate and thus to improve their performance. All the participants agreed that debriefing should be carried out after both successful and unsuccessful resuscitation attempts.

The role that nurses play in the events that characterise the end of life is but one factor in a complex process, and nurses are frequently faced with limited choices in the kind of treatments they can provide. The AACN (2003:[5]) maintains that because nurses are required to act as advocates for the interests of patients, they should be driven by the expressed needs and wishes of both patients and leave families of patients. Meerabeau and Page (1999:33) have confirmed that nurses who work in non-critical care areas experience much more stress than nurses who work in the critical care wards because former are less frequently exposed to the CPR procedure and therefore have little practice in the use of the requisite CPR skills. But the research of Hays, Mannahan, Cuaderes Wallace and Margaret (2006:185) produced evidence that critical care nurses also suffered a great deal of stress from having to make decisions about the prolongation of life and the treatment of critically unstable patients.

Ranse and Arbon (2008:45) suggest that all nurses should be provided with opportunities to attend formal debriefing sessions after they have participated in resuscitation attempts. Pups et al (1997: 69) suggest that interventions such as peer debriefings in which events are reviewed and peer support is provided, can be helpful in limiting the negative feelings that nurses experience during and after the provision of CPR.

In similar vein, Leary and Abella (2008:1) report that one of the barriers to optimal CPR may well be that the rescuers do *not* receive feedback from their team members – either during or after CPR procedures. The absence of any form of feedback makes it difficult to identify and appreciate the significance of errors performance errors. In a study conducted by Drotske and De Villiers (2007:17a) in South Africa, the registered nurses who were involved in the research suggested that all debriefings should include a reflection on the BLS protocols that were used, on any deficiencies that might be evident, on any

improvements that were effected during the resuscitation process, and on the way in which identified deficits had been improved during a resuscitation.

7.A.6.4 Perceived need for training, and how education and professional development influences the performance of CPR

This theme emerged from the focus group discussion where all the nurses expressed that BLS training should be mandatory for the nurses to provide optimum care during CPR, to have uniform knowledge and skills and to gain confidence from the community.

Theme 4: Perceived need for training, and how education and professional development influence the performance of CPR

Table 7.A.5 Perceived need for training, and how education and professional development influence the performance of CPR

Code	Categories	Theme
<ul style="list-style-type: none"> • Inadequate formal training • Lack of exposure to CPR in general wards • An absence of uniform standards • Inconsistencies in practice • Theory/practice gap in teaching institutions 	<ul style="list-style-type: none"> • An absence of uniform practice in hospitals • Feeling of incompetence 	<ul style="list-style-type: none"> • Perceived need for training, education and professional development

7.A.6.4.1 Verbatim evidence from the focus group discussions – 3b

This theme emerged from all of the participants when they were asked whether BLS annual certification should be mandatory for all the registered nurses working in Botswana so that a uniform standard of practice could be established. Their comments reflect these opinions.

One nurse said:

I think it is necessary. In general wards nurses are the one who is in the ward alone most of the time. If we have skill we could save life unlike we don't know what to do. It is an advantage.

Another nurse expressed the same opinion:

I also think it is very important. CPR performed 10 years back is not the same. Things change. It is a dynamic area.

A nurse from the accident and emergency ward added:

It is an overdue requirement. Policy should be put in place. Before we enter into practice, BLS should be mandatory. It is standard all over the world. Government should sponsor the staff. Currently individuals are paying privately.

The same nurse also emphasised the advantages:

It will solve a lot of conflicts. If it is a mandatory, it will be attended by all nurses - seniors or juniors.

According to the Australian Resuscitation Council (2006:4), the proper education of all staff in basic life support techniques is critical in the chain of survival for institution that hopes to optimise patient outcomes. Moule and Albarran (2002:223) support the statement by suggesting that, as a minimal standard, all clinical staff members in a clinical institution should undertake mandatory training in basic life support and that they should also be compelled to participate in annual CPR refresher courses. Every nurse who cares for patients may be required at any time to respond to patients in crisis and may also be required to initiate immediate resuscitation procedures. It is therefore essential that all health care practitioners remain proficient in emergency care and BLS procedures (Denton & Giddins 2009:50).

The ICN (2004:2) maintains that nursing regulatory bodies are responsible for the basic competence of the nurses. In addition to those, all regulatory bodies are increasingly concerned with the issue of continuing competence as a result of the influence of the safety and quality movement and because of increased consumer awareness of the need for practitioner competencies throughout the world (ICN 2004:2). Furthermore, the ICN code of ethics for nurses (ICN 2006:2) states that all nurses are personally responsible and

accountable for their nursing practice and for maintaining the highest possible level of competence by means of continual learning and practice.

According to the AACN Synergy Model for Patient Care, “enhancing clinical competency is an important and pivotal element in providing optimal care for the critically ill patients”. If nurses hope to create a satisfying work environment that is conducive to a high quality of patient care, they should all be able to rely on the fact that their peers are as competent as they themselves are.

7.A.7 DISCUSSION OF THE RESULTS OF THE FOCUS GROUP DISCUSSION (PHASE 3-A)

The focus group discussions among registered nurses on CPR perceptions, barriers and needs showed that they did experience practical barriers, inadequate interpersonal relationships, ill-defined policies, stress, ethical dilemmas and a need to develop professional competency to meet the societal needs they encountered in their profession. The problems that were identified were congruent with the competencies that are expected of nurses and the support that they need to receive from the system in terms of the AACN Synergy Model for Patient Care. The registered nurses clearly expressed their need to update their CPR knowledge and skills on a regular basis. The nurses who participated in the discussion indicated that the attitudes and degree of efficiency expressed by their colleagues also influenced their performance during the provision of CPR.

The nurses from intensive care units and accident and emergency wards were confident about their performance of CPR because they were constantly exposed to the need to perform CPR in their clinical area. It is worth noting that most of the participants expressed the view that they were comfortable with providing CPR for a client with HIV/AIDS. In contrast to this, one of the participants said that her comfort level would depend on the degree and severity of the disease. She also felt that the patient should be allowed to “rest”. All those who participated in the focus group discussion admitted that participation in CPR was more stressful than many supposed, and that debriefing after each CPR might well serve to reduce the stress that is accumulated from regularly performing this potentially life-saving procedure.

The registered nurses also suggested a number of strategies to overcome the barriers that impede the efficient performance of CPR. Such strategies would include regular in-service education, practice under simulated conditions, an annual certification of proficiency in CPR, the use of standard guidelines and well-defined delineated policies to guide decisions about CPR. The registered nurses also suggested that the Nursing and Midwifery Council of Botswana should include CPR in their scope of practice in order to create uniformity in the performance of CPR in all health care facilities in Botswana.

7.A.8 APPLICATION OF THE FINDINGS OF THE FOCUS GROUP DISCUSSION TO THE AACN SYNERGY MODEL FOR PATIENT CARE

The focus group discussions conducted among registered nurses in the two referral hospitals suggest that the AACN Synergy Model for Patient Care is closely aligned with the identified themes. The model asserts that nursing practice is predicated on the needs and characteristics of the patients who are the nurse’s clients. Table 7-A.6 sets out the themes identified in relation to the nursing competencies that form a part of the AACN Synergy Model for Patient Care.

Themes identified from the focus group discussions in relation to what the AACN Synergy Model for Patient Care asserts about nurse competencies and the health care system are listed in table 7.A.6

Table 7.A.6 Themes identified from the focus group discussions in relation to what the AACN Synergy Model for Patient Care asserts about nurse competencies and the health care system

Clinical judgement	Caring practices	Collaboration	Advocacy/ moral agency	Facilitation of learning	Systems thinking
<ul style="list-style-type: none"> • Lack of knowledge and skills • Incompetence • Attitude and beliefs • Stress • Emotional disturbance 	<ul style="list-style-type: none"> • Fear of contacting infection: • Ethical dilemma • Personal beliefs 	<ul style="list-style-type: none"> • Absence of team work • Inadequate communications and interactions • Role conflicts • Professional accountability 	<ul style="list-style-type: none"> • Ethical dilemma • Inability to make decisions 	<ul style="list-style-type: none"> • Lack of in-service education • Inadequate debriefing • Theory-practice gap 	<ul style="list-style-type: none"> Unable to utilise hospital resources

The themes that were identified from the focus group discussions in relation to what the AACN Synergy Model for Patient Care asserts about the failures of the health care system are listed in table 7.A.7.

Table 7.A.7 Health care system

Health care system
Lack of training and in-service education
Lack of policies about and guidelines for BLS
Inadequate communication systems
Inadequate and non-functional equipment
Inadequate staffing
Ineffectual collaboration, teamwork and leadership
Lack of any policy to guide DNAR decisions
The absence of any mandatory training in BLS

7.A.9 SUMMARY OF FINDINGS OF PHASE 3-A

This section presented the findings from the focus group discussions that the researcher held with the participants in the research. The major themes that emerged from the qualitative research findings were:

- the lack of organisational and systemic support and resources
- the perceived lack of competence and readiness to perform CPR
- the stress and ethical dilemmas associated with end-of-life experiences
- the perceived need for training, education, and professional development

All these themes were regarded by the registered nurses as pivotal factors that influenced the performance of CPR. The qualitative data were presented in terms of the themes and categories that were derived from the data collected from the registered nurses during focus group discussions. In the following section of this chapter, the researcher presents the qualitative data collected from the nurse managers during semi-structured interviews (in phase 3).

7.B DISCUSSION PHASE – PHASE 3-B

7.B.1 Discussion of data analysis of the semi-structured qualitative interview conducted with nurse managers from the two referral hospitals

The findings of the focus group discussion that the researcher had with the registered nurses were discussed in the first section of this chapter. The semi-structured qualitative interviews with nurse managers from the two referral hospitals are reported in this section. The semi-structured interviews were based on ten closed-ended questions. The researcher chose to combine quantitative and qualitative methods to complement the results from the focus group discussions with the registered nurses in phase 3 and thus to expand the scope of the triangulation that was part of the research design. The semi-structured interview guide contained a number of sections.

7.B.2 THE PURPOSE OF PHASE 3-B OF THE STUDY

Various forms of organisational culture have been modified and adapted for the successful implementation of quality care (Berlowitz, Young, Hickey, Saliba, Mittman, Czarnowski, Simon, Anderson, Ash, Rubenstein & Moskovitz. 2003:65). In healthcare settings, adequate resources, interpersonal communication skills and effectiveness in team work are considered to be essential preconditions for the quality care (Stordeur & D'Hoore 2006:45). But when there are deficiencies in clinical leadership and teamwork, a lack of a professional openness and trust, indifference to a culture of safety and quality of client care in a health care system, such defects are reflected in an excessive morbidity and mortality rate in the hospital concerned. According to the AACN (2005:16), a demoralised, demotivated and inefficient work environment contributes to an increasing rate of medical errors, due to a lack of efficiency in the delivery of care, to the prevalence of interpersonal conflicts, and high levels of stress among health professionals. The AACN standards make it quite clear that the creation of a well organised and disciplined work environment in which all of the staff are highly motivated is imperative for maintaining the safety of patients, for increasing the number of staff applicants, and for establishing and maintaining a health care organisation that is financially viable, sound and accountable.

The semi-structured interviews with the nurse managers helped the researcher to identify the specific features of the organisational environment that were dedicated to the provision of CPR.

7.B.2.1 Demographic information about the participants

This section elicited the following demographic information from the participants: gender, position, qualification, years of professional experience, the frequency and duration of former in-service CPR training sessions to which the participant had been exposed, the number of CPRs that had been attempted, and the outcome of all the CPRs that had been performed. Because all these questions yielded quantitative data, frequency tables were used to present the data.

7.B.2.2 Information about the CPR perceptions, barriers and needs among registered nurses from the perspective of nurse managers

This section comprised ten closed-ended questions. These answers were then analysed by using quantitative methods of analysis. The results thus obtained from the semi-structured interviews are presented in terms of themes, categories and subcategories in this chapter, and these results have, in each case, been complemented by information from the literature that substantiates and confirms (or contradicts and modifies) the results of the analysis.

7.B.2.3 Sample size

A total of 22 participants from the two referral hospitals participated in this phase of the research. This figure was made up by 11 nurse managers were from hospital A and 11 nurse managers were from the hospital B.

7.B.3 DATA ANALYSIS FOR PHASE 3 – B OF THE STUDY

It has already been noted that two kinds of data can be obtained by using a semi-structured interview guide. The first part of this section presents results from the quantitative analysis from the closed-ended questions, and the second part of this section

details the qualitative analysis that was derived from the open-ended questions. The open-ended semi-structured interview guide is presented in Annexure E.

7.B.3.1 Quantitative data analysis for phase 3 – B

Because quantitative data is always expressed in numbers, it is often presented in the form of frequency tables. Frequency tables were used to summarise this data.

7.B.3.2 Demographic data of the participants

The demographic information that is presented in this section includes information about gender, age, professional status, position, qualifications, years of work experience, area of assignment, CPR training, additional CPR training, and frequency of CPR performed.

The results summarised in table 7.B.1 show that the majority (n=20; 90.9%) of the respondents were female. Out of the 22 respondents nine respondents (40.9%) had obtained the Diploma in Nursing, two respondents (9.1%) had obtained a Diploma in Midwifery as an additional qualification, seven respondents (31.8%) had a bachelor's degree in nursing science, and four respondents (18.2%) possessed a master's degree in nursing science. The work experience of the respondents ranged from between eight and 20 years. Among these 22 respondents, four (18.2%) had accumulated eight to nine years of work experience, 11 (50.0%) had accumulated over 10 years of work experience and seven (31.8%) had accumulated more than 20 years of work experience. The results also showed that 10 respondents (45.5%) had received formal training in CPR during their basic nursing training and that five respondents (22.7%) had undergone BLS training. Only four respondents (40.9%) had received ACLS training, and nine respondents (40.9%) had been exposed to varying amounts of in-service education in CPR. With regard to the frequency of CPR performed, the results showed that one respondent (4.5%) had *never* performed CPR, one respondent (4.5%) performed CPR on a daily basis, and seven respondents (31.8%) performed CPR on a weekly basis while eight respondents (36.4%) performed one CPR annually.

Table 7.B.1 Distribution of participants' demographic characteristics (N=22)

Category	Frequency	Percentage
Gender		
Male	2	9.1
Female	20	90.9
Total	22	100.0
Age group		
31-35	3	13.6
36-40	9	40.9
41-45	2	9.1
46-50	8	36.4
Total	22	100.0
Professional status		
Registered nurse	16	72.7
Registered nurse/Midwife	6	27.3
Total	22	100.0
Qualification		
Diploma in Nursing	9	40.9
Diploma in Nursing/Diploma in Midwifery	2	9.1
Bachelor of Science in Nursing	7	31.8
Master of Nursing Science	4	18.2
Total	22	100.0
Work experience		
Less than 10 years	4	18.2
More than 10 years	11	50.8
More than 20 years	7	31.8
Total	22	100.0
Area of assignment		
ICU – intensive care unit	2	9.1
A&E – accident and emergency ward	2	9.1
MMW – male medical ward	2	9.1
FMW – female medical ward	2	9.1
MSW – male surgical ward	2	9.1
FSW – female surgical ward	2	9.1
MOW – male orthopaedic ward	2	9.1
FOW – female orthopaedic ward	1	4.5
GYN – gynaecology ward	1	4.5
MAT – maternity ward	2	9.1
PMW – paediatric medical ward	2	9.1
PSW – paediatric surgical ward	2	9.1
Total	22	100.0
CPR training		
No	12	54.5
Yes	10	45.5
Total	22	100.0
Additional CPR training		
No	21	95.5
Yes	1	4.5
Total	22	100.0
BLS certificate		
No	17	77.3
Yes	5	22.7
Total	22	100.0
ACLS certificate		
No	18	81.8
Yes	4	18.2
Total	22	100.0

Category	Frequency	Percentage
In-service CPR education		
No	13	59.1
Yes	9	40.9
Total	22	100.0
Frequency with which CPR was performed		
Never	1	4.5
Daily	1	4.5
Weekly	7	31.8
Monthly	5	22.7
Annually	8	36.4
Total	22	100.0

Among the 22 nurse managers, only ten had received formal training in CPR although none of them held the current registration in BLS and/or ACLS. Additional training had been acquired on various occasions by most of these ten nurse managers. Five of them had been trained in BLS while another four had been trained in ACLS training. Ten of them had received some degree of in-service CPR education. This indicates that the majority of the participants had not received any form of CPR training or in-service CPR education. Formal education and ongoing support are needed for nurse managers if they are to perform their function effectively in their positions in the current health care environment. All nurse managers require continuous training in the development of their critical thinking skills, and they need to believe in the indispensability of such skills for nurse managers if they are to be effective in their jobs (Zori & Morrison 2009:75). What actually happens is that most nurse managers have been insufficiently educated for their responsibilities and few receive any support for the functions that they are required to perform in their managerial role (Wilson 2005:137). The findings from the demographic data obtained in this study support the view that the nurse managers in the two referral hospitals have received insufficient education in BLS and ACLS.

7.B.3.3 Structure of the questionnaire

The perceptions, barriers and needs of the registered nurses were assessed by means of close-ended questions that yielded only quantitative data. The results of the quantitative data are summarised as tables. The researcher asked the nurse managers the following ten closed-ended questions.

1. How often do you participate in CPR?

Table 7.B.1.a Frequency of participation in CPR

	Frequency	Percentage
Never	6	27.3
Monthly	8	36.4
Fortnightly	4	18.2
Weekly	3	13.6
Daily	1	4.5
Total	22	100.0

Six managers said that they had never participated in CPR. Eight of them said that they participated in a CPR only once a month. Only one respondent said that she participated in CPR on a daily basis.

According to Thomson, Foy and Benstead (2006:e139), the confidence and frequency with which procedures such as CPR are performed, declines among senior consultants. In the UK, the mandatory updating of CPR skills has been introduced by employers so as to ensure that all the practising nurses – regardless of their positions – remain competent to undertake and perform clinical activities such CPR and infection prevention precautions. These authors continue by saying that they have identified a trend among more senior nursing managers to avoid occasions for continuous professional development while nurses at the ward sister level demonstrated the highest degree of professional commitment to continuous professional development.

2. Are all registered nurses in your unit competent enough to perform CPR?

Table 7.B.1.b Nurses' competency to perform CPR

	Frequency	Percentage
Few are competent	8	36.4
Some are competent	12	54.5
Many are competent	1	4.5
All are competent	1	4.5
Total	22	100.0

The response from the 22 participants showed that while eight nurse managers (36.4 %) felt that a “few” of the nurses were competent, 12 nurse managers (54.5%) believed that only *some* nurses were sufficiently competent to perform CPR. Only one nurse manager

(4.5%) responded with confidence that “many” or “all” nurses were sufficiently competent to perform CPR.

Thomson et al (2006:e139) insist that it is only by means of continuous professional development that nurses will not only acquire the knowledge that they need, but also the skills that they need to maintain their competencies. Gabbot et al (2005:171) recommend that all health care workers’ examinations should include a component that evaluates competency in resuscitation. The AACN standards of practice and performance for acute and critical care nurses (AACN 2002:18) state that nurses acquire and maintain current knowledge and competencies, and that they proactively seek and participate in experiences and learning opportunities that help them to acquire additional knowledge and skills about various interventions, therapeutics and clinical skills on a regular basis.

3. Are all registered nurses in your unit confident enough to perform CPR?

Table 7.B.1.c Nurses’ confidence to perform CPR

	Frequency	Percent
Few are confident	9	40.9
Some are confident	11	50.0
Many are confident	1	4.5
All are confident	1	4.5
Total	22	100.0

The responses from the 22 participants showed that nine nurse managers (40.9%) felt that while a “few” of the nurses were confident, 11 nurse managers (50.0%) believed that only “some” nurses were confident. Only one manager (4.5%) was confident that “many” or “all” nurses were confident. Castle et al (2007:664) found that greater levels of confidence and expertise were evident in doctors and nurses who were regularly exposed to cardiac arrest situations in clinical areas. This is supported by the research conducted by Premadasa, Shehab, Khaled and Thalib (2008:e63) which demonstrated that even a *limited* exposure to the important procedures such as CPR and defibrillation can improve the CPR skills and augment the confidence that health care personnel require to perform CPR when the need arises.

4. Do you provide orientation in CPR for the novice nurses in your unit?

Table 7.B.1.d Orientation for novice nurses

	Frequency	Percent
Never	6	27.3
Rarely	7	31.8
Sometimes	3	13.6
Mostly	5	22.7
Always	1	4.5
Total	22	100.0

Among the 22 participants, only five said that orientation in CPR was provided “most of the time” for novice nurses in CPR while only 1 replied that orientation in CPR was “always” provided for novice nurses on CPR. According to Rashotte and Thomas (2002:131), proper orientation programmes in knowledge, practice skills, attitudes, and critical thinking abilities are absolutely necessary if qualified nurses are to make the transition from being novices to experts. In addition to those, the research conducted by Messmer, Jones and Taylor (2004:132), cited Benner (1984) revealed that as nurses acquired more advanced experience and education, they became correspondingly more proficient and competent in clinical situations as they passed up through five stages of nursing proficiency, namely, novice nurse, advanced beginner nurse, competent nurse, proficient nurse, expert nurse. Taylor (2002:11) asserts it is one of the most important professional responsibilities of most managers to create occasions and opportunities for novice nurses to acquire competency in clinical practice without causing distress to themselves or their patients during such learning processes. Orientation programmes for novice nurses help to develop critical thinking skills. Without critical thinking skills, nursing care at best may be suboptimal. At its worst it may exert deleterious effects on patient outcomes (Forneris & McAlpine 2007:410). Santucci (2004:274) maintains that novice nurses should be encouraged to identify their own perceived professional and personal strengths and areas for growth as a part of a comprehensive orientation programme.

5. Do you receive adequate team support during CPR?

Table 7.B.1.e Adequate team support

	Frequency	Percent
Not at all	2	9.1
Rarely	1	4.5
Sometimes	7	31.8
Frequently	6	27.3
Always	6	27.3
Total	22	100.0

As may be seen from the results in table 7.B.1.e, there was a mixed response to the question about the availability of team support during CPR. A little more than half (12 out of 22 of the respondents) felt that they did receive team support “frequently” or “always”.

The Nursing and Midwifery Council of the UK (2008: [2]) is of the opinion that it is necessary for nurses to work in conjunction with team members so that the health and well-being of patients can be promoted and maintain. Denton and Giddins (2009:49) are of the opinion that when a healthcare team work well together, this results in more responsive service, increased clinical cost effectiveness, and improved outcomes. The AACN (2005:18) maintains that without synchronous, ongoing collaborative teamwork that involves experts from multiple disciplines, patient and family needs cannot be satisfied within the complexities of today’s healthcare system.

6. How quickly do resuscitation team members (such as doctors and an anaesthetist) respond to an emergency call during CPR?

Table 7.B.1.f Response from resuscitation team members

	Frequency	Percent
After more than 1 hour	3	13.6
Within one hour	5	22.7
Within 30 minutes	5	22.7
Within 15 minutes	7	31.8
Immediately	2	9.1
Total	22	100.0

Out of the 22 participants, only two said that the resuscitation team members responded immediately while seven and five participants said that they responded within 15 and 30

minutes respectively. The Resuscitation Council of the UK (2004: [3]) recommends that the healthcare institution must ensure that the resuscitation team is activated within 30 seconds of a call for emergency help. The chances that CPR will be successful increase when resuscitation is provided within the first four minutes of arrest and when defibrillation is performed within the eight minutes after the arrest (AHA 2005:1).

7. Which resuscitation council guidelines are being followed in your unit?

Table 7.B.1.g Resuscitation guidelines being followed

	Frequency	Percent
South Africa	2	9.1
United States of America	3	13.6
United Kingdom	1	4.5
Others	16	72.7
Total	22	100.0

There was a mixed response from different nurse managers about the identity of the council guidelines that they were following in their units. Most of them did not name the council. The Resuscitation Council of the UK (2004:4) recommends that the resuscitation committee of each healthcare institution should be responsible for ensuring compliance with national resuscitation guidelines and standards. The absence of uniform guidelines in healthcare institutions creates a gap in the theory and practice of CPR in health organisations (Desalu et al 2006:517). In a study conducted in Georgia, Nishiyama, Wold and Partshkhladze (2008:179) found that the nurse managers in their sample did not know how to utilise nursing guidelines effectively within the area of care provision that was concerned with ensuring a superior quality of nursing practice.

8. Is it important to report and document CPR in order to improve the quality of care?

Table 7.B.1.h Importance of reporting and documenting CPR

	Frequency	Percent
Not really	0	0
To a little extent	0	0
To some extent	0	0
Very much	2	9.1
Absolutely	20	90.9
Total	22	100.0

All the nurse managers agreed that it was important to report and document CPR in order to improve the quality of care. Spearpoint (2008:48) supports the necessity for recording and reporting emergency events by insisting that *all* critical situations such as resuscitation events require an accurate and honest recording of events, processes, interventions and details about the kind of care that was delivered. The accurate completion of a CPR audit form ensures the correct documentation of the course and nature of CPR events.

9. Do all nurses have to attend regular CPR training sessions?

Table 7.B.1.i Need for nurses to attend CPR training sessions

	Frequency	Percent
Not really	0	0
To a little extent	0	0
To some extent	0	0
Very much	3	13.6
Absolutely	19	86.4
Total	22	100.0

All the nurse managers felt that it was imperative for nurses to receive regular CPR training.

The Resuscitation Council of the UK (2004:3) recommends that all health care professionals should undergo regular resuscitation training to a level appropriate to their clinical responsibilities. Before they are allowed to undertake certain special procedures in the clinical setting, some nurses are required to undergo a process of credentialing that certifies their competency (Halcomb, Meadley & Streeter 2009:201). Whittaker, Carson and Smolenski (2000:10) suggest that regular training can determine levels of competence by

means of written re-examinations, practice evaluations, computer simulated tests and tests conducted in virtual reality settings. Drey, Gould and Allan (2009:740) confirm the importance of training core skills for *all* clinical nurses – regardless of whether they occupy an extended or standard role.

10. Is it important for the nurses to attend classes that orientate them to issues of death and grieving?

Table 7.B.1.j Importance of attending classes on death and dying

	Frequency	Percent
Not really	0	0
To a little extent	0	0
To some extent	0	0
Very much	1	4.5
Absolutely	21	95.5
Total	22	100.0

All the nurse managers agreed that it was important for nurses to attend classes or seminars that would orientate them with regard to issues of death, dying and grieving. It has been demonstrated by research that nurses may be adversely affected by stress and anxiety when they are confronted with the realities of grief, dying, death and loss without the necessary knowledge, skills and support to process their own emotions and offer help and comfort to the dying and to the families and friends of those who are in the process of dying and those who have already died (Hinshaw 2002:565). Qualified mentors who are suitably trained and experienced are in a position to offer nurses helpful strategies for coping with end-of-life crises as well as the kind of emotional guidance that they need to improve their competence and augment their confidence (Caton & Klemm 2006:604). Hamaideh et al (2008:40) recommend that the processes of death and dying should be integrated into everyday life and regarded as a natural and normal part of the rich continuum of life itself. In places where such an attitude prevails, nurses become more comfortable with such situations and are unable to offer comfort and reassurance to the dying and to their relatives. But wherever dying people are strictly segregated and where death and dying are regarded as shameful events that should be shielded from view, it can be upsetting for nurses suddenly to be exposed to the realities of death and dying in a the clinical setting.

7.B.3.4 Qualitative data analysis for phase 3 - B

The distinguishing characteristic of qualitative data analysis is that it is expressed in words rather than in numbers. The research used Tesch's method during the present data analysis process (Creswell 2003:192). As an initial step, the researcher read through all the transcripts and listened to all the audiotapes in order to become better and better acquainted with the data as a whole.

The researcher then began sifting out pieces of data that she considered to be most relevant to the aim of the study and coded and categorised this data as a step in the development of *themes*. A code is a symbol or abbreviation that is used to classify words or phrases that recur frequently in the data (Burns & Grove 2005:548). The researcher performed the coding manually during her reading and re-reading of the interview transcripts by making use of highlighter pens with different colours for each category.

The data was then incorporated into categories under headings that functioned as an index (Burns & Grove 2005:548). After the categorisation was complete, the researcher examined the categories with a view to gaining an even more refined understanding of the data and the relevant categories and themes. This was the processes by means of which the themes, categories and sub-categories of the study were allowed to emerge.

7.B.4 DATA STRUCTURE: THEMES AND CATEGORIES

The research identified the following three major themes in this study:

- Organisational factors that influence the performance of registered nurses and nurse managers when they provide CPR
- Factors that limit or hinder the performance of registered nurses and nurse managers when they provide CPR
- The need for periodic training and development sessions that will improve the CPR performance of registered nurses and nurse managers

Table 7.B2 Data structure of themes and categories

Data display	Theme	Theme and categories
7.2.1	Theme 1	Organisational factors that influence the performance of registered nurses and nurse managers when they provide CPR
7.2.1.1	Category 1.1	Human resources
7.2.1.2	Category 1.2	Lack of in-service education
7.2.1.3	Category 1.3	Lack of resuscitation team
7.2.1.4	Category 1.4	Policies and standards
7.2.1.5	Category 1.5	Lack of mandatory training
7.2.1.6	Category 1.6	Lack of policy on DNAR
7.2.1.7	Category 1.7	Ethical conflicts (different perspectives in relation to resuscitating HIV/AIDS client)
7.2.2	Theme 2	Other factors that influence the performance of registered nurses and nurse managers when they provide CPR
7.2.2.1	Category 2.1	Lack of knowledge and skills on CPR
7.2.2.2	Category 2.2	Inadequate and non functioning equipment
7.2.2.3	Category 2.3	Lack of confidence/feeling of inadequacy
7.2.2.4	Category 2.4	Lack of space to accommodate emergencies
7.2.2.5	Category 2.5	Attitude of doctors
7.2.2.6	Category 2.6	Inconsistent practice
7.2.2.7	Category 2.7	Stress due to Overwhelming workload
7.2.2.8	Category 2.8	Lack of incentives
7.2.2.9	Category 2.9	Lack of guidelines
7.2.2.10	Category 2.10	Communication barriers
7.2.3	Theme 3	The training and development needs of registered nurses and nurse managers
7.2.3.1	Category 3.1	Role of the nursing council
7.2.3.2	Category 3.2	Annual mandatory certification
7.2.3.3	Category 3.3	Continuous professional development
7.2.3.4	Category 3.4	Debriefing
7.2.3.5	Category 3.5	Computer learning
7.2.3.6	Category 3.6	Simulation

7.B.5 THEME 1: ORGANISATIONAL FACTORS THAT INFLUENCE THE PERFORMANCE OF REGISTERED NURSES AND NURSE MANAGERS WHEN THEY PROVIDE CPR

The major theme that emerged during the data analysis was that various organisational factors undermine, diminish and subvert the capacity of registered nurses to perform CPR wherever it may be required. All the other categories and themes can be derived from this central theme. The perceptions that were shared by the participants provided a number of insights into the realities that are faced by nurse managers who work in the two referral hospitals.

Table 7.B.3 Organisational factors that influence the performance of registered nurses and nurse managers when they provide CPR

Data display 7.2.1	Theme	Organisational factors that influence the performance of registered nurses and nurse managers when they provide CPR
7.2.1.1	Category 1.1	Human resources
7.2.1.2.	Category 1.2	Lack of in-service education
7.2.1.3	Category 1.3	Lack of resuscitation team
7.2.1.4	Category 1.4	Policies and standards
7.2.1.5	Category 1.5	Lack of mandatory training
7.2.1.6	Category 1.6	Lack of policy on DNAR
7.2.1.7	Category 1.7	Ethical conflicts (different perspectives in relation to resuscitating HIV/AIDS client.

7.B.51 Category 1.1: Human resources

A shortage of human resources affects the quality of care that is provided for patients who suffer cardiac arrest. The participants in the interview agreed that the shortage of nurses and doctors delays the inception of CPR after cardiac arrest. Staff shortages also mean that those nurses who are employed in hospitals are usually severely overworked and frustrated.

The following responses from respondents shed light on the lack of necessary human resources in the two referral hospitals.

Table 7.B.3.a Human resources

Data display 7.2.1.1 Human resources
<ul style="list-style-type: none"> • I would say that there is a shortage of staff when need arises and there is delay from the doctors to come. You are stuck and end up giving the resuscitation. • Getting the doctor during the resuscitation is very difficult. The doctor who is on call is not available on time. Shortage of doctors is there always. • We have a shortage of staff. Staff will be nervous most of the time. • Doctors come late during resuscitation since he will be covering the [whole] hospital. • Night duty only two nurses work. During the resuscitation one will be resuscitating the patient alone. The other one will call the doctor. • Doctors are not there always since there is a shortage and sometimes one doctor covers the hospital. Nurses they panic and doctors are not experienced.

Staff shortages were frequently mentioned as an important factor influencing decision making. Bucknall (2003:310) notes that staff shortages mean that fewer experienced nurses will be on duty at any one time, and that this inevitably compromises the quality of

patient care. Bucknall (2003:310) adds that staff shortages invariably affect the quality of decision making because there are fewer experienced nurses on hand when critical situations arise. Nurses from a study conducted in Jordan expressed similar opinions about the effect of staff shortages (Hamaideh et al 2008:40). Staff shortages dramatically increase the workload that each individual nurse is required to carry, and the resultant strain of being overworked and overextended is the major stressor among nurses who work in such conditions.

One of the participants from ICU commented:

We are stressed up due to shortage of staff. No doctors sleep in ICU. Calling the doctors from home take time. Suppose if two patients go in to cardiac arrest it is difficult to resuscitate the patient and we are expected to produce positive result. When the prognosis is poor, nobody writes "Do Not Attempt Resuscitation".

The nurses who took part in the study felt that that it crucially important to increase the number of nurses who are employed in hospitals because a more favourable staff-patient ratio would enable nurses to perform vital interventions safely and correctly without the actions are generated by too much work and unrealistic responsibilities. The participants also suggested that a more sophisticated communication system should be available in the hospitals to summon emergency staff. Unfavourable staff-patient ratios constitute one of the most serious threats to the safety of patients and the well-being of nurses. Evidence suggests that better patient outcomes occur when more registered nurses are employed by our hospital than when licensed practical nurses or nursing assistants are employed to perform functions that would normally be performed by registered nurses (Needleman, Buerhuas, Matlke, Stewart & Zelevinsky 2002:1715). The AACN (2005:29) recommends that healthcare organisations put formal processes in place to evaluate the effect of staffing decisions on patient and system outcomes. Such evaluations would be able to identify mismatches between the needs of patient and the competencies of nurses, and would be a precursor to implementing contingency plans.

Various studies undertaken by Aiken, Clark and Sloane (2002:5); Kane, Shamliyan, Mueller, Duval and Wilt (2007:1195), and by Tourangeau, Cranelly and Jeffs (2006:4) have

clearly demonstrated that an unfavourable balance between nurses and patients exert a negative effect on patient outcomes and that these manifest (inter alia) as much higher mortality rates and a much higher percentage of failed resuscitation attempts. According to Aiken et al (2002:5), favourable staff-patient ratios result in a far better standard and quality of patient care. The study by Aiken et al (2002:5) notes that since poorly organised and dysfunctional practice environments can negate the benefits of an excellent staff-patient ratio, health care organisations should accord priority to ensuring the necessary conditions and resources that will enable clinicians to deliver a higher quality of patient care. Quality health care is enabled by better communication among the members of teams, between nurse managers and physicians, by efficient clinical leadership and by increased levels of openness and trust between health care professionals (Stordeur et al 2006:45). Leonard et al (2004:i85) support this finding by maintaining that effective leaders have the effect of “flattening” the rigidity of the pyramid-shaped hierarchy, and that this in turn creates familiarity and trust between the health care professionals who work in the organisation. The remoteness, grandiosity and alienation created by authoritarian leadership styles usually inhibit the provision of the quality patient care and contribute to a lack of motivation and self-esteem among those who work within an institution. The research undertaken by Gillespie and Melby (2003:843) demonstrated that a lack of support and encouragement from those in managerial positions, as well as poor leadership and authoritarian management styles, served to increase the level of stress among ward nurses.

7.B.5.2 Category 1.2: An absence of in-service education

Continuous professional in-service education is indispensable for maintaining and improving a nurse’s professional knowledge and competence (NMC 2008 [2]). According to the Pew Health Professions Commission (1998:22) some of the benefits of in-service education are:

- a sense of personal satisfaction
- the development of professional growth
- the reinforcement of critical thinking abilities
- the preparation of nurses for practice in a dynamic health care delivery system
- an increased awareness of extent to which the needs of clients, families and communities are not being met (Pew Health Professions Commission 1998:22).

During the interview, participants indicated that there are no permanent units or hospital in-service educational programmes for reinforcing CPR skills and knowledge, and that such reinforcement is not offered on a regular basis by either of the two hospitals.

Verplancke et al (2008:75) reported that there were nurses in his study who had last attended a CPR refresher training course 18 months prior to his investigation. Cox, James & Hunt (2006:283) were also of the opinion that nurses required specific forms of training and in-service education that were based on the specific clinical skill deficiencies that had been identified at the level of the unit in which they operated.

The following responses were obtained with regard to a lack of in-service training programmes.

Table 7.B.3.b Absence of in-service education

Data display 7.2.1.2 An absence of in-service education
<ul style="list-style-type: none"> • In our unit we never had any CPR in-service for the past one year. • No in-service was conducted for the past one year. The reasons for that are shortages of manpower. Nurses are overworked and overwhelmed by the work. No relaxation and nurses are stressed. So nobody shows interest for unit in-service. • Three years back I was taught about CPR. After the school I didn't have exposure. Nurse managers are not exposed to CPR training. But no unit in-service was conducted on regular basis.

According to a report of the **Department of Health of the UK (2007:3)**, specific forms of education need to be responsive to the actual deficiencies manifested by nurses who operate in an ever-changing healthcare environment. These recommendations are equally applicable to Botswana if the country hopes to be able to maintain viable standards of health care and treatment. The literature identifies some of the barriers that hinder the establishment and delivery of in-service education. They are staff shortages, a lack of available venues, the absence of any kind of encouragement from managers, shortages of funding, and the inequitable selection of staff for continuing education (Ryan 2003:498). According to Balard & Karen (2003:4), it is a nurse's professional responsibility to maintain certain basic standards of safety incompetence through engagement in lifelong learning. It is therefore important for the nurses to make informed choices about their future educational progress and the specialities in which they would like to be certified.

A study conducted in Australia by Halcomb et al (2009:201) showed that there was a much greater perceived need (75.6%) among general *practising* nurses for programmes that would reinforce their competencies in CPR and first aid.

7.B.5.3 Category 1.3: Lack of a resuscitation team

Since team work is one of the most fundamental formats for health care delivery, and the ability to call upon the services of an efficient resuscitation team during CPR is a basic condition for successful CPR. Teams are most effective when those who are responsible for organising and maintaining teams have a clear idea, not only of the particular skills and competencies of each individual team member, but also of the personal attitudes of each individual team member towards the task that he or she has to perform (Cooper & Wakelam 1999:27).

Respondents expressed the following opinions about the lack of a resuscitation team in the hospital:

Table 7.B.3.c Lack of a resuscitation team

Data display 7.2.1.3 Lack of a resuscitation team
<ul style="list-style-type: none"> • Lack of team work among ourselves. The most important person is doctor and he should be there to take decision. But they take time to come. • Resuscitation is a team work. Instructions are not given clearly to the nurses. Even the doctors lack basic skills. Lack of standards. • Doctors come late during resuscitation. We nurses lose motivation and draw back ourselves. • Resuscitation is a team work. Some doctors don't know anything. They have an attitude. Even doctors don't know how to do CPR. • Team leader is not there to lead the team. No standards. Each will approach the resuscitation in a different way.

The findings of this study reveal the lack of team work that reportedly occurred during resuscitation. According to Meerabeau & Page (1999:29) a competent team leader should be present to coordinate and manage all critical incidents such as cardiac arrest situations. During an attempted cardiac resuscitation, team members dependent heavily on one another and particularly on the expertise of the team leader. When a team leader is inexperienced in dealing with emergency cardiac arrests, the ensuing situation becomes problematic and untenable (Meerabeau & Page 1999:29). A study conducted by Marsch et

al (2004:51) found that the absence of expert leadership behaviour and an explicit distribution of tasks among team members were identified as one of the many human factors that can negatively affect the quality of CPR. Gabbot et al (2005:171) insist that all major health care institutions such as hospitals should have a resuscitation team that can be immediately activated in response to a cardiopulmonary arrest.

The AACN (2005:[20]) emphasise the following requirements:

- Every team member contributes to the achievement of the common goal by acknowledging and respecting individual roles and opinions of each person in the team, by sublimating importance of purely individual and personal differences, by resolving competing interests, and by safeguarding the essential contribution that each member of the team needs to make in order to achieve optimal outcomes.
- Every team member should manifest a high level of personal integrity in all his or her actions, words and interactions.
- Each member of the team should have mastered a range of communication skills because effective collaboration cannot take place in the absence of such skills.
- Each member of the team should demonstrate those particular competencies that are appropriate to his or her role and responsibilities.

Most of the participants in the current study suggested that there should be a team that consists of a doctor, an anaesthetist and a nurse from the critical care units. Increasing efforts to create supportive and efficient health care teams will undoubtedly improve patient outcomes and decrease the current high level of in-hospital mortality rates (Wheelan, Burchill & Tilin 2003:527).

7.B.5.4 Category 1.4: Policies and standards

The responses from the participants from the two referral hospitals confirmed the fact that there were no standardised policies or protocols to guide the practice of CPR.

One participant commented:

When I am providing CPR, I use ambu bag but we are not allowed to use drugs. No policy to guide us as nurses. If something goes wrong, we are responsible. But we end up giving some of the drugs if the patient needs to be resuscitated according to the situation.

Another participant said:

There is no policy to guide us what to do on a particular client. Some of the drugs we need to know what to give in case of emergency.

Another participant was concerned about the policy of risk reduction:

At the time of resuscitation everybody is concerned about saving the life. Sometimes you even forget to wear gloves and [there is] so much risk involved during resuscitation.

Competence is linked to the existence of their policies and procedures because these policies and procedures function as checks and balances in the practice of nursing. Obviously, the lack of such policies and procedures s rise to serious practical dilemmas. The regulatory bodies that are responsible for nursing should devise and mandate the variety of practice guides, acts, rules and regulations to govern the practice of professional nursing so that the public can be protected from the potential harm that frequently occurs in the absence of safe practices. Such acts may be either general in their description of nursing practice or minutely specific in their authorisation of particular tasks and acts in specific situations (Balard & Karen 2003:5). The absence of clear and unambiguous guidelines and policies limits the competence of nurses and gives rise to substandard and even dangerous nursing practices that ultimately affect the well-being of all patients and the overall quality of care (Shuriquie, While & Fitzpatrick 2007:144).

The participants identified the following factors that contribute to practice dilemmas:

Table 7.B.3.d Policies and standards

Data display 7.2.1.4 Policies and standards
<ul style="list-style-type: none">• Limitation in area of practice due to lack of policies.• No resuscitation team with identified roles and responsibilities.• Minimal protection of nurses from infection during resuscitation.• Lack of role clarity resulting in confusion and team work.• No policy on DNAR leaving much of the decision making on the nurses.• Ethical conflicts between doctors and nurses.• Lack of exposure to and training on BLS.

Most of the participants were of the opinion that the Ministry of Health, Botswana, should work in conjunction with the heads of the other government departments to make clear and unambiguous collective decisions about how to develop policies that would improve the quality of care that is offered in the hospitals of Botswana.

Deakin (2005:685) also recommends that health care institutions adhere to clear practice guidelines. Such guidelines should, for example, indicate how and when the nurse should call out the resuscitation team. A “*Do Not Attempt Resuscitation*” policy should be drawn up and communicated to all relevant members of staff. Such a document should serve as a guide for practice and it should be regularly audited and reviewed (Deakin 2005:685). In addition, Deakin (2005:685) also suggests that health care institutions that admit acutely ill patients should at least have a resuscitation team (or its equivalent) available at all times. According to Baskett and Lim (2004:267), only a minority of countries in Europe have a formal “*Do Not Attempt Resuscitation*” policy (this at least was evident in the seven countries in which their research was conducted). A “*Do Not Attempt Resuscitation*” order may be the correct policy to follow in those cases where CPR has been attempted but the patient’s heart and breathing do not revive spontaneously and the expected benefits are clearly outweighed by the continued suffering of the patient (Griffith 2007:229).

Some of the participants in the current study expressed the opinion that a “*Do Not Attempt Resuscitation*” policy should not be implemented and that nature should be allowed to take its course. Since the decision to implement the policy on “*Do Not Attempt Resuscitation*” is influenced by personal as well as cultural, religious and traditional beliefs of many kinds, the public has to be sensitized and educated before such a policy can be implemented. The AACN(2006:[2]) recommends that the topics to deal with when considering end-of life care competencies should include information about population dynamics, comfort care,

communication, cultural diversity, symptom management, holistic treatment, grief, legal and ethical issues and the application of knowledge.

7.B.5.5 Category 1.5: Lack of mandatory training

The participants in the study noted that if there were a mandatory training on BLS, it would create uniform practice among nurses.

One participant noted:

Most of the time, nurses are posted to the hospitals straightaway without any training. When the situation arises, the new graduate nurses don't know what to do during the emergency.

The following responses were obtained on the issue of mandatory training in CPR.

Table 7.B.3.e Lack of mandatory training

Data display 7.2.1.5 Lack of mandatory training
<ul style="list-style-type: none">• Nurses learn CPR at school. But there is no practice afterwards. If it is mandatory everybody will have the same knowledge and skills.• Everybody should have a BLS certificate before entering into the service. It is a life-saving procedure and it is an added advantage.• Nurses should have BLS certificate. We have to move with other countries.• BLS should be not only for the entrants. Even those who are in the service should have certificate.• During training we are shown CPR once on the dolls. Then we are expected to perform alone even with the junior nurses. If it is made as compulsory, I think it will improve our competency and also help us to know the correct way it is being done.• Annual mandatory [training] should be there. Imagine you are a qualified nurse, come to the ward don't know what to do, and you can't save somebody's life. It should be a priority.

The findings of the present study were confirmed by research conducted in Nigeria by Desalu et al (2006:517). In this study it was reported that since there was no resuscitation council to oversee annual mandatory certification in Nigeria, there could therefore be no annual updating of CPR training skills within the health sector of Nigeria.

According to Gabbot et al (2006:171), it is up to the health care institutions themselves to ensure that their staff members receive adequate training in resuscitation on a regular basis so that their nurses can maintain their level of competence. Gabbot et al (2005:171)

are of the opinion that nurses who work in the clinical area should update their skills annually. Jevon (2004:28) further insists that nurses should be encouraged to develop skills such as using airway adjuncts, intra venous canulation, ECG recognition, the administration of specific drugs and defibrillation. New staff members should have resuscitation training as a compulsory part of their induction programme, and all training should be recorded in a central data base system (Jevon 2004:28).

One nurse manager from a paediatric ward commented:

Nurses are very reluctant to give medications and canulate the patient during resuscitation.

Gabbot et al (2005:171) recommend that nurses extend their skills and be encouraged to learn the use of airway adjuncts, intravenous canulation, rhythm recognition, manual defibrillation and the administration of specific drugs in resuscitation. The professional associations, private testing companies and speciality boards should all have a hand in assessing the professional competence of nurses (Whittaker et al 2000:2). Mandatory certification can be used to demonstrate proficiency and expertise in the practice of nursing or even expertise in a specific role. In the UK (Drey et al 2009:740), and in Australia (Halcomb et al 2009:201), mandatory updating has been introduced in the nursing profession, and such updating has become compulsory for nurses who wish to maintain their registration.

7.B.5.6 Category 1.6: Lack of policy on “Do Not Attempt Resuscitation” (DNAR)

The issues surrounding the formulation and implementation of “Do Not Attempt Resuscitation” decisions in the event of cardiac or respiratory arrest are among the most sensitive ethical dilemmas that nurses to cope with in their daily practice (NMC 2006:6). Although a “Do Not Attempt Resuscitation” order is specifically concerned with resuscitation, those patients who have been given “Do Not Attempt Resuscitation” status are potentially at risk of receiving much less attention and help than other patients. The participants stated that they encountered ethical dilemmas because of the lack of an existing policy in the two referral hospitals.

The following responses were among those that were given by participants in connection with the “Do Not Attempt Resuscitation” issue.

Table 7.B.3.f Lack of policy on “Do Not Attempt Resuscitation”

Data display 7.2.1.6 “Do Not Attempt Resuscitation”
<ul style="list-style-type: none">• We don't have a policy on this. Terminally ill-you should come up with your own discretion.• Policy on DNAR. Never seen it! It is very important. We need to explain [it] to the relatives. When they ask if there is policy, we don't know what to tell [them].• Most of the policies are traditional. Policy should be defined well [about] whom to resuscitate and whom not.• No policy available for a medico-legal approach. Verbal actions and words are not safe and will not protect us from legal problems.• No policy available. But we need to educate and sensitize [people to] DNAR. Otherwise it will form a loophole. By understanding the policy, it doesn't mean that you don't provide care.• No policy available. After the assessment of the brain dead, if there is policy other patients can benefit by the facilities. It is necessary to have policy to cover us legally.• There should be a policy. Nurses we feel why do CPR for terminally ill patient? Policy will guide us. Not to fold our arms to say, “God has to take his course.”

One participant said:

DNAR policy is not available. As a nurse, we need to save life. So it is not necessary to have the policy.

According to Baskett and Lim (2004:267), attitudes to ethical matters may be dictated by existing laws, by the government that is currently in power, by prevailing religious beliefs, by medical tradition, and by various social, cultural and economic factors. The policy of some hospitals permits nurses to abandon a CPR if the duration of a cardiac arrest exceeds 20 minutes of asystole in the absence of a reversible cause (Holm & Jorgensen 2001:135). The participants expressed different opinions during the data collection process. A decision to end a resuscitation attempt will need to be dealt with in a sensitive manner because it involves the feelings and sentiments of family members. Ideally it is the leader of a resuscitation team who should be delegated to make a decision to discontinue CPR (RCN 2004: [3]). Because of a lack of education and training in difficult and ethical dilemmas, many health care personnel are confronted by such problems. Naess (2009:140) has noted that while healthcare providers are trained in advanced life support skills, they tend to focus far less on ethical issues. The possibility of devising educational encounters, in which both critically ill patients and their next of kin can be brought into the

dialogue, might well lessen the difficulties that currently surround the implementation of DNAR orders and make the whole process more humane, less guilt-ridden and more patient-centred.

7. B.5.7 Category 1.7: Ethical conflicts (different opinions about resuscitating HIV/AIDS clients)

Although the actual risk of transmission during mouth-to-mouth ventilation is very low, many health care workers including physicians and nurses remained fearful of becoming infected with HIV while on the job (Owotade et al 2003:228, cited by Oyeyemi et al 2008:11). Because many nursing procedures involve activities in which contact with blood and bodily fluids are a real possibility, the intrinsic nature of the CPR procedure might disturb some nurses when they are required to perform a procedure of this kind on an AIDS clients. Nurses in Africa also face daily challenges when they make decisions in which they have to balance their own long-term safety needs against the immediate survival needs of their patients (Ehlers 2006:657).

The following opinions were provided by participants on the issue of whether HIV/AIDS clients should be resuscitating or not.

Table 7.B.3.g Ethical conflicts/Different attitudes towards the resuscitation of HIV/AIDS clients

Data display 7.2.1.7 Different attitudes towards the resuscitation of HIV/AIDS clients	
<ul style="list-style-type: none"> • We need to have a policy on resuscitating HIV/AIDS clients. I really feel that I should do something for the patient. Sometimes you get a patient with Kaposi’s sarcoma that has affected his lungs. You try to put on oxygen so that the patient can die peacefully. • Everybody [has a right to] the same treatment. So, regardless of the condition, a patient should be resuscitated. • No policy in relation to HIV/AIDS. I realised that doctors are reluctant to perform CPR. There is a belief [that states] “Terminally ill means no CPR”. But to me they should be resuscitated until the last. God has to help the nature to take its own course. • As long as universal precautions are adhered, CPR can be offered to all the patients. • Well there is no policy existing. It is like any other condition. We need to take universal precautions. If you have a policy, there is segregation anyhow. • Doctors are reluctant to perform CPR on chronically ill. 	

Most of the participants felt that there should not be any difference between resuscitating HIV/AIDS clients and clients who are not infected with HIV. The findings of the current

research are different from those in previous studies. According to Oyeyemi et al (2008:11), a majority of nurses were either very uncomfortable or less comfortable when administering mouth-to mouth resuscitation to people who were living with AIDS. Although the reluctance of these nurses to apply this procedure might not imply that they would actually refuse to resuscitate a patient infected with HIV, it might well mean that the resuscitating could be delayed or even denied to people with AIDS, when it was clearly necessary. The reluctance that many nurses express to engage in resuscitation attempts (when compared with other procedures), suggests that mouth-to-mouth resuscitation has created a much greater fear of contagion than any other routine hospital and medical procedures. Fear of contagion indicates that most of the medical personnel in their study would prefer some type of barrier device when initiating any kind of mouth-to-mouth ventilation.

The findings of the present research were that, so long as the universal precautions against contagion were strictly adhered to, resuscitation should be continued regardless of the status of the client. Because of the very high rate of HIV/AIDS infection that exists in Botswana and adjoining countries, this can be regarded as an extremely positive response on the part of the participants in this study. Since the breath of life is vital for reviving a patient during cardiac or respiratory arrest, all health care professionals should be willing to resuscitate any needy patient unless a specific *“Do Not Attempt Resuscitation”* order has been authorised.

7.B.6 Theme 2: Factors that limit the performance of registered nurses and nurse managers during the provision of CPR

Table 7.B.4 sets out the factors that limit the performance of nurses and nurse managers.

Table 7.B.4 Theme 2: Factors that limit the performance of nurses and nurse managers during the provision of CPR

Data display 7.2.2		Themes and categories
7.2.2.1	2.1	Lack of CPR knowledge and skills among nurses, nurse managers and doctors
7.2.2.2	2.2	Lack of availability of equipment and drugs
7.2.2.3	2.3	Inconsistent practice
7.2.2.4	2.4	Lack of confidence and feelings of inadequacy
7.2.2.5	2.5	Stress that is caused by an overwhelming workload
7.2.2.6	2.6	Lack of incentives
7.2.2.7	2.7	Lack of guidelines
7.2.2.8	2.8	Attitude of the doctors
7.2.2.9	2.9	Communication barrier
7.2.2.10	2.10	Lack of adequate spacing

7.B.6.1 Category 2.1: Lack of CPR knowledge and skills among nurses, nurse managers and doctors

Various studies have reported poor retention of CPR knowledge and skills among doctors and nurses (Badger & Rawstone 1998:231; Hemming et al 2003:254). While the immediate provision of CPR is crucial for optimising patient outcomes in cardiac arrest (Hopstock 2008:425). Abella et al (2005:305) recently demonstrated that the rate and depth of chest compressions were mostly too shallow during in-hospital resuscitation attempts. The participants in this study indicated that most of the nurses and doctors lacked the necessary CPR knowledge and skills. In the table 7.B.4.a, the participants' responses to CPR knowledge and skills are set out.

Table 7.B.4.a Deficiencies in CPR knowledge and skills among nurses, nurse managers and doctors

Data display 7.2.2.1
Deficiencies in CPR knowledge and skills among nurses, nurse managers and doctors
<ul style="list-style-type: none"> • Nurses are not sure of what to do during emergency. Even some doctors don't know how to check the patient during an emergency. They lack knowledge and don't know the equipment in the emergency trolley. • A lot of doctors and nurses can't recognize cardiac arrest on time. You have to teach and coach them. It is always done haphazardly. • Nurses are not well prepared on what to do during emergency. They get panic when it comes as emergency procedure even though they have gone through the training. • Some nurses get lost. Doctors respond sluggishly, shy away from the participation and lazy to start resuscitation. • Nurses and doctors are confused. No coordination and confusion since they lack knowledge. Some even don't know what is laryngoscope and they waste time. • Most of the nurses have inadequate knowledge and panic during CPR. Nurses they panic and doctors are not experienced.

Consistent with these findings are the findings from studies conducted in the UK Iran and Ireland had also identified deficiencies in the CPR knowledge and skills of nurses (Delvin 1999:201; Madden 2006:218; Nikandish et al 2007:321. According to Delvin (1999:201), nurses not only need to be able to perform individual skills competently, but they also need to be able to modify their performance in response to changes in a patient's condition. The findings of Nikandish et al (2007:321) were consistent with those in the literature when they characterised the BLS skills of nurses as generally poor – even shortly after they had been trained. Madden (2006:218) reports that since the CPR knowledge and skills of nurses are decisive for the survival of a patient after cardiac arrest, hence it is essential for nurses to possess the necessary CPR knowledge and skills. Regge et al (2008:283) also identified a wide variability in CPR skills among nurses. Verplancke et al (2008:75) pointed out that an increase in the frequency of training is likely to improve CPR skills. Recent studies undertaken by Edgren et al (2009:e79) and Hopstock (2008:16) also confirmed that nurses lack the necessary CPR knowledge and skills.

7.B.6.2 Category 2.2: Lack of availability of equipment and drugs

The availability of proper equipment and drugs plays a major role in the survival of a cardiac arrest victim. According to Soar and McKay (1998:145), a cardiac arrest trolley in any hospital should be equipped with a defibrillator, and cardiac arrest drugs should be perpetually available in every ward. The participants in their study explained that they became deeply anxious during cardiac arrest events because of the non-availability of functional equipment. The following data display sets out the responses of the participants to the unavailability of the necessary equipment and drugs are.

Table 7.B.4.b Lack of availability of equipment and drugs

Data display 7.2.2.2 Lack of availability of equipment and drugs
<ul style="list-style-type: none"> • In our ward no emergency trolley. We improvise and the trolley is not fully equipped. • CPR is a team work. Nurses run around, looking for ambu bag and waste time. Emergency trolley is not equipped well. Shortage of equipment and drugs forms a barrier. • In our ward no board. So compressions are not successful. Oxygen outlets are off. Sometimes in the ward floor beds no adequate space to provide CPR. • Defibrillator not all of them can operate. Doctors don't know how to operate defibrillator. Spacing in the unit is a problem. Congestion and spacing prevents somebody to work at the fullest capacity. • In my unit, we experience lack of equipment such as a hard board. Non-functioning defibrillator and

sometimes even the K-Y gel is not available, pulse oxymeter and cardiac monitors.

- Most of the time our emergency trolley is empty and we don't have drugs.
- In our ward no proper resuscitation trolley. Very old and it is falling apart. No equipment available. Pharmacy does not know anything. Drugs are not available.
- It is cumbersome because of shortage of equipment.

Participants also noted that the emergency trolleys were not properly equipped with what the nurses needed to perform CPR. Some said that they actually had to run into other wards and ask for what was lacking in their own wards. These responses are congruent with findings from other studies. A study by Laws (2001:76), for example, notes that the unavailability and poor quality of equipment influence patient outcomes and result in an enormous degree of stress for the nurses. Suraseranivongse et al (2006:188) point out that the non-availability of a defibrillator causes a delay before ALS can be initiated. Bucknall (2003:310) highlights the influence of resource availability on the quality of care – and of critical care in particular. The availability or unavailability directly affects the nurse's autonomy, the nature of the workload and the quality of patient care that can be delivered (Bucknall 2003:310). Kavari and Keshtkaran (2005:1) agree that if equipment is not available or if it malfunctions, the possibility of resuscitating a patient successfully becomes even more remote than in optimal circumstances.

Regge et al (2008:283) citing Perkins et al (2003:2330), were of the opinion that it was necessary to use a backboard during resuscitation because they have not been shown to improve the depth of compressions. The participants in the current study would not have agreed with this finding because it was their opinion that a hard board helped them to make the correct depth of compressions.

The participants proposed the following measures to resolve the shortage of the equipment. They were of the opinion that the management of the hospital should provide:

- a sufficient number of emergency trolleys
- functioning defibrillators, cardiac monitors and pulse oxymeters
- an adequate supply of emergency drugs

One participant also felt that it was important that the pharmacy department of the hospital should be informed of the importance of supplying emergency drugs to all those departments that might need them instead of reserving them only for the critical care unit.

It is inevitable that efficiency will increase if caregivers are supplied with functional and well-serviced equipment. Life-saving procedures in emergency situations should never be compromised because of malfunctioning of equipment. If inventories are consistently updated and thorough checks are routinely performed, those who are responsible for maintaining the equipment can be notified before the equipment is needed in an emergency.

7.B.6.3 Category 2.3: Inconsistent practice

The participants stated that inconsistent practice created difficulties and that hindered their performance during the provision of CPR.

One participant expressed it thus:

Nurses are not sure what to do during emergency. Even some doctors don't know how to check and how to act during an emergency.

Another participant added:

Things are not well in place. No standards and different approach. Each one will approach it in a different way. Structures are not explicitly stated. Different schools of thoughts so no standards.

A participant from intensive care unit expressed the same opinions:

Nobody knows about the guidelines and don't follow the guidelines. Haphazard way of doing things during resuscitation and some confused, panic and don't know what to do.

The participants stated that the problems experienced by nurses because of inconsistent practice were:

- the loss of valuable time during resuscitation

- a state of uncertainty about what to do
- an increased potential for inefficiency and the inadequate provision of life- saving services
- an increased potential for negligence and errors of omission

Pups et al (1997:59) stated that if hospitals wished to improve their consistency in the practice of BLS; they should adopt standardised protocols because these would forestall any differences in practice between critical care nurses and nurses from the other clinical areas. Ranse & Arbon (2008:38) support these recommendations and agree that a lack of preparedness during resuscitation often results in a loss of critical time before an intervention is applied, and this decreases a patient’s chances of survival even more. But such protocols can only be implemented after a considerable amount of training and preparation in BLS and ACLS. Similar opinions were expressed by all the participants in the current research.

7.B.6.4 Category 2.4: Lack of confidence/feelings of inadequacy

A lack of confidence and feelings of inadequacy were experienced as barriers to the provision of effective CPR by some nurse managers. According to Hopstock (2008:425), CPR training for health personnel result in high levels of confidence but low levels of skills shortly after training. This mismatch between levels of confidence and the poor retention of skills is a basic problem in resuscitation training. The following statements were made by participants with regard to a lack of confidence and feelings of inadequacy.

Table 7.B.4.d Lack of confidence/feelings of inadequacy

Data display 7.2.2.4 Lack of confidence/feelings of inadequacy
<ul style="list-style-type: none"> • I would say that my experience in CPR is that we get scared and afraid when situation arises. People those who don't have experience, you work with them, they don't know what to do. We feel failed. That forms a barrier. • Nurses are not well prepared on what to do during emergency. Panic, scared when it comes as a emergency procedure even though they have gone through training. • Many nurses in my unit can't function independently since they are not exposed to CPR frequently. So nurses are not confident and competent. They rely on managers. But some mangers also don't have exposure.

The responses from the participants showed that the nurses lacked confidence and competence during the resuscitation. The Nursing and Midwifery Council of the UK (2004: [1]) defines the term *competency* to mean “the skills and ability to practice safely and effectively without the need for being supervised directly”. Adequate nursing practice in CPR is, however, only attainable when a complex combination of knowledge, performance, skills and attitudes in the performance of CPR are brought into play. According to the theory of planned behaviour, people are more likely to develop competency if they believe that they are capable of performing CPR and that CPR is easy (Dwyer & Williams 2002:85). A study by Verplancke et al (2008:75) demonstrated that increased levels of confidence improved the quality of both compression and ventilation skills. If one therefore sets out to improve the self-confidence of registered nurses by implementing an educational strategy that is designed to do so, their ability to perform better BLS will also be enhanced. A study conducted by Premadasa et al (2008:e60) identified a great variety in the frequency and confidence with which medical interns performed CPR, defibrillation, endotracheal intubation, and that the skills of the respondents in their sample did not meet the required standards. Thomson et al (2006:e139) point out the irony in the fact that incompetent individuals are sometimes inappropriately confident and that competent performers sometimes lack confidence.

7.B.6.5 Category 2.5: Stress caused by an overwhelming workload

Nurses who work in health care setting are bombarded as a great variety and intensity of stressors because of frequent changes in the health care environment. French et al (2000:161), cited by Hamaideh et al (2008:40), list some of the most common workplace stressors as:

- conflict with physician
- the extent of the workload
- problems with peers
- difficulties with leadership and management
- discrimination
- uncertainties about treatment
- the necessity of having to deal with death and with dying patients

The following opinions were expressed by the participants with regard to the kind of stress that is caused by an overwhelming workload.

Table 7.B.4.e Stress caused by an overwhelming workload

Data display 7.2.2.5	
Stress caused by an overwhelming workload	
<ul style="list-style-type: none">• I have experienced shortage of manpower. Sometimes only two nurses will be available during the shift. There will be a panic, confusion to call the doctor.• We have shortage of manpower. Nurses are reluctant to attend workshop or seminar because of the overwork and there is no incentive.• Sometimes we nurse 70 patients and only two nurses will be available during that shift. When we have resuscitation it is very difficult to do justice to our job mainly due to the shortage.• Sometimes I work with a nurse who is not competent; causes lot of stress on me.	

The participants in the present study attributed their stress to an acute shortage of personnel and the non-availability of equipment. Inadequate number of nurses in the wards delayed the immediate initiation of CPR during emergencies. The most significant stressor among Jordanian nurses was identified as excessive workloads (Hamaideh et al 2008:40). Aiken et al (2002:5), Milisen, Abraham, Siebens, Darras and Casterle (2006:745) found that nurses regarded the shortage of trained personnel as one of the most crucial hindrances to the provision of quality care. They also noted that those hospitals with adequate staffing compliments experienced consistently lower mortality rates and failures in resuscitation attempts (Aiken et al 2002:5). Lambert and Lambert (2008:38) identified a lack of organisational support, inadequate resources and excessive workloads (i.e. insufficient equipment, patient care and unit management) as causes of substandard nursing care, while Yam and Shiu (2003:144) identified crucial staff shortages as the reason for stressful work conditions in China and in Hong Kong.

7.B.6.6 Category 2.6: Lack of incentives

It has been noted that nurses commonly entertain negative attitudes towards resuscitation training sessions (Lewis et al 1993:174, cited by Covell 2006:63). It has also been noted that improvements in the attitudes of nurses towards BLS increase their motivation to attend courses and retain knowledge.

One nurse manger made the following comment:

Nurses are reluctant to attend the in-service because there are no incentives for them.

In our unit nurses are not interested to attend in-service because nurses are overworked. No relaxation and no incentives in any form.

A literature review on continuing education in nursing by Furze and Pearcey (1999:353) revealed that nurses in the USA are better paid than nurses in other countries, and that they receive tax deductions for the expenses that they incur when attending continuous education programmes. Nursing and Midwifery Council of the UK (2008: [2]) recommends that the appraisal of continuous professional development needs to be undertaken annually as part of each nurse's performance review, and that a standardised and widely recognized tool should be used for this purpose. Continuous professional development may take a number of forms such as e-learning, the reading of articles in professional journals, work-based learning and the granting of formal study days.

Furze and Pearcey (1999:353) are of the opinion that if continuous professional development is to be maintained, nurses need to be both motivated and self-directed. In spite of this, research conducted by Drey et al (2009:740) produced evidence that senior specialist nurses neither underwent mandatory training nor developmental continuous professional development to update their knowledge of the latest important developments in their field of speciality. A study conducted in Australia by Halcomb et al (2009:201) came to the conclusion that there are very limited incentives for practising nurses to engage in ongoing professional development other than the motivation that occurs as a result of their own intrinsic desire to maintain their clinical competency and professional standards. It is therefore necessary to create strategies to encourage nurses to engage in education and training and officially to recognise their participation and skill development when they do so (Halcomb et al 2009:201) No system has been introduced by the Nursing and Midwifery Council of Botswana to encourage or promote continuous professional education. The introduction of mandatory continuous professional development is bound to have a positive effect on the attitudes of nurses to their professional development.

7.B.6.7 Category 2.7: Lack of guidelines

The quality of CPR is undoubtedly influenced by the absence of clear guidelines about the procedures that should be followed during resuscitation. Policies designed to promote the quality of CPR should emphasize education, practice and adherence to guidelines that are being drawn up by practising experts in their fields (Brown, Dias, Saini, Cofield, Terndrup, Kaslow & Watchbor 2006:253). Standardised guidelines should be made available in all health care institutions. In the present study, most of the participants expressed a definite need for CPR guidelines that they could use to assess their practice.

We don't have guidelines to say what to do during resuscitation. Nurses' role is limited.

Oxygen and hydrocortisone are given by the nurse. Adrenaline and atropine are given by the doctors.

Most of us don't know how to attend the emergency since there are no guidelines.

Consistent with these conclusions are the findings of Gabbot et al (2005:171) who recommend that resuscitation committees should be made responsible for ensuring adherence to national resuscitation guidelines and standards. Brown et al (2006:253) produced evidence to show that when a rescuer understands and adheres to the guidelines, he or she is far more likely to perform correct compressions and ventilations. Brown et al (2006:253) also agree that the degree of familiarity with CPR guidelines is an indisputable determinant of the quality of performance of some aspects of CPR. Because there is no resuscitation council currently exists in Botswana to oversee the practice of CPR, one witnesses the kind of deficiencies in the provision of CPR that are described by the participants in this research.

7.B.6.8 Category 2.8: Attitude of the doctors

Since cardiac arrest is always a highly stressful event, nurses are frequently nervous about being involved in resuscitation and treatment (Page & Meerabeau 1996:317). But this kind

of stress can be aggravated by friction between the nurses and the physicians, by equipment that malfunctions and by general disorganisation and lack of method.

The participants made the following comments:

Some doctors respond very sluggishly and shy away from the participation and lazy to start the resuscitation.

Doctors are reluctant to perform CPR on chronically ill patients. Some come late during resuscitation intentionally.

Some doctors don't know anything. That is why they have an attitude. They also need education on CPR.

The following suggestions to improve the situation were made by the participants:

Since CPR and BSL skills also crucial for doctors, they too should be educated in these skills and techniques. An annual certification in CPR and BLS proficiency should also be compulsory for doctors. Pups et al (1997:59) reported that the behaviour and attitudes of physicians aggravated conditions during resuscitation attempts, and that the absence of any defined protocols frequently caused chaos and confusion. Pups et al (1997:59) feel that a supportive environment and the adequate preparation of *all* hospital staff will undoubtedly improve the therapeutic environment. The personal characteristics and preparedness of physicians also influence the outcome of patient care. In support of this point of view, Gallagher and Blegan (2009:106) maintain if clinicians possess up-to-date CPR knowledge and skills, all kinds of disasters and mistakes can be prevented and effective strategies can be instituted for reducing the harm that is done to patients.

Leonard et al (2004:i85) are of the opinion that stress and fatigue, distractions and interruptions, negative attitudes, and a limited ability to multitask make it certain that even skilled experienced health care providers will make mistakes. Post-arrest peer debriefing sessions in which nurses and doctors can review their performance and give vent to their emotions may facilitate learning and reduce the currently high levels of stress and the negative responses that accompany resuscitation attempts and other therapeutic

procedures (Drotske & De Villiers 2007:17a; Pups et al 1997:59, cited by Dwyer & Williams 2002:85).

7.B.6.9 Category 2.9: Communication barriers

Valuable time is wasted when a nurse has to make several telephone calls to summon a doctor or another qualified health care provider (Strzyzewski 2006:10). The participants in this study expressed serious reservations about the hospitals. The following data display lists some of the participants' responses

Table 7.B.4.e Communication barriers

Data display 7.2.2.9 Communication barriers	
<ul style="list-style-type: none">• Sometimes if you bleep the doctor or anaesthetist, you can't reach them. And many doctors sleep at home.• In ICU, no doctors sleep. Calling the doctor from home takes time. No doctors placed in ICU.• Usually doctors are not there during resuscitation. Doctors take time to come from home. Our bleeps most of the time do not work.	

Teamwork frequently disintegrates because of factors that could be avoided. One of the obstacles that impede efficiency and that is mentioned in the literature is *communication* (Meerabeau & Page 1999:29). The participants expressed the view that if it were possible to organise a resuscitation team that included a anaesthetist, a surgeon, a physician and a critical-care-trained nurse, such a team would be able to meet the challenges of any cardiac arrest.

Gabbot et al (2005:171) recommend that the members of a resuscitation team should be summoned to all cardiopulmonary arrests by the use of a common dedicated telephone number. All institutions should ensure that the resuscitation team is activated within 30 seconds of the call for help (Gabbot et al 2005:171). The lack of any standardised communication procedures increases the likelihood of communication failure, and this in turn increases the probability of patient harm, the length of stay, the use of resources, caregiver dissatisfaction and accelerated rates of staff turnover (Leonard et al 2004:i85). Effective communication reduces a likelihood of avoidable errors and increases the safety of patients (Leonard et al 2004:i85). Intimidating behaviour and deficient interpersonal relationships result in mistrust, chronic stress and dissatisfaction among nurses. According

to the AACN (2005:10) a healthcare organisation is responsible for establishing systems that require individuals and teams to formally evaluate the impact of the quality of their communication on clinical, financial and work environment outcomes.

7.B.6.10 Category 2.10: Lack of adequate spacing

Inadequate spacing was regarded as a barrier by some of the participants.

In A&E, spacing in the unit is a problem. Congestion and spacing and we expect somebody to function at the fullest capacity.

In our ward patients are on the floor so we can't move the victim. Space is inadequate and mobility is affected during resuscitation.

According to Bucknall (2003:310), an open and spacious layout in a unit not only improves morale; it also enables health care staff to accommodate their own needs and the needs of patients. Nurses experienced the cramped and stressful environments in which they were compelled to work both physically dangerous and subversive of their decision making (Bucknall 2003:310). The concerns expressed by the participants in the study are similar to those expressed by Bucknall (2003:310).

7.B.7 THEME 3: TRAINING AND DEVELOPMENT NEEDS OF THE REGISTERED NURSES AND THE NURSE MANAGERS

Table 7.B.5 Theme 3: Training and development needs of the registered nurses and nurse managers

Data display 7.2.3	Theme	7.2.3 Categories and themes
7.2.3.1	3.1	Role of nursing council
7.2.3.2	3.2	Annual mandatory certification
7.2.3.3	3.3	Continuous professional development
7.2.3.4	3.4	Debriefing after participating in CPR
7.2.3.5	3.5	Computer learning
7.2.3.6	3.6	Simulation

7.B.7.1 Category 3.1: Role of nursing council

The primary function of a Nursing and Midwifery Council in any country is to protect the public by setting professional standards and by giving guidance to registered nurses, midwives and specialist community public health nurses (Nursing and Midwifery Council of the UK 2002:[2]). The participants indicated that the Nursing and Midwifery Council of Botswana had produced no explicit policies about CPR. This absence of accredited standards hampered the function and performance of the registered nurses during resuscitation.

Table 7.B.5.a Role of nursing council

Data display 7.2.3.1 Role of nursing council
<ul style="list-style-type: none">• Every professional should have BLS certificate. If nursing council includes in the scope of practice then it is a mandatory for all of us.• Yes, nursing council should include BLS in their scope of practice. It helps nurses to get adequate exposure and also increase uniformity.• Nursing Council should include BLS in their scope of practice since it is a key procedure. It helps to add quality of life. For a better practice it should be included.• Nursing is somebody's life. Nursing Council should include BLS in their scope of practice.• It will help a lot. To maintain uniformity. It should not be an individual interest. It will make everybody competent and confident.

The proper educational and clinical preparation of nurses is essential if they are expected to deal with emergency situations. The Nursing and Midwifery Council of the UK (NMC 2006:[2]) makes the following statement about resuscitation: "When caring for patients with life threatening and life limiting conditions, the registrants fulfil this requirement when initiating appropriate resuscitation measures if the patients suffer cardiac or respiratory arrests provided that a "Do Not Attempt Resuscitation" decision has not been made. Wherever no training programme exists, the general nurses who work in hospitals can only gain their experience from real-life emergency situations and the performance of CPR in such situations from a basis of limited knowledge and skills.

Most of the participants felt that they had not been adequately prepared for the provision of CPR. They also stated that they had neither been oriented to nor trained in BLS.

I have done CPR long before. I don't have practice afterwards.

When I was inexperienced I used to have fears while performing CPR. I paid myself and got the certificate. Nursing Council manuals from Botswana are incomplete.

Most of us are not taught about CPR. I once saw it in the male medical ward.

The participants expressed the view that the Nursing and Midwifery Council of Botswana should include BLS in the regulated scope of practice in order to create uniformity throughout the country. Covell (2006:63) suggests that all nurses who are in active employment should be able to certify their competency in CPR by demonstrating the necessary psychomotor skills and cognitive skills. Covell also feels that the staff nurses should demonstrate the appropriate competency is at least once a year (Covell 2006:63). To maintain uniformity in practice, the Nursing and Midwifery Council of Botswana should consider introducing BLS certification as a mandatory requirement prior to employment. The Pew Health Professions Commission recommends that state licensing or regulatory boards should require nurses to demonstrate their competence on a regular basis, laying emphasis on assessment of professional competence to be carried out by professional associations, private testing companies and speciality boards (Whittaker, Carson & Smolenski 2000:4).

7.B.7.2 Category 3.2: Annual mandatory certification

The following data display records the responses of the participants to the possibility of annual mandatory certification.

Table 7.B.5.b Annual mandatory certification

Data display 7.2.3.2 Annual mandatory certification
<ul style="list-style-type: none">• I think it is important. Nurses are from school. If they have mandatory certificate, then they wouldn't come to the situation to come to the clinical area as a new nurse and don't know what to do in an emergency situation.• Nurses learn CPR at school. But there is no practice afterwards. If it is an mandatory. Everybody will have the same knowledge and skills.• Annual mandatory helps to update the necessary knowledge and skills. It helps the nurses to function independently during the absence of doctors.• During training we were shown CPR on dolls once. If the certification is awarded before employment. I think it will help us to know the correct way of doing it. It will help to improve our competency and help us to know the correct way it is being done.

All the nurse managers expressed their belief in annual mandatory BLS certification so that clinical practice could be improved. Gabbot et al (2005:171) assert that all clinical staff should update their BLS skills annually. Hanefeld, Lichte, Mentges-Schroter, Sirtl & Mugge (2005:167) agree about the importance of a minimal standard of competence, and they recommend that all clinical members of staff who are employed in a clinical institution should undertake mandatory training in BLS and attend compulsory annual refresher training. Speciality certification is one method of validating a registered nurse's knowledge in a specific area of practice (Gallagher et al 2009:106). Evidence suggests that certified nurses perform better than non-certified nurses when tested on their knowledge of their speciality (Landon 2008:1365). Several barriers need to be overcome before certification will be widely sought by nurses. Fewer nurses are seeking certification today because of the prohibitive cost of certification and because of the limited extrinsic rewards that are accorded to certified nurses. Bekemeier (2007:439) feels that extrinsic rewards motivate nurses to become certified in particular areas of practice. Certification also improves the quality of collaboration and patient outcomes in the long run. Most health care systems will, however, need to find better ways of supporting those nurses who seek certification and of rewarding and recognising those who have taken the trouble to acquire certification (Wade 2009: 183).

7.B.7.3 Category 3.3: Continuous professional development

Nurses had to be prepared to deal with the various aspects of emergency care confidently and competently. In order to do this, nurses need the necessary clinical knowledge and skills that will enable them to initiate and apply treatment in emergency and other situations. According to the Health Professions Council of South Africa (2007: [5]) continuing professional development means “the acquisition of new current knowledge and measurable professional skills with an end benefit to the patient or client”. Some of the responses of participants in this study to continuous professional development are set out in data display.

Table 7.B.5.c Continuous professional development

Data display 7.2.3.3 Continuous professional development
<ul style="list-style-type: none">• All nurses have to be taught CPR regardless of the area of work and regular in-service should be conducted.• Unit and hospital continuous education. CPR should be in fore front. Nurse educator should be in charge for continuous education.• Nurse mangers should take continuous education seriously. Set standards and give test and feedback of CPR. Regular unit in service should be conducted.• Continuous medical education should be there. Things should not wait for workshop. CME should include simulation of CPR and workshop should be conducted.

These participant responses acknowledge the importance of continuous education. Other responses on the part of participants were as follows:

In our unit nurses are there without any exposure to training on CPR. When there is any training we are not called. They neglect our unit and nurses become redundant.

We should have regular continuous in-service education so that we are equipped with current knowledge. Management should organize for continuous education.

The South African Nursing Council plans to use regulation 58 of the Nursing Act of 2005 (Republic of South Africa Act 33 of 2005) to draw up certain rules that will regulate conditions for continuing professional development. In terms of such rules, practitioners will only be able to retain their registration if they comply with the criteria for recognition that governs the provision of certain services in health care institutions. The Health Professions Council of South Africa (2007:[5]) has stipulated that medical practitioners must accumulate 30 continuing education units for continuing professional development annually. There are however no such regulations currently for the nursing profession in South Africa.

The standards for the support of learning and assessment in practice drawn up by the Nursing and Midwifery Council of the UK (2006:17) insist that the nurses are under an obligation to develop their own knowledge, skills and competency beyond registration by means of continuous professional development in the form of both formal and experiential

learning because this kind of development is essential for their professional practice. The Nursing and Midwifery Council of the UK (2006:17) supports and advocates lifelong learning for all nurses and midwives and requires evidence of continuous professional development for the mandatory renewal of registration. The Nursing Council of New Zealand (2006:[4]) has also promulgated protocols for continuous professional development, and it expects that nurses should acquire at least 60 hours on continuous education in the previous three years as evidence of professional development. Continuous professional development is a vital factor in the retention of well-qualified staff. Opportunities for undertaking continuous professional development, are associated among nurses with increased levels of job satisfaction, with more positive attitudes to remaining in the profession, with incentives that are provided by the organisation, with an accumulation of useful professional knowledge, with the renewal and updating of existing qualifications, and with the enhancement of the status of their profession (Ryan 2003:498; Shields & Ward 2001:677).

7.B.7.4 Category 3.4: Debriefing after participation in CPR

Drostake and De Villiers (2007:17a), citing Gamble (2001:157), have produced evidence that participation in both successful *and* unsuccessful CPR is one of the most stressful situations with which a nurse has to deal. Nurses may also suffer physiological and psychological stress in the aftermath of a cardiopulmonary arrest. Because of this, arrangements should be made for peer debriefing sessions. In such sessions, the events of the resuscitation can be discussed, deconstructed and reviewed and the negative emotions and attitudes that are commonly experienced by resuscitators who participate in CPR can be minimised. The participants indicated that no debriefing sessions were held after resuscitation attempts, whether successful or unsuccessful.

One participant made the following trenchant observation:

*It is important to give feedback so they know their strengths and weaknesses.
But we don't do it.*

The following data display details the participants' responses to the possibility of holding debriefing sessions after resuscitation attempts.

Table 7.B.5.d Debriefing after participation in cardiopulmonary resuscitation

Data display 7.2.3.4 Debriefing after resuscitation
<ul style="list-style-type: none">• Yes, I believe in debriefing. It helps to correct our mistakes. Helps to assess and prepare us to deliver CPR effectively.• Debriefing helps to close the gap. It helps to get common practice.• Debriefing used as a learning experience. It helps to reflect on our mistakes and helps to improve practice.• Debriefing helps to relieve guilty feelings and ease our emotions.

Another participant added the following:

[Debriefing] is important to know the reasons. If CPR is successful or unsuccessful, we should know the reasons. Repetition and reinforcement and it will help us to know what saved the life.

The present study revealed that no debriefing sessions were ever conducted in the aftermath of resuscitation attempts – even in critical care units. Most of the participants agreed that there was an urgent need for regular debriefing sessions. Laws (2001:76) reflects that most of the nurses who participated in his research expressed a strong need to be able to defuse their anxieties and debrief their emotional responses to CPR – apart from the educational usefulness of reviewing the technical and management aspects of the procedure during the session. These findings are consistent with those in the present study.

Ranse and Burke (2006:4) suggest that those who have participated in a resuscitation event can resort to a variety of coping strategies such as talking to their colleagues immediately after the event or discussing it with family and friends. Leary and Abella (2008:1) point out that most participants in CPR do not receive feedback from their colleagues and so they are denied opportunities for any kind of objective evaluation from their own colleagues. Wherever immediate feedback is lacking, rescuers off are less likely to recognise their own performance errors (or even those of others). In post-arrest peer debriefing sessions, nurses can review their performance and give vent to their emotions in a way that will establish and strengthen a supportive therapeutic environment (Page & Meerbeau 1996:317). The literature points to a certain amount of disagreement about the

risks and benefits of debriefing. Ransie and Arbon (2008:38), citing Bledsoe (2003:272), have observed that debriefing does not necessarily prevent the development of stress-related symptoms following critical incident, and that, in some cases, it might even aggravate certain stress-related symptoms.

The participants in this study expressed the opinion that debriefing facilitates therapeutic communication, addresses the needs of nurses to process their own negative emotions and attitudes, and affirms that feelings and emotions are an integral and normal component of the teaching-learning process. Cantrell (2008:e19) agrees that debriefing is an integral component of an effective teaching-learning strategy because it helps to reduce the emotional pain that frequently accompanies stressful situations. A study conducted in South Africa by Drotske and De Villiers (2007:17a) confirmed that the nurses in their study expressed the opinion that debriefing should include reflection upon whether or not the correct BLS protocols were followed and where improvements might be made – especially for the benefit of new staff members.

The present study revealed that debriefing sessions in the aftermath of resuscitation attempts are completely absent – even in intensive care unit and accident and emergency wards. This absence of debriefing sessions might adversely affect the performance of CPR and create unwarranted levels of stress and anxiety among registered nurses. Any well-conducted debriefing session after a resuscitation attempt should produce observable therapeutic benefits.

7.B.7.5 Category 3.5: Computer learning

Computer-based training from sources on the Internet offers nurses opportunities for personal professional enrichment and training in those cases where individuals have the necessary desire, facilities, time and motivation (Peterson 2006:55).

Some of the participants in this study suggested that the creation of a dedicated hospital website from which nurses would be able to access all the information they need, would be an asset of inestimable value, indirectly for patients, and directly for nurses themselves.

One participant made the following comment:

Computer learning should be available on the hospital website of hospital so that they can practise at their own convenience

We will learn more if there is an availability and provision of video tapes and CD.

Since computer-based learning is far more flexible than conventional learning, it increases a learner's self-esteem, self-sufficiency and curiosity about information that would otherwise be extremely difficult to locate. By doing this, it enables professionals to examine and reflect upon whatever information they need at their leisure and in some depth. It would be enormously helpful if computer learning could be substituted for traditional method of teaching and instruction because even experienced nurses who have access to far more facilities sometimes find it immensely difficult to locate the information that they need. Moule, Albarran, Bessant, Brownfield & Pollock (2008:427) and Moule et al (2001:73) and produced evidence that e-learning in combination with a multimedia approach is far more effective in the teaching of BLS than the traditional "talking head" classroom methods of instruction.

7.B.7.6 Category 3.6: Simulation

Since health care institutions have an obligation to provide an effective resuscitation service, they also have an obligation to ensure that their personnel receive regular training and periodic refresher courses so that they can maintain the level of competence that is appropriate to each individual's job description (Resuscitation Council of the UK 2005:[5]). An inability or failure to provide an effective service represents a failure in the duty of care and constitutes a clinical risk that contravenes the principles of clinical governance – and this has important implications for clinical negligence premiums. Simulation as a teaching method is as close to a real-life experience as one can get, and it helps health care personnel to develop clinical skills, clinical reasoning, decision making, inter-professional team work and competence.

Simulation is an event or situation that resembles real-life clinical practice as closely as possible. Gaba (2004:i2) defines *simulation* in clinical instruction as a process that uses

artificial models as a substitute for real-life encounters with patients and also uses live actors or virtual reality patients to replicate a variety of patient care scenarios in a quasi-realistic environment.

The participants' responses to simulation are set out in the following table.

Table 7.B.5.f Simulation

Data display 7.2.3.6 Simulation
<ul style="list-style-type: none">• Simulation is rarely conducted in the ward.• I have never seen one.• No simulation on CPR conducted.• We never do that. We should start conducting that.• No simulation is conducted in our unit.. We used it last year.

The responses from all the participants made it clear that no simulations or mock drills had been conducted either in the units in which the participants worked or in any other settings in the hospital. The researcher was, in fact, required to explain the meaning of the word *simulation* to the participants in the context of teaching therapeutic and clinical skills because most of the participants were unaware of what it actually meant.

Since BLS and ACLS comprise skills that can mean the difference between life and death for patients, they are indispensable in any kind of clinical setting where competence and professionalism are valued. It is not advisable to practise CPR skills on real-life patients who suffered cardiac arrest because the process CPR is characterised by unpredictable contingencies that are beyond human control and is accompanied by very high levels of stress. Because of these difficulties, people who are still in the process of learning how to administer CPR might make critical mistakes that can result in death for a patient who is being used as a teaching model. It is therefore highly undesirable to use real-life patients who suffered an arrest in order to teach CPR skills in a hospital or anywhere else (Shiner 2009:42).

According to Shiner (2009:42), simulation as a teaching device includes the following benefits:

- Simulation provides a safe learning environment and offers innumerable opportunities to practise CPR skills in a realistic clinical setting.
- Simulation offers opportunities to staff to learn from their mistakes in a relatively risk-free environment.
- Simulation improves the skills of participants and therefore generates the kind of self-confidence they need to perform CPR in real-life situations.
- Simulation offers opportunities for improving communication skills and team work.
- Simulation encourages critical reflection on the part of participants.

Simulation plays a central role in contemporary advanced life-support training because it empowers health care professionals to manage cardiac arrests efficiently, responsibly and with the necessary degree of self-confidence. Simulation also enables learners to acquire the knowledge, attitudes and skills they need to deal with emergency cardiac arrests in a systematic and confident manner (Perkins 2007:202). Some clinical and educational institutions are beginning to use simulation to validate the competency of students and nurses, particularly in high-risk and high-stress clinical situations such as resuscitation and trauma care (Spunt, Foster & Adams 2004:192).

The participants felt that regular sessions of in-hospital simulation would improve the way in which registered nurses performed CPR. They also felt that it would enable nurses to learn how to handle the newer technologies that will soon be standard equipment in resuscitation attempts.

7.B.8 SUMMARY OF THE FINDINGS OF PHASE 3 – B

Summary of phase 3 – B: Findings from semi-structured interview conducted with nurse managers

A summary of the findings from the semi-structured interview conducted with nurse managers in the two referral hospitals are presented below in table 7.B.6.

Table 7.B.6 Findings from semi-structured interview conducted with nurse managers

Research question	Study objectives	Findings from the study
<ul style="list-style-type: none"> How can registered nurses be helped by management to overcome the identified barriers at the end of the performance of CPR? 	<p>Describe the perceptions, barriers and needs that are experienced by registered nurses from the perspective of the nurse managers when they perform CPR.</p> <p>Solicit suggestions from the nurse managers about how the provision of CPR in the two referral hospitals could be improved.</p>	<p>Theme 1: Organisational factors that influence the performance of registered nurses in the provision of CPR</p> <p>Human resources</p> <ul style="list-style-type: none"> Shortage of nurses and doctors Stress and the increased work loads that are generated by staff shortages The non-availability of the doctors during emergencies <p>Lack of in-service education</p> <ul style="list-style-type: none"> Lack of in-service education in units and in the two referral hospitals Inadequate exposure of nurse managers to the CPR process <p>Lack of resuscitation teams</p> <ul style="list-style-type: none"> No resuscitation team was available to attend to emergency cardiac arrests. Lack of leadership The absence of standards <p>Policies and standards</p> <ul style="list-style-type: none"> Lack of guidelines Lack of regulatory mechanisms Conflict of roles Ethical conflicts <p>Lack of mandatory training</p> <ul style="list-style-type: none"> The necessity for annual mandatory certification The absence of pre-employment BLS certification <p>Lack of policy on DNAR</p> <ul style="list-style-type: none"> Legal issues A need for sensitisation and education A need for clearly stated policies that will enable staff to understand the implications of DNAR <p>Ethical conflicts</p> <ul style="list-style-type: none"> Dilemmas about whether or not to resuscitate HIV/AIDS clients The hope offered by anti- retro viral therapy Explanations of how safe it is to provide CPR if universal precautions are observed
		<p>Factors that limit the performance of registered nurses and nurses managers when they provide CPR</p> <p>Lack of knowledge and skills</p> <ul style="list-style-type: none"> An inability to recognise the signs of cardiac arrest on the part of nurses and doctors An inability to identify or operate the equipment that is used in resuscitation attempts Stress and panic that is caused by a lack of skills and knowledge <p>Lack of availability of equipment and drugs</p>

Research question	Study objectives	Findings from the study
		<ul style="list-style-type: none"> • The absence of necessary equipment in ab emergency trolley • The absence of the essential emergency drugs that are used in CPR • Defibrillators that are operationally defective and dysfunctional • The lack of adequate space within which to perform vital CPR procedures <p>Inconsistent practice</p> <ul style="list-style-type: none"> • No standard approach to perform CPR • Haphazard way of performing CPR by doctors and nurses <p>Lack of confidence</p> <ul style="list-style-type: none"> • Staff who are inadequately prepared to cope with emergencies • The complete absence of self-confidence and competence in nurses who are expected to perform CPR • Disabling levels of panic and fear among nurses during emergency situations <p>Stress caused by overwhelming workloads</p> <ul style="list-style-type: none"> • Stress caused by a shortage of indispensable personnel • Stress caused by personnel who possess some essential skills but not others • Panic and confusion caused by a shortage of indispensable personnel <p>Lack of incentives</p> <ul style="list-style-type: none"> • A reluctance to participate in in-service education opportunities • The absence of any motivation to attend in-service education opportunities because of overwhelming workloads <p>Lack of guidelines</p> <ul style="list-style-type: none"> • The absence of any guidelines for those who are required to perform CPR • Limitations of assigned roles • A lack of clarity on the part of team leaders <p>Attitudes of doctors</p> <ul style="list-style-type: none"> • The slow and sluggish reactions of doctors when they are required to initiate and perform CPR • The reluctance of doctors to perform CPR • Deliberate delaying tactics on the part of doctors who are required to perform CPR <p>Communication barrier</p> <ul style="list-style-type: none"> • Poor hospital communication systems • The absence of doctors from CPR events <p>Lack of adequate spacing</p> <ul style="list-style-type: none"> • Serious congestion and overcrowding in wards • The stressful work environment caused by overcrowding and lack of space in hospitals
		<p>Training and development needs for the registered nurses and nurse managers</p> <p>Role of the Nursing Council</p>

Research question	Study objectives	Findings from the study
		<ul style="list-style-type: none"> • Compulsory BLS certification • The establishment and maintenance of uniform practice standards • The maintenance of a uniform standard of competence among all nurses who work in Botswana <p>Continuous professional development (CPD)</p> <ul style="list-style-type: none"> • CPD by means of regular periodic workshops • CPD by means of regular periodic seminars • The institution of effective in-service education to maintain knowledge and skills at an acceptable level <p>Simulation</p> <ul style="list-style-type: none"> • The absence of any simulation training to improve levels of self-confidence • Deficiencies in teamwork caused by an absence of any kind of simulation training <p>Debriefing</p> <ul style="list-style-type: none"> • The necessity of debriefing to maintain standards of practice • The use of debriefing as a means for improving learning and expertise • The necessity of debriefing for closing the theory practice gap.

7.B.9 APPLICATION OF THE FINDINGS OF THE SEMI-STRUCTURED INTERVIEW TO THE AACN SYNERGY MODEL FOR PATIENT CARE

The semi-structured interview conducted among nurse managers in the two referral hospitals suggest that the AACN Synergy Model for Patient Care is closely aligned with the identified themes. The model asserts that nursing practice is predicated on the needs and characteristics of the patients who are the nurse’s clients. Table 7-B.6 sets out the themes identified in relation to the nursing competencies, as viewed by the nurse managers that form a part of the AACN Synergy Model for Patient Care.

7.B.10 CONCLUSION

This chapter presented the findings from the close-ended questions and from the semi-structured interviews that the researcher conducted with the nurse managers from the two referral hospitals. The quantitative data were analysed by means of the SPSS (Version 15) statistical package, and qualitative data was analysed by using Tesch’s method. The major themes in the qualitative findings consisted of (1) those organisational factors that influence the performance of registered nurses and nurse managers when they provide CPR, (2)

those factors that limit the proper performance of registered nurses and nurse managers, and (3) the training and development needs of registered nurses and nurse managers who need to be properly trained and supported in the performance of CPR. The qualitative data were presented in terms of the themes and categories that were derived from the data. These findings are summarised in table 7.B.6. The following chapter (chapter 8) will suggest recommendations that are based on the AACN Synergy Model for Patient care with regard to the system, the patients and the nurses who are required to provide CPR in the two referral hospitals in Botswana.

CHAPTER 8

CONCLUSIONS, RECOMMENDATIONS AND LIMITATIONS OF THE STUDY ACCORDING TO THE SYNERGY MODEL FOR PATIENT CARE

8.1 INTRODUCTION

The aim of this study was to identify the perceptions, barriers and needs that are experienced by registered nurses in the two referral hospitals in Botswana during the provision of CPR.

The conclusions and recommendations are derived from the major tenets of the AACN Synergy Model for Patient Care. According to the AACN Synergy Model for Patient Care, optimal outcomes occur when a synergy is achieved between the characteristics of patients in the competencies of nurses. Three levels of outcomes are described by the AACN Synergy Model for Patient Care. These three levels are the patient and family level, the unit level and the system level. The recommendations in this study are based on the findings of the present study which examined the research problem in terms of the system, the nurse and the patient.

The identification of the components of the AACN Synergy Model for Patient Care and the subsequent development of the objectives of the study according to the conceptual framework provided by the model assisted the researcher to identify the perceptions, barriers and needs that are experienced by the registered nurses when they performed CPR.

8.2 CONCLUSIONS AND RECOMMENDATIONS FROM THE AUDIT PHASE (phase 1)

Once the researcher had completed the data analysis, a number of conclusions were drawn and a number of recommendations were made. These conclusions and recommendations are discussed in the text below under the following headings so that it

will become evident that these conclusions are firmly grounded in the context of the AACN Synergy Model for Patient Care:

- Conclusions and recommendations based on the findings from the audit phase and discussion phase (with nurse managers) that address the issues pertaining to the system (sections 8.2 and 8.3)
- Conclusions and recommendations based on the findings from the evaluation phase and the discussion phase (with registered nurses) that address the issues raised by the nurses (8.4)
- Recommendations for improving the quality of patient care during the provision of CPR.

The study identified a number of deficiencies in the provision of CPR. The major tenets of the AACN Synergy Model for Patient Care provided the researcher with a conceptual framework that guided the study throughout all of its phases. The performance of nurses during the provision of CPR (see figure 2.2 in chapter 2) are affected by all the nursing competencies such as clinical judgement, clinical reasoning, critical thinking, knowledge and skills, advocacy, caring practices, and the availability of the resources. The need to identify the components of the AACN Synergy Model for Patient Care and to develop the objectives of the study in terms of the conceptual framework of the model helped the researcher to identify the perceptions, barriers and needs that were experienced by the registered nurses in the sample during their performance of CPR.

Sections 8.2.1 and 8.2.2 provide a discussion of the findings in relation to the *system*. The first audit phase was to evaluate the existing facilities for the provision of CPR in the two referral hospitals.

8.2.1 The objectives of the audit phase (phase 1) of the study (system)

The most important components of the system include the adequacy of facilities and equipment, administrative structures, explicit policies, and the operation of those programmes that provide care. The process of care comprises of all the actions and services that constitute direct care. Patient outcomes are a direct result of the structure and processes involved in care.

The objectives of audit phase of the study were to:

- observe the existing facilities for conducting CPR in all units of the two referral hospitals in Botswana by making use of a checklist that was especially drawn up for the purpose of facilitating observation
- conduct an audit of the records of the two referral hospitals in order to identify the number of CPRs that had been performed in male and female medical wards, intensive care units, and accident and emergency units during the period delimited by the study
- check and evaluate hospital policies with regard to CPR and to investigate all of the in-service education records

8.2.2 Auditing of the emergency trolleys

The researcher audited the emergency trolleys in two referral hospitals so that she could evaluate the state of the facilities that were available for the performance of CPR.

Findings

The results of the study showed that the *availability* of emergency equipment in the two referral hospitals was below 50.0% (see figures 5.1 and 5.2 in chapter 5). The distribution of equipment in terms of wards (see figure 5.3) showed that the availability of emergency equipment in critical care units (such as the intensive care units, and the accident and emergency wards) was somewhat better (57.5%).

The emergency trolleys in most wards had poor supplies of vital CPR equipment such as airway and breathing equipment. The availability of airway and breathing equipment was 33.6% and 17.5% hospital A and hospital B respectively.

The availability of essential CPR drugs was 42.5% and 33.3% in hospital A and hospital B respectively. The research also noted that the checks on the emergency trolleys in the two referral hospitals were carried out infrequently in most wards in both hospitals.

Conclusions

The distribution of the equipment and drugs that are indispensable for optimal performance of CPR in the two referral hospitals were inadequate. The unavailability of equipment and drugs that are essential for performing CPR undoubtedly delays the initiation and sustaining of resuscitation attempts, and this causes high levels of stress among the nurses who attempt resuscitation. These factors exert a profoundly negative effect on the quality of care that any nurse can provide during CPR.

Recommendations

- Standardise basic resuscitation equipment across the health care institutions.
- The equipment that is used for cardiopulmonary resuscitation (including defibrillators) and the layout of the equipment and the drugs on resuscitation trolleys should be standardised throughout an institutions.
- It should be a basic requirement for each ward to have a recently checked, well-equipped and functional emergency trolley. The emergency trolley location should be assigned an unvarying place in the physical structure of the ward.
- All CPR equipment and drugs on the trolley should be checked and (if necessary) replenished, serviced or replaced on a daily basis. Portable oxygen and suction devices should be available in case of electricity failure.
- All resuscitation drugs and equipment for airway management, circulatory access and fluid administration should be immediately accessible in all clinical areas so that delays do not compromise the possibility of a successful resuscitation.
- The deployment of an automated external defibrillator in all wards will reduce the mortality rate that results from cardiac arrests that occur inside hospitals.
- All staff should be familiar with CPR equipment and their mode of operation. All nurses should be trained in the use of a defibrillator until they can use it with complete confidence.
- The two referral hospitals should carry out their own audits and review their resuscitation equipment procedures in all clinical areas on a regular basis.
- The checklist that is used for checking the state of emergency trolleys should be standardised in all health care institutions.

- Any harm that is experienced by patients (including mortality) because of missing, faulty or expired equipment or the unavailability of necessary CPR medications during an arrest should be described in writing and the incident should be reported to the resuscitation committee.
- Since it is the duty of the department or the ward to check and maintain the state of the emergency trolley, they should accept full responsibility for checking and audited it according to a prescribed daily schedule.
- A planned replacement programme should be in place for inspecting, renewing and, if necessary, replacing all the equipment and drugs on emergency trolleys.

Proposed guidelines

The researcher proposes the introduction of a resuscitation trolley checklist that is based on all the best practice identifiable from the literature and from the research results of this study so that uniform procedures for the maintenance of equipment and drugs on resuscitation trolleys in the two referral hospitals (see Annexure C for a prototype of the proposed checklist).

8.2.3 Auditing of the death records

The purpose of auditing the death records was to evaluate the efficacy of all the in-hospital resuscitation procedures that were attempted during the period reviewed by the study, and to record their outcomes.

Findings

Out of the 508 death records that were audited, 64% of deaths occurred in medical wards while 36% occurred in critical care units. Out of this total, almost half of all the deaths (namely 49.4%) occurred among people who were in the prime of life (between 21 and 40 years old). Almost 60% of these deaths were caused by medical conditions and the remainder were precipitated by surgical conditions. Out of this total, 37.6% were experienced in the context of HIV/AIDS-related illnesses and conditions. More deaths (45.9%) occurred during the night shift (between 8 pm and 7 am). Among the 508 deaths recorded, resuscitation was attempted on only 103 (20.3%). The 508 records that were

audited showed that cardiac compressions were administered to 81 (16%) and that 15 (3%) were defibrillated. It is worth noting that all of these defibrillations were attempted only in intensive care units. Injections of adrenaline were administered to 118 (23.2%), injections of atropine were administered to 111 (21.8%), and injections of hydrocortisone were administered to 20 (3.9%) of the patients whose death records were audited by the researcher. The researcher's auditing of the death records showed that resuscitation was not attempted at all for 391 patients (77%) and no details about whether or not resuscitation was even attempted were available for 13 patients (2.85%).

Conclusions

The auditing of the records revealed that CPR was not carried out according to standards and procedures that are regarded as standard in hospitals throughout the world. The fact that a large number of the deaths were those of people who were suffering from HIV/AIDS-related illnesses cannot be regarded as the reason why resuscitation in these cases was not attempted. The failure to use defibrillators in wards other than intensive care units points to a lack of equipment and/or proper training. The other reasons are the unavailability of functional defibrillators, and the fact that the doctors and nurses concerned did not possess the necessary skills and knowledge to operate the defibrillators correctly.

Recommendations

- The two referral hospitals should introduce a standard resuscitation audit form to report all in-hospital cardiac arrests (see Annexure G for a prototype of such a form).
- It is necessary to base the design and structure of such a form on the Utstein template.
- Both doctors and nurses should be trained in the correct use of this form.
- A common data base and method of reporting resuscitations should be standardised for all hospitals and other health care institutions in Botswana.
- The audit of CPR incidents should include names of the attending doctors, arrival time of the doctors, and details of the CPR.
- All death records should be audited and analysed on a regular basis.

Proposed guidelines

The researcher proposes the use of a standardised audit form that reflects the most recent best practice in the literature (see Annexure H). The use of such a standardised audit form will improve the record maintenance procedures and this will eventually lead to a noticeable improvement in patient care.

8.2.4 Auditing of the procedure manual

The purpose of auditing the procedure manual was to examine the existing CPR policies in the two referral hospitals.

Findings

The researcher noticed that the procedure manual of the hospital A was last updated in 1996. It was also deficient in basic CPR information such as the composition of the responsible resuscitation team, the right moment and conditions for initiating any resuscitation attempt, and suggestions for how long a resuscitation attempt should be continued before it is abandoned. The procedure manual also omitted any guidelines for the use of the staff.

Conclusions

A procedure manual in a hospital is a vital document for promoting safer and more effective practices. The auditing revealed that the procedure manual had not been updated for many years. Wherever procedure manuals omit guidelines for the benefit of doctors and nurses, far more errors are likely to occur during the administration of CPR.

Recommendations

The researcher recommends that the referral hospitals should develop procedure manuals that provide detailed information about all the most recent advances, discoveries and practices in CPR. The procedure manual should be subject to an annual audit, and active steps should be initiated to remedy identified deficiencies.

8.2.4.1 Proposed procedure manual for CPR

The researcher recommends that the proposed procedure manual be based on the findings of all the current literature and research into CPR research throughout the world. This will place the two referral hospitals in a position to implement a uniform practice (see Annexure J).

8.2.5 Auditing the in-service records

The purpose of auditing the in-service records was to find out whether or not in-service training was being conducted on a regular basis those in units and in the two referral hospitals. These records demonstrated that neither hospital nor unit in-service training in CPR was being conducted on regular basis in either of the two referral hospitals. Most of the wards depended on the management of the hospitals to initiate the in-service education and since they did not do so, no in-service training occurred. The researcher also noticed that the in-service training department had not been provided with functional manikins for the in-service training of nurses in CPR techniques.

Conclusions

There can be little doubt that inconsistency and irregularity in the conduct of in-service CPR education contribute to the deterioration of CPR knowledge and skills among nurses that was identified in this study. The absence of in-service training and education also prevents nurses from becoming acquainted with all the most recent important developments in the area of CPR that have occurred throughout the world.

Recommendations

- The researcher recommends that nurses should be given increased learning opportunities to establish and reinforce their BLS knowledge and skills. In-service CPR education, which should be initiated and administered by the management of all hospitals, should be conducted on a frequent basis for all ward and unit staff.

- Hospital management should improve BLS knowledge and skills by making a point of enlisting the collaboration and cooperation of those agencies and foundations that specialise in teaching BLS.
- The two referral hospitals should make a point of acquiring both adult and paediatric training manikins because effective in-service CPR education cannot be conducted without them.

8.3 CONCLUSIONS AND RECOMMENDATIONS FOR PHASE 3 (system)

In this section, the conclusions based on the findings involving the system from semi-structure interviews with nurse managers and recommendations of the researcher are provided in detail.

Phase 3 of the research was the discussion phase in which the researcher conducted semi-structured interviews with the nurse managers from the two referral hospitals. The conclusions and recommendations that were derived by the researcher from the qualitative data of the study are presented below in terms of the themes and categories that emerged from the data analysis. Three themes were derived from the data analysis.

8.3.1 The objectives of phase 3 of the study (system)

The following two objectives guided phase 3 of this study:

- To identify the perceptions, barriers and needs that were experienced by the nurse managers during the performance of CPR
- To solicit suggestions from the nurse managers about how the provision of CPR in the two referral hospitals could be improved

These objectives were realised by the data that has been set out in themes under sub-sections 7.A.6.1, 7.A.6.2, and 7.A.6.3, 7.B.5, 7.B.6, AND 7.B.7 in chapter 7.

8.4 THEME 1: ORGANIZATIONAL FACTORS THAT INFLUENCE THE PERFORMANCE OF REGISTERED NURSES AND NURSE MANAGERS IN THE PROVISION OF CPR

8.4.1 Category: Human resources

Findings

The nurse managers were of the opinion that the shortage of doctors and nurses adversely affects the quality of care that can be provided after a cardiac arrest. They indicated that such shortages also delay the initiation of CPR after a cardiac arrest has occurred. They further indicated that the inadequate and ineffective communication systems that exist in the two hospitals – when coupled with a shortage of doctors – can only serve to aggravate an already serious situation.

Conclusion

Because of a serious shortage in the number of doctors and nurses who work in the two referral hospitals, patients can only expect to receive inadequate and substandard care and treatment in the event of a life-threatening situations such as cardiac arrest.

Recommendations

It is recommended that an adequate number of nurses be assigned to the wards, and that the number of nurses on duty at any one time should correspond to the complexity, needs and acuity of the conditions of the patients who require treatment.

The two referral hospitals should improve their communication systems so that nurses will be able to communicate successfully with doctors in those cases in which a patient's condition suddenly changes for the worse. The hospitals should also make provision for doctors to remain on hospital premises during their call duty hours.

8.4.2 Category: An absence of in-service education

Findings

The results of the study revealed that no regular in-service education was being conducted in the two referral hospitals. The nurses who participated in the study also revealed no interest in attending any form of in-service education because of the complete absence of any kind of incentives offered by the hospitals. Nurse managers also reported that the acute shortage of nurses did not permit the management of the hospitals to schedule regular in-service education sessions.

Conclusion

Regular in-service education improves the professional knowledge and competence of health care professionals. Barriers such as acute shortages of personnel and the lack of reasonable incentives should be addressed by the management.

Recommendations

- All hospitals should formulate in-service committees. Each ward should select a nurse to represent their interests and grievances on the committee.
- A particular nurse educator should be assigned the responsibility for conducting CPR in-service education sessions on a regular basis.
- Hospital management should also provide whatever resources are necessary for the establishment and continuation of in-service education on a regular basis.
- The provision and availability of online learning opportunities in combination with incentives that motivate nurses to participate in training opportunities would encourage nurses to participate in in-service education programmes.

8.4.3 Category: The absence of a resuscitation team

Findings

The findings of this study revealed that no resuscitation teams had been formed to treat cardiac arrest events in the two referral hospitals. The absence of a resuscitation team undermines the decision-making process and increases the levels of stress that are experienced by nurses during resuscitation attempts.

Conclusions

The unavailability of a resuscitation team and deficient teamwork affect the quality of CPR in hospitals.

Recommendations

- All hospitals should have a resuscitation committee that consists of a physician, an anaesthetist, a surgeon and a critical care nurse.
- This resuscitation committee should be responsible for implementing the operational policies that guide cardiopulmonary resuscitation and training.
- All hospitals should have a team that is immediately activated to respond to a cardiopulmonary arrest. Such a team should include at least two doctors who are familiar with the latest trends in ACLS, an anaesthetist, a surgeon and a nurse from the ICU.
- All members of the team should be completely familiar with the knowledge and skills required to perform tracheal intubation, central venous line insertion and defibrillation.
- The resuscitation team should be summoned to all cardiopulmonary arrests by means of a dedicated telephone line. It should be possible to activate this team in less than 30 seconds of the call for help.
- The team leader should be responsible for directing and coordinating the resuscitation attempt.
- After resuscitation procedures have been performed, the team leader should be responsible for documenting the events of the resuscitation and for communicating these events to the relevant health care professionals and to the relatives of the patient.

8.4.4 Category: Policies and standards

Findings

The responses of the nurse managers indicated that there were no standard policies or protocols to guide the practice of CPR. The nurse managers were unaware of the existence of any guidelines in their hospitals.

Conclusion

This absence of policies and standards severely undermines all aspects of health care practice in a hospital.

Recommendations

- Professional nursing practice should be guided by appropriate policies and standards that are based on the latest research findings and best international practice (although these may have to be adapted to suit local conditions). The resuscitation committee should be responsible for ensuring that hospital staff members adheres to national or regional resuscitation guidelines and standards.
- The resuscitation committee should collaborate with the management of an institution to develop policies to guide resuscitation procedures and policies that can assist staff members to make difficult resuscitation decisions such as those that involve, for example, the implementation of “*Do Not Attempt Resuscitation*” decisions.

8.4.5 Category: Lack of mandatory training

Findings

The participants in this study expressed a definite need for mandatory annual BLS training.

Conclusion

Mandatory training in BLS maintains uniformity of practice among nurses. When BLS training is made compulsory for all nurses, it also serves to improve the competency of the nursing staff – regardless of their work area and experience.

Recommendations

Mandatory training in BLS would improve the quality of care and enable nurses to be more confident and decisive in emergency cardiac arrest situations. The Nursing and Midwifery Council of Botswana and the Ministry of Health should consider the introduction of mandatory training in BLS for all nurses in Botswana. All data relating to such training should be recorded in the central database of the hospital concerned.

8.4.6 Category: The absence of a “Do Not Attempt Resuscitation” policy

Findings

The nurse managers entertained different opinions about “Do Not Attempt Resuscitation” policy. Some of the nurse managers expressed a point of view that an official “Do Not Attempt Resuscitation” policy protected them from the legal complications that might ensue in the aftermath of any decision to discontinue life-support treatment. Although the implementation of such a policy would help to nurture valuable resources, the general public have to be educated about the implications of such a policy.

Conclusion

The results of this study revealed that before a “Do Not Attempt Resuscitation” policy can be successfully introduced, both the public and the health care professionals need to be educated about the meaning of such a policy and the reasons why a hospital needs such a policy.

Recommendations

Hospital management should consider ways and means to publish and distribute educational brochures to the public so that they will have a clear understanding of the purpose of a “*Do Not Attempt Resuscitation*” policy. Such a brochure should be written in such clear and concise terms that even people who have not enjoyed the advantages of education will be able to understand what a “*Do Not Attempt Resuscitation*” is about. Hospitals can make use of newsletters to inform their staff about the meaning and purpose of the hospital’s “*Do Not Attempt Resuscitation*” policy. Such newsletters can also educate hospital personnel in the processes that surround death and grieving. Newsletters can also be used to train staffs as to how they can cope with the grief and how they can comprehend the relatives and friends who have lost their loved ones through death and incapacitation.

8.4.7 Category: Ethical conflicts (different opinions about resuscitating HIV/AIDS clients)

Findings

Most participants in the study expressed the point of view that hospital staff should make no distinction between providing a full resuscitation service for HIV/AIDS clients and any other category of patient. Some of the nurses managers observed that some doctors were reluctant to perform CPR on chronically ill clients and that some nurses were reluctant to resuscitate HIV/AIDS clients.

Conclusion

Since CPR is a standard life-saving procedure, it should be offered to all patients regardless of their condition unless a valid a “*Do Not Attempt Resuscitation*” order is in place.

Recommendations

- Newly assigned nurses could benefit from special in-service education about and orientation to the resuscitation of HIV/AIDS clients. Some health care personnel need to be sensitised to the essential humanity of HIV-infected clients, who retain all the characteristics of ordinary human beings in spite of their health status.
- Such education should include training in the correct way to handle routine tasks and procedures. It should also emphasise universally accepted safety precautions such as the use of protective barriers and goggles.
- This kind of in-service education should be specifically designed to accommodate the needs of nurses and deal with their personal prejudices and conditioning. It should specifically emphasise humane values such as an acceptance of the essential dignity of all human beings – no matter how great their suffering, their condition or their personal problems.

8.5 THEME 2: FACTORS THAT LIMIT THE PERFORMANCE OF REGISTERED NURSES AND NURSE MANAGERS DURING THE PROVISION OF CPR

8.5.1 Category: Lack of knowledge and skills among nurses, nurse managers and doctors

Findings

When responding to questions from this category, the nurse managers expressed the opinion that most of nurses and doctors lacked adequate CPR knowledge and functional skills. They also noted that numerous doctors and nurses were unable to identify the signs and symptoms of cardiac arrest or even identify all the equipment and ancillary objects in the emergency trolley. Some of these nurse managers also noticed dangerous inconsistencies in the performance of CPR by nurses and doctors.

Conclusions

Familiarity with CPR knowledge and skills are essential preconditions for the successful performance of CPR. A lack of CPR knowledge and skills on the part of health care

personnel radically reduces the probability that a patient who is being treated will survive a cardiac arrest.

Recommendations

The recommendations here are the same as those that appear in section 8.4.

8.5.2 Category: Lack of availability of equipment and drugs

Findings

The nurse managers mentioned that they routinely experienced a shortage of essential equipment such as ambu bags, masks and protective barriers, and drugs during resuscitation attempts. The reason for this is that some of the wards did not possess functional emergency trolleys.

Conclusions

The unavailability of the correct drugs and equipment undermine and, in some cases, prevent the procedures and steps that nurses should be following during CPR, and this state of affairs adds immeasurably to the levels of stress experienced by the nursing staff.

Recommendations

The recommendations here are the same as those that appear in section 8.2.

8.5.3 Category: Inconsistent practice

Findings

The nurse managers pointed out that there were inconsistencies in the way in which CPR was performed in the wards. They also noted that some nurses tended to panic and become overwhelmed by anxiety during the resuscitation process.

Conclusions

Inconsistent practice in the provision of CPR decreases a patient's probability of survival because inconsistent practice is one of the causes of omissions and negligence during the implementation of a life-saving procedure.

Recommendations

- All hospitals should adopt standardised resuscitation guidelines and should expect all personnel to comply with the guidelines that are set out in these documents.
- Such guidelines should be implemented with complete uniformity of practice throughout the country.
- Any changes made to the guidelines should immediately be communicated to all health care and training institutions so that the necessary adjustments can be made.

8.5.4 Category: Lack of confidence/feelings of inadequacy

Findings

The nurse managers explained how nurses began to panic and become frightened during CPR because of their feelings of inadequacy and their lack of confidence in what they were doing.

Conclusions

A lack of confidence and feelings of inadequacy radically decrease the efficiency of CPR performance.

Recommendations

Regular periodic exposure to CPR training that deals with the different clinical scenarios that arise during practice improves the degree of confidence felt by nurses as well as their competence in the performance of CPR.

8.5.5 Category: Stress caused by overwhelming workloads

Findings

The participants in this study attributed their high levels of stress to unmanageable workloads, a shortage of properly trained personnel, and the failure of equipment during resuscitation attempts.

Conclusions

An unmanageably heavy workload has been identified as the most potent of all the stressors that afflict nurses because it gradually undermines the ability of a nurse to cope effectively with emergency situations such as the administration of CPR after cardiac arrest.

Recommendations

- The hospital and nursing administration should address the problems that cause a manageable stress among nurses.
- The management of the hospital should make provision for support groups and should encourage nurses to join these support groups.
- The management of a hospital could facilitate the introduction of stress management training in a programme presented by experts in their field.
- Nurse educators should acquaint nurses with the factors that are known to introduce stress into a system and should emphasise the value of social support in both undergraduate and graduate programmes.
- In-service education and staff development programmes about issues that relate to stressors and social support should empower nurses with the techniques that they need to cope with stressful situations.
- Nursing administrators should create opportunities for nurses to receive emotional support, guidance, social support and other tangible forms of assistance whenever they need them.

8.5.6 Category: Lack of incentives

Findings

The nurses who worked in the wards were not motivated to work or attend in-service education because of a lack of official incentives.

Conclusions

When no incentives of any kind are provided for nurses who attend in-service training, they tend to develop negative attitude to in-service education.

Recommendations

- Management may consider offering the incentive of a single day off for nurses who attend workshops.
- Management can make in-service training more attractive by arranging for them to attend workshops and seminars outside the hospital environment.
- Management can introduce a system of credit points for which nurses can qualify by continuous attendance at professional development seminars.

8.5.7 Category: Lack of guidelines

Findings

The nurse managers in the study expressed the opinion that the role of nurses was limited because of a lack of guidelines and standards. Most of the participants felt that there was an urgent need for guidelines.

Conclusions

The existence of clearly expressed guidelines is an important determinant of the quality of CPR performance.

Recommendations

The quality of the CPR that is provided is deeply compromised in the absence of guidelines. The two referral hospital should base their guidelines on well-established international or regional resuscitation guidelines so that they can ensure uniformity in practice.

8.5.8 Category: Attitudes of doctors

Findings

The nurse managers observed that they frequently experienced problems because of the attitude of the doctors in the hospital. It was observed that some doctors intentionally delayed the initiation of CPR until its possible benefit to the survival of the patient became irrelevant.

Conclusions

The unprofessional attitude and behaviour of some doctors affect the work environment during the provision of CPR.

Recommendations

- All resuscitation teams should perform under the guidance of a team leader.
- The team leader needs to display an openly positive, encouraging and ethical attitude towards the treatment of all patients because it is only by means of such attitudes that are members of the team can be motivated and encouraged.
- Management could devise a training programme for doctors and nurses on the importance of team work during resuscitation and the importance of abiding by certain minimal ethical standards during the provision of treatment.
- Both nurses and members of the resuscitation team need to realise that effective communication is a precondition for ensuring optimal management during resuscitation attempts. Such a realisation can be instilled by means of in-service education.

- Debriefing sessions after resuscitation attempts can help to correct any errors that occurred during resuscitation. Debriefing sessions also enable the participants to reflect on the quality of their clinical performance.
- There are valid and reliable models that hospitals can use to establish nurture and measure the quality of teamwork during CPR.

8.5.9 Category: Communications barriers

Findings

The participants explained that they experienced problems and hindrances when they tried to communicate with doctors about a sudden emergency cardiac arrest in the hospital especially during the night.

Conclusion

Vital time is wasted during resuscitation if a nurse who tries to alert a doctor to an emergency in a hospital is continuously discouraged and hindered by a cynical or unhelpful attitude on the part of the doctor on duty. This difficulty is compounded when a doctor refuses to take an emergency telephone call.

Recommendations

The management of the two referral hospitals could implement better communication systems by means of options such as radio calls, pagers and emergency cell phone numbers. Hospitals can also make suitable arrangements for doctors who are on call duty to reside on the hospital premises so that undue delays in responding to patients can be avoided.

8.5.10 Category: Lack of adequate space in hospital wards

Findings

The nurse managers observed that congestion and an inadequate amount of space in which to perform emergency procedures created a stressful environment during resuscitation attempts.

Conclusion

Not having sufficient space in which to work properly during an emergency is prejudicial to the proper performance of CPR, and can also impede the decision making process during a cardiac arrest.

Recommendations

All wards should have separate resuscitation rooms to which the patients, who have suffered cardiac arrest, can be quickly removed for immediate treatment. This will reduce the amount of stress experienced by resuscitators in overcrowded wards, and it will also maximize the kind of care that the patient can expect to receive during resuscitation. The use of a separate room will also ensure that the privacy of the other patients and the victim can be respected.

8.6 THEME 3: TRAINING AND DEVELOPMENT NEEDS OF THE REGISTERED NURSES AND THE NURSE MANAGERS

8.6.1 Category: Role of the nursing council

Findings

The responses from the nurse managers revealed that the Nursing and Midwifery Council of Botswana had adopted no explicit policy with regard to CPR. The participants also expressed various opinions about the nature and scope of the practice expected from nurses during CPR.

Conclusion

The absence of regulatory mechanisms, policies and procedures specific to CPR restricts the functions of registered nurses during cardiac arrest.

Recommendations

The Nursing and Midwifery Council of Botswana should develop a regulatory mechanism which will be able to articulate what is expected of nurses during the provision of CPR.

8.6.2 Category: Annual mandatory certification

Findings

All the nurse managers expressed their beliefs in annual mandatory BLS re- certification so that clinical practice could be improved. Evidence suggests that certified nurses perform better than non-certified nurses when tested on their knowledge of their speciality. Fewer nurses are seeking certification because of the prohibitive cost of certification and because of the limited extrinsic rewards that are accorded to certified nurses.

Conclusion

All clinical members of staff who are employed in a clinical institution should undertake mandatory training in BLS and attend compulsory annual refresher training.

Recommendations

The healthcare system should initiate the conduction of annual mandatory certification course for a moderate fee and set out systems to reward certified nurses periodically to encourage improved clinical practice.

8.6.3 Category: Continuous professional development

Findings

The participants were of the opinion that the system should introduce compulsory continuous education, and a nurse educator should be in charge of continuous education programmes. Some participants wanted CPR to be taught on a regular basis because they felt that continuous education would help to keep them abreast of the current developments in their field.

Conclusion

In any health care institution, the lack of continuous professional development and education causes a gradual deterioration in the professional skills and knowledge of nurses, and this ultimately compromises the quality of care that patients receive.

Recommendations

- The Nursing and Midwifery Council of Botswana should make continuing professional education a mandatory part of the professional obligations of nurses in Botswana.
- All nurses in Botswana should be obliged to accumulate a minimum of 30 hours of continuing professional education as a condition for the renewal of their licenses.
- Continuing professional education can be conducted by means of experiential learning such as that which is mediated through e-learning or by attendance at seminars and workshops.

8.6.4 Category: Debriefing

Findings

The responses from the participants showed that no debriefing sessions were conducted in the wards after resuscitation attempts. The nurse managers noted that debriefing was immensely important because it allowed the nurses to express their feelings, to give vent to

their frustrations, and to take note of whatever mistakes might have been made during resuscitation.

Conclusion

Because CPR is always associated with very high levels of stress and anxiety, many nurses unconsciously develop negative attitudes towards the procedure. The introduction of debriefing sessions after resuscitation attempts will help to improve the performance of registered nurses and reduce the stress experienced by them.

Recommendations

- The two referral hospitals should incorporate debriefing sessions after resuscitation attempts as an official procedure in both hospitals.
- The debriefing or a formal discussion of events should be carried out within 24 hours after a resuscitation attempt has taken place.
- The unit managers, the nurses and the doctors who participated in the resuscitation should make themselves available for these debriefings.
- Debriefing sessions should be convened when resuscitation attempts have been successful and when they have been unsuccessful.
- Debriefing should utilise clinical governance pathways to deal with medical issues and should utilise pathways referral if psychological problems are discovered.

8.6.5 Category: Computer learning

Findings

Some of the participants suggested that the hospitals should acquire CPR training courses that registered nurses could access by means of computer-assisted learning or internet-based courses.

Conclusion

Computer-based CPR training courses should be complemented with the traditional methods of teaching CPR that have been described in this study.

Recommendations

- The two referral hospitals should acquire computer-based training courses for teaching registered nurses the basics of CPR.
- Registered nurses should be given permission to access the training website freely any time that is convenient to them.

8.6.6 Category: Simulation

Findings

The nurse managers noted that simulation exercises were never undertaken, and some of the nurse managers had never even witnessed a simulation during their practice.

Conclusion

Since CPR is always an emergency procedure that is intended to save a human life, it is essential for all nurse resuscitators to be competent in CPR. The use of simulations as a teaching strategy can help registered nurses to acquire the competency and confidence they need to perform CPR as efficiently as possible. By simulating BLS situations, mistakes and errors can be rectified in a controlled environment without any harm being inflicted on living patients and clients.

Recommendations

- The management of the hospital and units in the two referral hospitals should develop a simulation programme that is dedicated to the practice of CPR as a major teaching strategy.

- The performance of an occasional mock code for resuscitation increases the levels of competency and confidence among nurses.
- Hospital management should acquire a sufficient number of simulators and manikins to make the provision of in-service education a practicable proposition.

8.7 CONCLUSIONS AND RECOMMENDATIONS FOR THE EVALUATION PHASE AND THE DISCUSSION PHASE (THE NURSE)

In this section, the conclusions based on the findings from the evaluation and discussion phases are drawn, and recommendations of the researcher are provided in detail.

8.7.1 The objectives of the evaluation phase of the study (phase 2) (the nurse)

The objective during the evaluation phase was to assess the CPR knowledge and skills that registered nurses displayed during the performance of CPR. The objective of the discussion phase was to identify the perceptions, barriers, and needs of registered nurses who were required to perform CPR. The researcher made a decision to discuss the findings, conclusions and recommendations of the above two phases mentioned above together in this section because the objectives were to improve the ways in which registered nurses were able to perform CPR.

In every part of the health care sector, professional nurses are expected to demonstrate a holistic approach that is based on humanistic values, and to display the attitudes and skills that are needed to provide patients and their families with a high quality of nursing care. These skills are considered to include the mastery of various practical, affective and social skills, creative and reflective thinking abilities as well as qualities of leadership. The sections below will set out the conclusions, findings and recommendations from both the evaluation phase and the discussion phase. The recommendations are based on the characteristics that nurses are expected to have in terms of the AACN Synergy Model for Patient Care: these characteristics are clinical judgement, caring practices, advocacy, the facilitation of learning and the ability to collaborate with others. Various recommendations to improve the knowledge, teamwork skills, leadership abilities and motivation of nurses are also set out in this section.

The purpose and objective of this phase was to identify the existing CPR knowledge and skills of the registered nurses in the two referral hospitals of Botswana

8.7.2 Background information about the participants

Among the 102 participant nurses who took part in the study, 44.1% were from Hospital A and 55.9% were from Hospital B. While most of the participants (86.3%) were female, 43.1% came from the age group of between 26 and 30 years of age. The work experience accumulated by the registered nurses ranged from between 2 to 10 years. 31.4% had accumulated eight to nine years of work experience, and 26.5% had accumulated less than two years of work experience. Most of the participants worked in the accident and emergency wards, and in the intensive care units.

While 52% of participants had received no formal training in CPR during their nursing training, only 28.4% had undergone additional training such as training in BLS and ACLS. Out of a total of 102 participants, only 28.4% had never performed CPR during the course of their daily practice. When asked about the outcome of the CPRs that they performed, 40.2% of the nurses said that most of the patients had died during the resuscitation attempts in which they had participated.

8.7.3 Findings, conclusions and recommendations for evaluation phase (phase 2) (nurse)

Findings about the assessment of the CPR knowledge of the registered nurses

The extent of the knowledge about CPR that the 102 registered nurses possessed was assessed on three separate occasions by the administration of 21 self-administered questions. The pre-test mean score for the extent of their knowledge was 55% (the pass grade was 85%). While there was a considerable improvement in the post-test with the nurses achieving a mean score of 80.6% after training, this figure was still below the pass grade of 85%. Since the mean score in the re-test that was administered after three months decreased to 70.7%, one could conclude that nurses' CPR knowledge remained well below standard. These results in fact indicated that the participants' cognitive knowledge about CPR had undergone a significant deterioration in only three months. The

researcher used the Friedman test to test for statistical significance. A chi-square test showed that the differences between the results of the pre-test, the post-test and the re-test after three months were significant ($\chi^2 = 86.235$, degrees of freedom=2, $P=.000$) at a 5% level of significance.

Findings about the assessment of the CPR skills of the registered nurses

The CPR skill levels of the 102 registered nurses were assessed on the same three occasions in a simulated scenario in which nurses were asked to demonstrate various essential resuscitation skills on a collapsed victim.

While the pre-test mean score was only 9.4%, the post-test score level increased to 78.3% after training but dropped again after three months in the re-test to a mean score of 67.8%. The nurses performed the required CPR skills incompetently. Despite the fact that the scores in the re-test decreased by 10.5% from the post-test scores, there was a significant improvement (58.4%) between the pre-test and the re-test scores. The Wilcoxon signed ranks test was used to assess the statistical significance. The P-value was significant (<0.05) at a 5% level of significance between the pre-test and post-test, and between the post-test and the re-test after three months.

Conclusions

Despite the fact that all nurses in Botswana are expected to possess a valid BLS certificate, only half of the participants possessed BLS certificates (a basic requirement for any nurse who works in a hospital setting). Most of the nurses in the sample therefore still needed to acquire the BLS and ACLS certificates that would make them compliant with the conditions for working in the hospitals of Botswana.

The CPR knowledge and skills demonstrated by the nurses in the pre-test were deeply inadequate. It was interesting to note that some of the nurses who had qualified during the previous five years lacked the necessary CPR knowledge and skills – despite the fact that these nurses had received formal training and education in CPR during their basic nursing training. Although the CPR knowledge and skill levels were low in the results of the pre-test, they improved substantially in the results of the post-test that followed the training

session. While all the nurses were able to retain most of the CPR knowledge and skills acquired from the training session immediately after the training took place, there was a noticeable deterioration in their CPR knowledge and skills after three months (as was evidenced by the results of the re-test). This indicates that nurses need to update their CPR knowledge and skills at regular six-monthly intervals. Since nurses are nearly always the first health care professionals to witness a cardiac arrest in a hospital, they are expected to possess a sufficiently adequate degree of CPR knowledge and skills to attempt a reasonably convincing resuscitation procedure on a patient who has suffered a sudden cardiac arrest.

Recommendations

Because the education of all nurses in **basic life support** techniques is a critical link in the chain of survival that maximises patient outcomes, the researcher made the following recommendations:

- BLS and ACLS training programmes should be available in all referral hospitals and secondary health facilities.
- All nurses, regardless of their seniority, their area of practice, their experience and their education, should update and refresh their BLS knowledge and skills at regular intervals.
- All the nurses should undergo regular resuscitation training to a level that is compatible with their clinical responsibilities.
- Since all nurses should be trained to recognise patients who are most at risk of cardiopulmonary arrest, all nurses should be trained to initiate whatever treatment is needed to prevent cardiopulmonary arrest. In this way, the overall survival rate of patients can be maximised.
- The health authorities should set a minimum standard of requiring all nurses without exception to undertake mandatory training in basic life support and to participate in compulsory annual refresher training courses.
- All new nurses should be exposed to resuscitation training as a part of their induction training.
- One of the basic conditions of nurse employment is that health care institutions should recognise and accept the necessity of making provision for all nurses to be given a

sufficient amount of leave from their regular nursing duties to be trained (or re-trained) in resuscitation skills.

- Since most of the graduates from the diploma and degree programmes that are offered in Botswana are general nurses who are deployed in health settings, the curricula in these teaching institutions should make provision for more time to be spent on the teaching of BLS and ACLS.
- All CPR training should be based on adult learning models, and all cardiac arrest scenarios should be made relevant to the needs of the working conditions in which nurses find themselves.
- Nurses should be taught that the moral, ethical and legal responsibilities that accompany CPR need to be accepted as a non-negotiable part of their training. The acceptance of such responsibilities may indeed increase the motivation of some nurses to improve their CPR knowledge and practise their CPR skills as frequently as they need to in order to remain proficient.
- The introduction of experiential learning techniques such as role playing, simulation and learning through practice will serve to increase the retention of CPR knowledge and skills.

8.8 CONCLUSIONS AND RECOMMENDATIONS FOR DISCUSSION PHASE (PHASE 3) (THE NURSE)

In this section, the conclusions based on the findings from the focus group discussion among the registered nurses and recommendations of the researcher are provided in detail.

8.8.1 The objectives of the discussion phase (phase 3) (the nurse)

The objective of phase 3 of this study was to collect in-depth information from the registered nurses about the perceptions, barriers and needs that they experienced as registered nurses when they performed CPR.

8.8.2 Background information about the participants

A section of the participants in the quasi-experimental design, through a convenient sampling process, participated in the focus group discussions. A total of 24 registered nurses took part in the focus group discussions. While five of these participants were male, 19 were female. While 18 of the 24 participants possessed a diploma in nursing, six were registered nurses who had acquired a degree in nursing science. The years of their experience ranged from between two and fifteen years.

8.8.3 Findings, conclusions and recommendations for discussion phase (phase 3) (the nurse)

Findings

The registered nurses identified the following four themes from the focus group discussions:

- a lack of organisational and systemic support and resources
- a perceived lack of competence and readiness to perform CPR
- an association between end-of-life experiences and high degrees of stress and various ethical dilemmas
- a perceived need for regular repetitions of CPR training and education

The participants in the focus group discussion noted that no standards or guidelines were available to guide them in the performance of CPR after a cardiac arrest. Most of the participants thought that the nurses lacked the competence and confidence to perform CPR successfully. Nurses from the intensive care units were, however, more confident in their performance of CPR. Since the nurses who worked in the ICU were exposed to CPR more frequently than nurses who worked in non-critical care units, they expressed a much greater degree of confidence in their ability to perform CPR with a high degree of efficiency. Some nurses identified the lack of any regular in-service education in the hospitals as a cause of the lack of confidence demonstrated by nurses who were required to perform CPR.

Some of the nurses were concerned about the stress and anxiety that they experienced as well as the ethical dilemmas with which they were confronted when they were required to resuscitate clients who were suffering from terminal illnesses. The absence of any policies or guidelines about “*Do Not Attempt Resuscitation*” orders undermined their ability to make the necessary decisions in such circumstances. Since all nurses who took part in the discussion noted that CPR always induced high levels of stress and anxiety among those who were required to participate in this procedure, they felt that the introduction of compulsory debriefing sessions after every resuscitation attempt might help nurses to process the anxiety and negative emotions that were evoked in them by the practice of CPR. Many of the participants in the FGD felt that nurses should show the same degree of willingness to resuscitate clients who were HIV-positive that they would show in the case of clients who were HIV-negative. Most of the nurses expressed the opinion that BLS training should be a necessary precondition of employment as nurses in Botswana, and some nurses suggested that an annual BLS certification (or re-certification) should be mandated by the Nursing and Midwifery Council of Botswana for those nurses who wished to retain their registration credentials.

Recommendations

The results of the focus group discussion have important implications for nursing education, practice and policies. The recommendations in this regard are as follows:

- **Nursing education**

The discussions that took place during the course of the study clearly revealed a lack of CPR knowledge and skills as well as a critical lack of preparedness on the part of nurses for the provision of CPR in a hospital setting. As a result of these deficiencies, nurses were simply not adequately prepared or equipped to undertake CPR. All nurses should be exposed to comprehensive and extensive training on a regular basis so that they will be in a position to meet the demands of quality care in hospital settings. The specifics of the CPR education and training that are required by nurses have already been discussed in section (8.3.4).

- **Nursing practice**

The performance of nurses during resuscitation events in the hospital setting are limited by their inadequate preparation prior to their employment to these settings. The limited availability of material and properly trained personnel, coupled with a lack of competence and extremely low levels of confidence, exerts a profoundly negative impact on the CPR performance of the nurses. The recommendations to improve the quality of practice are discussed in section (8.2.3).

A clearly defined description of the nature and scope of practice from the Nursing and Midwifery Council of Botswana would help the nurses to identify and remember their specific responsibilities during resuscitation attempts. The Nursing and Midwifery Council of Botswana should also be required to develop a mechanism to regulate the BLS requirements of nurses. The Nursing and Midwifery Council of Botswana should also develop an unambiguous policy about compulsory annual BLS certification prior to employment as well as a policy about the necessity for regular retraining for all those nurses who wish to retain their registration credentials.

- **Policies**

- Policies should be put in place to mandate the BLS certification of all registered nurses in Botswana.
- The guidelines that need to be followed during the resuscitation process should be made available to all hospitals and other health care institutions in Botswana.

The management of the two referral hospitals in collaboration with the Ministry of Health should develop a definite and unambiguous policy about the conditions in which “*Do Not Attempt Resuscitation*” may be legitimately applied so that ordinary nurses in Botswana will not be exposed to extreme levels of anxiety, to difficult ethical dilemmas or the possibility of legal action on the part of a deceased patient's relatives. The two referral hospitals should also develop a policy about the measures they intend to implement for the debriefing of resuscitators and the management of the stress that is incurred during resuscitation by participant nurses. All these intention should be embodied in policies that are sanctioned by all the relevant health authorities in Botswana.

8.9 RECOMMENDATIONS TO IMPROVE LEVELS OF PATIENT CARE BEFORE, DURING AND AFTER CPR

Although this study has concentrated on issues that relate to the way in which the system functions and the performance of registered nurses during the provision of CPR, the researcher suggests the following recommendations in order to improve the quality of patient care to even a greater extent during the treatment of cardiac arrest cases.

8.9.1 Cardiopulmonary arrest prevention

Cardiac arrest is a condition that can be anticipated and therefore prevented in a variety of in-hospital patients. Most patients who experience in-hospital cardiac arrest display a number of characteristic signs of physiological deterioration before any actual cardiac arrest occurs. If proper notice is taken of these signs and if appropriate action is initiated in a timely fashion, many incidents of cardiac arrest can actually be prevented. Since no standard guidelines are followed in the two referral hospitals in Botswana, the following recommendations are made based on the Resuscitation Council of the UK (2004: [20]) recommendations. In terms of these recommendations, the two referral hospitals should have:

- an Early Warning Scoring System that serves to identify patients who are critically ill and therefore at risk of cardiopulmonary arrest (see Annexure G). A medical emergency team that is capable of responding to acute clinical crises that can be identified by means of clinical triggers or other significant indicators should be maintained.
- a patient charting system that facilitates the regular measurement and recording of early warning scores
- a clear and specific policy that requires an immediate and purposive clinical response to calling criteria or early warning systems (the “track and trigger” protocol). This policy should delineate in clear detail the specific responsibilities of the senior medical doctor and all the registered nurses as well as consultants.

Proposed guidelines for an Early Warning Scoring System

The researcher proposes that the guidelines that are used by the Early Warning Scoring System be adopted for identifying those patients who are at risk of developing cardiac arrest (see Annexure K).

Post-resuscitation care

Recommendations

- Since most patients are clinically unstable immediately after resuscitation, they are likely to require admission to a critical care unit.
- Although a patient's condition should be stabilised as far as possible before a transfer is put into effect, this should not delay any kind of necessary and definitive treatment.
- The two referral hospitals need to ensure that appropriate equipment, drugs and portable monitoring devices are readily available for the safe transfer of all patients from the scene of cardiopulmonary arrest to the ICU.
- A patient who is being transferred should be accompanied by a member of staff who is appropriately trained in BLS and ACLS.
- A post-resuscitation care policy should be devised to guide all these requirements.

Audit and reporting standards

Recommendations

In order to ensure a high quality of resuscitation service, an institution should audit:

- the availability, functionality and currency of every item of CPR equipment
- the availability and expiry dates on all cardiopulmonary arrest and peri-arrest drugs
- all cardiopulmonary arrest outcomes (each event)
- all critical incidents that result in cardiopulmonary arrest or the necessity for a resuscitation attempt (each event)
- all other health and safety issues such as, for example, manual handling

Such audits should include an examination of whether or not debriefing sessions take place after all resuscitation attempts. In all cases where an audit has identified deficiencies, steps should be taken to improve overall performance.

8.10 LIMITATIONS OF THE RESEARCH

Although this study has produced significant findings, the possibility of generalising these research findings is subject to the following inherent limitations of this study:

- The research was confined to two referral hospitals in Botswana. This prevents any inferences being made about other populations of registered nurses in Botswana.
- The researcher recommends that a similar study be conducted among the registered nurses in primary hospitals so that the similarities and differences in their experiences and those of the participants in this study during the performance of CPR can be identified.
- The fact that the researcher selected a non-probability sampling approach for use in this research was a decided disadvantage because this procedure increases the risk of bias in research of this kind.
- Large samples of nurses from different hospitals in replications of this research design could prove to be valuable to validate the findings of the current research.
- The researcher's access to the records of the hospital B for the purpose of auditing was limited. If researcher had been able to audit more of these records, she might have been able to obtain a better overall picture of the information that she required about the kind of CPR that was being carried out in this referral hospital.
- It is acknowledged that this study, in keeping with most of the research that is being performed in the past, deals with the ability of nurses to demonstrate their CPR knowledge and skills during simulated cardiac arrests. Unfortunately, however, the sole use of a simulation process cannot assess the ability of nurses to transfer their knowledge and skills from a simulated setting to a situation involving actual real-life cardiac arrests, and their actual performance in real-life CPR situations must therefore remain provisional and questionable.
- The same number of nurses that were pre-tested and post-tested was not available for re-evaluation after three months had elapsed since the post-test. About 31.2% (32 out of the original 102 participants) of the recruited subjects were unavailable for re-

evaluation because of institutional transfers and migrations to other nursing positions in other countries or institutions. This difference between the numbers who were pre-tested and post-tested and those who were re-tested might affect the accuracy and completeness of the findings.

8.11 RECOMMENDATIONS FOR FURTHER RESEARCH

Modern resuscitation disciplines are emerging areas of study that have helped to prolong the life of many patients. Each individual nurses should also accept responsibility for generating new knowledge about CPR on the basis of their own individual clinical experiences. The researcher therefore recommends that further research should be carried out with a larger sample that would represent a wider population of all the registered nurses in Botswana. The researcher also recommends that research be carried out in the following areas:

- A longitudinal follow-up study of the nurses who participated in the current study will shed further light on the critical point at which the levels of CPR knowledge and skills begin to deteriorate. This may help to determine the optimal frequency with which CPR training and the reinforcement of previous training episodes should be implemented.
- Observational studies that investigate the responses of nurses to real cardiac arrest situations would help to assess and amplify existing knowledge about the provision of CPR and all the problems that attend this emergency procedure.
- The conduct of various forms of phenomenological research will enable researchers to obtain a holistic picture of the way in which different cohorts of participants experience in-hospital resuscitation.
- A cross-sectional study that identifies the motivation of nurses who learn about CPR will help researchers to correlate this kind of education with other relevant knowledge from the experience and theory of adult learning procedures.

8.12 FINAL CONCLUSIONS

Professional practice does not take place in vacuum; it always occurs within the context of a dynamic organisation. Maintaining competence of creating a synergistic nursing practice and achieving the goal of a safe passage for clients through the health care system by

matching patient needs to nurses' competencies. Nurses increase the probability that their patients will move safely through the healthcare system by using their knowledge of the patients' needs and the health care environment in which they work. By applying this knowledge intelligently and with foresight, nurses are able to assist their patients to move through the healthcare process without preventable complications or unnecessary delays.

The proper educational and clinical preparation of nurses is essential for the provision of immediate CPR and for improving the survival rate in cases of cardiac arrest. The registered nurses of Botswana are the initial health care providers in all the clinics, peripheral hospitals and referral hospitals of Botswana. The present study confirms that the nurses indeed experience a number of barriers and hindrances in their performance of CPR. Most of these identified factors are attributable to:

- a lack of policies to guide practice and resolve the serious ethical dilemmas that are frequently associated with the practice of CPR
- organisational factors
- the perceived lack of competency and readiness on the part of nurses to perform successful CPR

Policies can be incorporated into the system by regulatory bodies involved in the formulation of administrative procedures and guidelines. Initiative in this regard should arise from the appropriate level in the healthcare system in the Ministry of Health, Government of Botswana.

Organisational factors can be ameliorated by the employment of an adequate number of properly trained and experienced personnel, by well-delineated policies and standards, by the provision of adequate materials and resources, and by improvements in the standard of team work. There is as yet no authoritative or statutory body that is authorised to mandate BLS training for nurses in Botswana. Because of this, it is vitally important to intensify efforts to provide an appropriate education in BLS for all registered nurses, as well as a compulsory annual recertification of BLS skills and knowledge, and periodic refresher courses to reinforce the knowledge and skills of experienced nurses who are required to provide CPR during the course of their duties. Nurse educators should investigate and review all current methods of instructing student nurses in CPR in order to ensure that they are competent to perform CPR *before* they enter nursing practice.

The perceived lack of competency and readiness on the part of nurses to perform successful CPR can be largely overcome by the formulation and implementation of policies, and by improvements to the organisational factors addressed above. A gradual improvement in the competency of nurses will take place and nurses will also be willing and ready to perform CPR with improvements to their environment. A package of incentives can also be formulated and implemented to encourage nurses who perform well during such emergencies.

The AACN Synergy Model for Patient Care (2005:6) takes into consideration patients' unique needs and provides adequate resources to skilled nurses to accomplish desired outcomes. The 'Forces of Magnetism' are the key elements to provide excellent care and improved outcomes (Kaplow & Reed 2008:17). The following table highlights the key elements of the 'Forces of Magnetism'.

Table 8.1: Key elements of the “Forces of Magnetism”

1	Quality of nursing leadership	8	Consultation and resources
2	Management style	9	Quality assurance
3	Organisational structure	10	Nurses as teachers
4	Quality of care	11	The community and the hospital
5	Personnel policies and programmes	12	The nurse-physician relationship
6	Level of autonomy	13	The image of nursing
7	Professional models of care	14	Professional development

The AACN Synergy Model for Patient Care helps to achieve a high degree of professional “magnetism” and an ability to provide the best quality of nursing care during the provision of CPR.

Baskett and Lim (2004:267), cited by Caroline and Safar, have written: “Resuscitation is a science that should be carried out with art”. It is therefore imperative for all the necessary CPR knowledge and skills to be effectively disseminated to all practising nurses so that the rates of patient mortality following cardiac arrest can be significantly reduced to more acceptable levels.

Botswana as a country has committed itself to a national vision that is known as Vision 2016. This document reflects the desire for where Botswana hopes to find itself as a nation

by the year 2016. Among the seven pillars that support Vision 2016, there are two pillars that are particularly relevant to this study namely:

- an educated, informed nation
- a compassionate, just and caring nation

To achieve these two pillars, the healthcare system in Botswana needs to prepare its registered nurses to be competent and confident in the performance of CPR whenever they encounter a client who has suffered a cardiac arrest or wherever they are called upon to respond to an emergency cardiac event.

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ANNEXURE A

- 1. Letter to the Ministry of Health requesting permission to conduct research**
- 2. Letter granting permission from the research unit, Ministry of Health, Botswana**
- 3. Letter to hospital A requesting access to conduct the research**
- 4. Letter granting permission from hospital A**
- 5. Letter to hospital B requesting access to conduct the research**
- 6. Letter granting permission from hospital B**

Ministry of Health



Republic of Botswana

Application for Approval of Human Research

Section A: Instructions

For research/academic institutions or PHD students attach 14 copies of the following.

Research Application form

Study proposal.

Consent/authorization form or a request for waiver of consent/authorization- Setswana, English and back translation where applicable.

Questionnaires to be used. Setswana, English and back translation where applicable.

Curriculum vitae/ resume of the Principal investigator(s)

Approval letter from other IRBs

Grant approval letter

Any other supporting materials i.e. recruitment scripts, brochures, flyers etc

2. For undergraduates and graduates attach one copy of the above listed items/ documents.

Section B: Application Details

1. Study Title: (Include Version number and date)

Cardio Pulmonary Resuscitation: Perceptions, Needs and Barriers experienced by nurses in Botswana

2. Date of submission:

3. Type of Research:

Basic Science ()

Public Health ()

Clinical Research ()

Human Biology ()

Other _____

5. Principal Investigator(Name & Qualifications):

Lakshmi Rajeswaran
Masters (Nursing)

5(i). Local Contact Details

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Name of affiliate Institution/Organization:	Name of Institution/Organization:
Department (If Government):	Department (If Government):

6. Other Investigators /Co-Principal Investigators			
Name:	Organization:	Email:	Telephone Number:

7. Key Personnel working with data that may be linked to human subjects:			
Name:	Organization:	Email:	Telephone Number:

1. Section C: Description of Research

Brief Description of Study

Cardio pulmonary resuscitation (CPR) has become an integral part of the life saving procedure which can be done without explicit doctor's prescription. Trauma and medical emergencies are causing devastating social and health problems in Botswana. Most of the time the victims lose their lives before pre-hospital care and Basic Life Support are provided. The high rate of casualties and death rate can be reduced to a great extent if the healthcare professionals are well trained in providing CPR. In Botswana, nurses are backbone of the national health care system. Most of the time it is the nursing professionals who discover the patients with cardiac arrests. The nature of Botswana's health care environment requires nurses to be competent and equipped with necessary knowledge and skills to provide CPR.

The nurses' perceptions, barriers and needs about CPR remained largely unexplored in Botswana. This study is aimed at assessing the perception, needs and barriers on CPR amongst nurses in the two referral hospitals (Gaborone, Francistown) in Botswana. The information gained from this study to support a recommendation to establish a programme on CPR for nurses.

2. *Rationale/Justification (Why the need to carry out this study in Botswana):*

Members of public become assertive about the competence of health care providers as well about the incompetence. Competent practice is essential as stake holders expect more skills from the health care personnel. Such expectations also prevail in Botswana.

The study conducted in developed countries among nurses revealed that nurses' perceived barriers, needs affect their functions during emergency cardiac arrest situations. Inadequate knowledge, skills and non availability of resources do play role in the provision of CPR. The nurses' perceptions, barriers and needs about CPR remained largely unexplored in Botswana. The information gained from this study to support a recommendation to establish a programme on CPR for nurses.

3. *Study Objectives (Both General and Specific):*

The aim of the research is to describe and develop a model for CPR among nurses in Botswana and to develop an audit form for the use during the provision of CPR.

The purpose of this research is to describe and explore the perceptions, barriers and needs encountered by the nurses in Botswana during the provision of CPR.

Research objectives: Phase 1

- Evaluate the existing facilities for conducting CPR in all units of the two referral hospital in Botswana using the formulated checklist.
- Conduct hospital audit to identify the number of CPR performed and their outcomes during the period 2005-2006 in the two referral hospitals in Botswana.
- Check and evaluate the hospital policies on CPR.
- Audit the in service education records to see the number of times CPR education offered, any continued education credits were obtained by the registered nurses.
- Conduct a quasi experimental research to evaluate the existing knowledge and skills about CPR among nurses.

Research objectives: Phase 2

- Conduct focus group interviews with registered nurses to identify the perceptions of CPR before and after the education of CPR, identify the barriers perceived by the registered nurses in performing CPR.
- Conduct individual interviews with the nurse managers of two referral hospitals to identify nurses' perceived barriers in performing CPR and possible solutions.

4. Expected Results (*Both Primary and Secondary endpoints*):

The research will help to assess the existing barriers, needs and perceptions about CPR among nurses in the two referral hospitals.

The result will also help evolve a model for CPR and to develop a audit form that can be used during the provision of CPR.

Section D. Methodology

1. Study Design

2.

A quantitative, qualitative, descriptive and exploratory research design will be used to describe and clarify phenomena significant to the registered nurses' perceptions, barriers and needs in the provision of CPR.

2. Study sites (*Districts, Towns, Villages, Health facilities, Schools etc:*

Hospital A -- Gaborone

Hospital B -- Francistown.

3. Subject Population(s) (Clinical condition, Gender, age, and other relevant Characteristics):

Registered Nurses and Nurse Managers in the two referral hospitals.

Emergency trolley, patients records, in service records and policy manuals.

5. Sample size(The number of subjects to be involved in the study and how these subjects will be selected from the population):

90 Registered Nurses and 20 Nurse Managers from the two referral hospitals.

5. Subject Recruitment/Sampling Methods (Explain all procedures in detail):

Convenience sampling method will be used to recruit registered nurses and nurse managers.

The matrons from the two referral hospitals will be requested to make a list of potential participants who work in the medical, surgical, gynaecology, maternity, orthopaedic, intensive care unit and accident and emergency department. The possible participants on the list will be then approached personally; the researcher will explain the relevant aspects of the research, purpose, method, objectives and the significance of the research to the participants.

6. Data Collection Methods (Explain all procedures in detail)

Phase 1-Structured observational audit will be carried out by utilizing the formulated checklist to check the emergency trolley.

The unit and hospital policy manuals will be audited by the formulated check list.

A hospital audit will be conducted to identify the number of CPR performed and their outcomes during the period 2005 and 2006 in the two referral hospitals.

To assess the existing knowledge and skills about CPR, the researcher will conduct a quasi-experimental design, where the researcher is planning to administer pre-test, CPR training programme and post test will be conducted. A re-test will be conducted after four months to know the retention of knowledge and skills in performing CPR.

Phase 2 – The researcher is planning to conduct focus group discussion among registered nurses to identify the perceptions of CPR before and after the education of CPR, identify the barriers

perceived by the registered nurses in performing CPR.

The researcher will also conduct individual interview among nurse managers of the two referral hospitals to identify nurses' perceived barriers in performing CPR and possible solution.

7. Data Analysis (*Briefly explain how data will be analyzed*)

The quantitative data will be analysed by using SPSS 15.0 computer software programme. Descriptive and inferential statistics such as frequency tables, percentages would be used in the data analysis to describe and explore the relationship in the data. The choice of statistical test would be t- test to compare the mean scores of the same participants. The computer programme calculates the t-test with a p value which indicates the probability of occurrence.

The qualitative data (focus group discussion) will be analysed by content analysis and by using QSR-NUD-IST version 6 (2002) computer soft ware programme.

8. Piloting/Pretesting (*Explain all procedures in details*)

A pilot study of the instrument will be conducted among five registered nurses from private, eye and oncology ward. These wards are not part of the selected units from the real study.

9. Protection of Subjects (*Describe measures to protect subjects from and minimize possible risk of harm, discomfort, or inconvenience*):

A verbal and written consent will be obtained from the participants. The participants will be fully informed and explained about the nature of the study and are free to choose to participate or not to participate without coercion.

The participants will be informed if they feel like withdrawing from the study they are allowed to do so without any penalty. The researcher will also communicate the benefits and risks of the study to the participants and weighed the benefits over the risk of the study.

The privacy and confidentiality will be maintained by conducting the Interviews and focus group discussion in a seminar room. The researcher will assign a code numbers to the settings, the questionnaire and to the interview schedule. The researcher will also be sensitive and careful not to cause any harm or discomfort to the respondents. The participants will be informed that no immediate benefits in terms of money or any other reward would be associated with participation in the study. The participants will be also explained that the study results will be available in the UNISA library and in the research unit.

10. Approximate Date Study Recruitment will begin:

15.01.08

11. Estimated Duration of entire study:

6 months

Section E: Subject Information

1. Inclusion Criteria

1. The participants has to be registered nurses residing in Botswana and working in Gaborone and Francistown.
2. The participants has to be registered with the nursing and Midwifery Council of Botswana.
3. The participants have to be employed on full time basis.
4. Each participant has to be willing to participate in the study and give a written consent.
5. The participants have to be actively working in service for one year or more.

2. Exclusion Criteria:

The registered nurses those who are having working experience less than year will not participate in the study.

3. Does the study involve Vulnerable Groups? (Tick all that Apply)? No.

- | | |
|---------------------------------------------------------------------------|-----|
| Elderly | () |
| Children | () |
| Pregnant women/ foetuses/ or neonates of uncertain viability or nonviable | () |
| Prisoners | () |
| Decisionally impaired Persons | () |
| Minority and indigenous groups | () |
| Low Literacy | () |
| Economically Disadvantaged | () |
| Other | () |

4. Does this study involve any use of a drug? No () Yes (). If yes, is the drug registered or given exemption status (IND studies) by the Drug Regulatory Unit in Botswana? If yes attach proof)_____N/A_____

5. Reasonably foreseeable risk or discomforts to the subjects (list in detail):

No foreseeable risk; nor discomforts anticipated.

6. Who will cover Subject Injury-Related Costs?

Sponsor ()
Third-Party Payers ()
Subjects ()
N/A ()
Other _____

7. Potential benefits to society and to subjects (*do not include compensation*):

The society will benefit by getting quality and competent health care services from the nurses.

The registered nurses will benefit by acquiring knowledge, skills about CPR.

By assessing registered nurses perceptions, barriers and needs in providing CPR, this research will help to develop a policy and module for the provision of CPR.

8. Give details of Botswana based personnel that will be involved (*Name, functions and qualifications*):

Registered Nurse	Diploma in general nursing & midwifery
Nurse Managers	Diploma in general nursing & midwifery with 5 years of experience in management

9. Any remuneration given to subjects? Yes () No ().

If yes, specify:

10. Will the participant incur any financial cost in this study? Yes (); No ().

If yes, specify:

Section F: Data Sources

1. Sources of Data

Focus Group(s)	(<input checked="" type="checkbox"/>)
Interviews	(<input checked="" type="checkbox"/>)
Questionnaires/Surveys	(<input checked="" type="checkbox"/>)
Census/Public Records	()
Human Biological Specimen	()
Archive	()
Prospectively Collected	()
Discharged	()
Stored Samples	()

Medical Records	(<input checked="" type="checkbox"/>)
Registers (e.g. TB register and Cancer register)	(<input type="checkbox"/>)
Other	(<input type="checkbox"/>)

Section G. Study Details

1. Capacity Building (how will the study build capacity in the country)

Registered nurses will be better equipped with adequate knowledge and skills to perform CPR.

2. Dissemination (How will the study findings be disseminated)

The study findings will be disseminated by conducting in-service education and seminars in all the Institute of Health Sciences and also in the two referral hospitals. Dissemination will also take place by paper presentation in conferences and publications in Nursing Journals. A copy of the research will be distributed to Research Unit, Ministry of health, Hospital A, Hospital B and UNISA.

3. Other Ethical Body(ies) Involved in the review of the study

Health Studies Research & Ethics Committee, UNIVERSITY OF SOUTH AFRICA

Section H: Sponsor Information

1. Name of Sponsor: SELF

2. Type of Sponsor:

- Government ()
Private Foundation()
Industry ()
Internal ()
Other ()

3. Sponsor Contact : Person: Lakshmi Rajeswaran

4. Sponsor Contact : Telephone: 3932060 / 71459556

Section I: Contact Information:

PI or other researchers for answers to questions about the study or research-related injuries (You must offer at least two contacts):	The HRDC representative who can answer questions about their rights as research subjects
i) Lakshmi Rajeswaran (PI) ii)	Name: Head of Health Research Unit Ministry of Health Private Bag 0038 Botswana Tel: (+267) 3914467 Fax: (+267) 3914697

Section J: Investigator's Statement

INVESTIGATOR'S STATEMENT OF ASSURANCE

I promise to abide with existing relevant International Declarations and National procedures and guidelines when undertaking research involving human subjects within the Republic of Botswana and agree to:

1. Ensure that all studies conducted on human participants are designed and conducted according to sound scientific and ethical standards within the framework of good clinical practice.
2. Report to the Health Research and Development Committee any information requested, serious or unexpected adverse events and any information related to national programs.
3. Unless if an emergency treatment for patient care, obtain prior approval from the HRDC before amending or altering the scope of the project or implementing changes in the approved consent form(s).
4. Submit progress reports as required by the HRDC.
5. Maintain all documentation including consent forms and progress reports.

Principal Investigator's Name:

Principal investigator's Signature:

Date:

Principal Investigator's Position:

Local Investigator's Name:

Local investigator's Signature:

Date:

Local Investigator's Position:

After Completion

An electronic and hard copy of the report should be submitted to the Health Research Unit, Ministry of Health as well as other relevant Botswana Government Institutions/Organizations within 3 months of producing a bound report.

All continuing renewals should be submitted at least 6 weeks before the expiration.

Section K. For Health Research Unit use ONLY.

Date Received	6. Review Body <input type="checkbox"/> Health Research Unit <input type="checkbox"/> HRDC
Final Outcome	
Ref No:	
Expiration Date:	
7. Continuing renewals extension Date 1 _____ Date 2 _____ Date 3 _____	
8. Final Report Submission <input type="checkbox"/> Yes Date _____ <input type="checkbox"/> No	

TELEPHONE: 3632000
FAX:3914467
TELEGRAMS:RABONGAKA
TELEX: 2818 CARE BD



MINISTRY OF HEALTH
PRIVATE BAG 0038
GABORONE
BOTSWANA

REPUBLIC OF BOTSWANA

REFERENCE No: PPME-13/18/1 Vol II (61) January 17, 2008

Lakshmi Rajeswaran
P.O. Box 2684
Gaborone

**PERMIT: Cardio Pulmonary Resuscitation: Perceptions, Barriers,
Needs Encountered by nurses in two Referral Hospitals**

Your application for a research permit for the above stated research protocol refers. We note that you have satisfactorily revised the protocol as per our suggestions.

Permission is therefore granted to conduct the above mentioned study. This approval is valid for a period of 1 year effective December 6, 2007

This permit does not however give you authority to collect data from the selected facilities without prior approval from the management of the facilities. Individual consent should be obtained at all times.

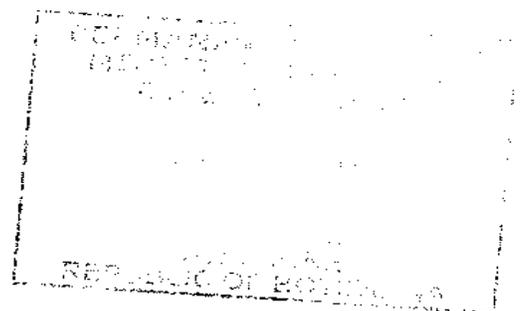
The research should be conducted as outlined in the approved proposal. Any changes to the approved proposal will need to be resubmitted to the Health Research Unit in the Ministry of Health.

Furthermore, you are requested to submit at least one hardcopy and an electronic copy of the report to the Health Research Unit, Ministry of Health within 3 months of completion of the study.

Thank you,

A handwritten signature in black ink, appearing to be 'S. El-Halabi'.

S. El-Halabi
For/Permanent Secretary Ministry of Health



To
Research and Ethics Committee
Hospital- A
P O Box 258
Gaborone
Botswana

From
Lakshmi Rajeswaran
Lecturer in Nursing
Institute of Health sciences
P.O.Box 985
Gaborone, Botswana

01 November 2007

Dear Sir/Madam

RE: PERMISSION TO CARRY OUT THE RESEARCH

I write to request your permission to undertake a research in Hospital – A, Gaborone.

I am a Registered Nurse-Midwife and am employed by Ministry of Health as Nurse Lecturer since 1995. I obtained my Bachelor of Nursing Science from the University of Madras, India and Masters in Nursing Science from the University of Botswana. I am currently a doctoral student at the University of South Africa (UNISA-Pretoria). The doctoral programme requires me to undertake empirical research. My research will explore the perceptions, barriers and needs about Cardio Pulmonary Resuscitation among nurses in Botswana.

The basis of the study is that literature has shown a poor knowledge and skills among nurses on CPR prevails both in developed and in developing countries. The lack of knowledge, skills and competency can be a major barrier in the provision of CPR. Therefore, this research will seek to identify the existing perceptions, barriers and needs among nurses in the provision of CPR in Botswana. The attached proposal document provides details of the research.

I take this opportunity to thank you for your assistance in granting permission to my research.

Thank you,

Yours faithfully

Lakshmi Rajeswaran
RN/RM MSc(N)

Telephone
Telegrams
Facsimile
Fax 203774



Republic of Botswana

PMB 2/11

23rd January 2008

Lakshmi Rajeswaran
Lecturer in Nursing
Institute of Health Sciences
P O Box 985
Gaborone

Dear Sir/Madam

RE:- PERMISSION TO CARRY OUT THE RESEARCH

This is to inform you that permission has been granted to you to carry on your research. Please follow the terms and conditions stipulated by the Ministry of Health (MOH - REF - PMS - 13-18-1 (Vol II 4)) January 17, 2008).

Thank.

Yours faithfully

A handwritten signature in cursive script that reads "B.C. Sharma".

Dr. B.C. Sharma
For Hospital Superintendent

Lakshmi Rajeswaran
Lecturer in Nursing
Institute of Health Sciences
Gaborone
August 25, 2008

To
Matron
Hospital- B
Francistown

RE: Re-evaluation of the in-service education on Basic Life Support- 22nd, 23rd, & 24th Sept 2008.

This is to inform you that there will be a re-evaluation of the in-service education on Basic Life support between September 22nd and 25th at the **conference room, Hospital- B, Francistown.**

I request you to kindly inform the Nurse Managers to send the following nurses from the above mentioned department. The re-evaluation will start at 8 Am until 4 PM.

On 24th I will be conducting the **Focus Group Discussion** among **Registered Nurses** who have participated in the workshop. Please find the names for FGD.

On 25th I am planning to conduct the individual structured interview with the **unit nurse managers** from ICU, A&E, Male & female medical ward, Male & female Surgical ward , Paediatric Medical ward.
The interview will take approximately 20 minutes.

Any change of venue will be communicated well in advance.

Refreshments will be served.

Thank you for your co-operation.

Lakshmi Rajeswaran

TELEPHONE:
FAX:
REFERENCE:



Republic of Botswana

NH 3/54

4th April, 2008

Ms Lakshmi Rameswaran
P O Box 2684
Gaborone.

Dear Madam

STUDY PROTOCOL

Your letter dated 25th March, 2008 on the subject refers.

Having gone through your explanation in the letter, I hereby grant you permission to carry out the study as per your protocol.

My ardent hope is that the findings will inform us how to improve our skills in this very important procedure.

Thank you and all the best.

Yours faithfully

A handwritten signature in black ink, appearing to read 'Dr J Mawungu'.

Dr J Mawungu
HOSPITAL SUPERINTENDENT

ANNEXURE B

- 1. Letter to the registered nurses requesting participation (with consent form)**
- 2. Letter to the nurse managers requesting participation (with consent form)**

Letter requesting participation in the research and Form for

Informed consent – Registered Nurses

RESEARCH TITLE

Cardio Pulmonary Resuscitation: Perceptions, Barriers, and needs experienced by nurses in Botswana

RESEARCHER

Lakshmi Rajeswaran RN, RM BSc(N) MSc(N)

I am a registered nurse and a doctoral student undertaking research at the University of South Africa (Pretoria). I would like to explore the perceptions, barriers and needs among registered nurses in providing Cardio Pulmonary Resuscitation in Botswana.

The research will provide insight into the prevailing extent of nurses' perceptions of CPR and what they perceive as needs and barriers in the provision of CPR. Since CPR contributes greatly to reduce the mortality rate, the research findings will be useful in the development of policy on CPR training programme, and in CPR annual certification for nurses in Botswana.

The University of South Africa, the Health Research Unit, Ministry of Health and the Research and ethics committees, Hospital- A have approved the research project and its procedures. The research involves no foreseeable risk or any harm to you. The procedure involves answering the pre-test questionnaires, undergoing training on CPR and answering post-test questionnaires. You are also requested to participate in a re-test after four months to re-assess the retention of knowledge and skills. Participating in this research will take approximately two hours. You are free to ask any questions about this research or about being a participant and you may call me at 3932060(H-after hours) or 71459556 (M) if you have further questions.

Your participation in this research is voluntary and you are under no obligation to participate but your participation will be valuable and important. You have the right to withdraw at any time without any penalty.

Your identity will not be revealed while the research is being conducted or when the study is reported or published. All data will be collected and stored in a secure place, and shared only with research statistician, promoter and co-promoter but none of these persons will be able to link you to any responses. Only the completed questionnaires, without names, might be available to these persons.

I (the participant) have read the information above and any questions I have asked have been answered to my satisfaction. I agree to participate in this study, realizing that I may withdraw at any time.

The signed consent will be sealed in an envelope and placed in one container. Your completed questionnaire will be sealed in another envelope and placed in another container. . In this way it will be extremely difficult to link sign consent with your completed questionnaire.

I agree that the research data gathered for this study may be published provided I am not identifiable.

Participant

Date

Researcher

Date

Letter requesting participation in the research and Form for

Informed consent – Nurse Managers

RESEARCH TITLE

Cardio Pulmonary Resuscitation: Perceptions, Barriers, and needs experienced by nurses in Botswana

RESEARCHER

Lakshmi Rajeswaran RN, RM BSc (N) MSc (N)

I am a registered nurse and a doctoral student undertaking research at the University of South Africa (Pretoria). I would like to explore the perceptions, barriers and needs among registered nurses in providing Cardio Pulmonary Resuscitation in Botswana.

The research will provide insight into the prevailing extent of nurses' perceptions of CPR and what they perceive as needs and barriers in the provision of CPR. Since CPR contributes greatly to reduce the mortality rate, the research findings will be useful in the development of policy on CPR training programme, and in CPR annual certification for nurses in Botswana.

The University of South Africa, the Health Research Unit, Ministry of Health and the Research and ethics committees, Hospital- B have approved the research project and its procedures. The research involves no foreseeable risk or any harm to you. The procedure involves answering the pre-test questionnaires, undergoing training on CPR and answering post-test questionnaires. You are also requested to participate in a re-test after four months to re-assess the retention of knowledge and skills. Participating in this research will take approximately two hours. You are free to ask any questions about this research or about being a participant and you may call me at 3932060(H-after hours) or 71459556 (M) if you have further questions.

Your participation in this research is voluntary and you are under no obligation to participate but your participation will be valuable and important. You have the right to withdraw at any time without any penalty.

Your identity will not be revealed while the research is being conducted or when the study is reported or published. All data will be collected and stored in a secure place, and shared only with research statistician, promoter and co-promoter but none of these persons will be able to link you to any responses. Only the completed questionnaires, without names, might be available to these persons.

Researcher

Date

Letter requesting participation in the research and Form for

Informed consent – Nurse Managers

RESEARCH TITLE

Cardio Pulmonary Resuscitation: Perceptions, Barriers, and needs experienced by nurses in Botswana

RESEARCHER

Lakshmi Rajeswaran RN, RM BSc (N) MSc (N)

I (the participant) have read the information above and any questions I have asked have been answered to my satisfaction. I agree to participate in this study, realizing that I may withdraw at any time.

The signed consent will be sealed in an envelope and placed in one container. Your completed questionnaire will be sealed in another envelope and placed in another container. . In this way it will be extremely difficult to link sign consent with your completed questionnaire.

I agree that the research data gathered for this study may be published provided I am not identifiable.

Participant

Date

ANNEXURE C

- 1. Checklist for 'Emergency trolleys'**
- Audit Forms for**
- 2. (a) Death Records**
- 3. (b) Hospital Policy on CPR**
- 4. (c) In-service education on CPR**

CHECK LIST: Emergency Trolley

(Recommended by Resuscitation Council of the UK: (2004:1).

AIR WAY

Name	Present	Not present	Working	Not working
Pocket mask				
Spare one-way valve for pocket mask				
Oro pharyngeal airway, sizes 2,3,&4				
Nasopharyngeal Airways, sizes 6&7				
Endo tracheal tubes sizes 6,7,8,&9				
Laryngoscopes – 2				
Spare laryngoscope bulb				
Spare laryngoscope batteries-2				
Large & standard blades				
Laryngeal mask airways size 3,4, &5				
Combi tube				
Suction catheters, sizes 12, 14, 16 (each x 5)				
Yankauer sucker x 2				
Tracheal tube stylet				
Intubating bougie				
Tracheal tube changing catheter				
20 ml syringe for inflating TT cuff				
Magill's forceps				
Sterile lubricating jelly				
Cotton tape Length 1.5.m				
Corrugated Tube for catheter mount				
Catheter mount with 15 mm female connector				
Mount connector 15 mm black rubber				
Swivel connector				
Bacterial filter				
Cricothyrotomy set				

BREATHING

Name	Present	Not present	working	Not working
Manual resuscitator with Oxygen reservoir				
Face mask size 4,5, &6				
Oxygen tubing (length 5m)				
Oxygen mask with reservoir bag				
Source of Oxygen				

CIRCULATION

Name	Present	Not present	Working	Not working
Intravenous cannulae, sizes 14, 16, & 18 G				
Intravenous fluid administration sets 4				
Central venous catheter, size 14G X 2				
Blood gas syringe				

DRUGS

Name	Present	Not present	Expiry Date	Remarks
<u>First Line Drugs</u>				
Adrenaline 1 in 10,000, 10ml				
Atropine 1mg / 3 mg				
Amiodarone 300 mg				
Calcium Chloride, 10%, 10ml				
Sodium Bicarbonate solution, 8.4%				
Saline for flushing intravenous cannulae				
<u>Second Line Drugs</u>				
Lidocaine, Diltiazem, Verapamil, Esmolol, Pottasium Chloride, Magnesium 50%				

ELECTRICITY

Name	Present	Not present	working	Not working
Manual / Automatic defibrillator				
Defibrillation gel pads				
ECG electrodes X 10				

FLUIDS

Name	Present	Not present	Expiry Date	Remarks
0.9% Sodium Chloride, 500ml/ 1000ml				
5% Dextrose, 500ml/ 1000ml				
0.2% Lidocaine in 5% Dextrose 500ml				
Gelofusin, 500ml				

GLOVES

Name	Present	Not present	Expiry Date	Remarks
Gloves non sterile (large X 6 pairs)				

HARDWARE

Name	Present	Not present	Expiry Date	Remarks
Disposable razor				
Scissors				
Micropore tape 1" X roll				
Bandage 2"				
Elastoplast 3" X roll				
Intravenous cannulae dressing X 4				
3 Way stopcock				
Bungs injectable luer lock X 2				
Syringes 2ml/5ml/10ml/20ml X 6 each				
Syringe needles white/green/orange X 6 each				
Syringes for arterial blood gas sample analysis				
Sterile swabs X 6				
Sharps box				

Checklist: Auditing of the death records (for CPR performed)

Observation item	Entered	Not entered	Remarks
Underlying cause of cardiac arrest			
<u>Time of arrest:</u>			
Morning shift			
Evening shift			
Night shift			
Vital signs before the cardiac arrest			
Time of Arrival doctor			
Time of CPR initiated			
Defibrillation available			
Defibrillation used			
Duration of CPR			
Outcomes			
<u>Drugs given during resuscitation:</u>			
Adrenaline			
Atropine			
Amiodarone			

Checklist: Auditing of the hospital policy on CPR

Name of the hospital	Present	Not present	Remarks
Name of the policy			
Authors of the policy			
Availability of the policy			
Awareness of the nurse about existence of the policy			
Date of last review			
Next formal review date			
<ul style="list-style-type: none"> • Policy statement • Aims and objectives • Training implications • Procedure guidelines • Description of the CPR • Indications • Contra indications • Whom to contact first in case of cardiac arrest • Equipment needed for resuscitation • Frequency of checking the emergency trolley 			
<ul style="list-style-type: none"> • Outcome measures • Audit & review 			
Responsible person for updating the policy			
Guidelines of the resuscitation council followed by the institution			
Policy on 'Do not attempt resuscitation'.			
Policy on resuscitation in relation to HIV_AIDS			

Checklist: Auditing of the in-service education on CPR

Name of the ward	Mentioned	Not mentioned	Remarks
Date of in service conducted on CPR			
Number of registered nurses attended			
Continuous education credit awarded			
Frequency of in service conducted			
<u>Availability of the CPR manikin:</u>			
Adult			
Paediatric			

ANNEXURE D

Registered Nurses

- 1. Demographic data collection form**
- 2. Questions on CPR knowledge and skills**
- 3. Questions on Focus Group Discussions**

REGISTERED NURSES

DEMOGRAPHIC DATA

Answer each question by tick (X) in the appropriate box or write down your response in the space provided.

			OFFICE USE
1.1	<i>Please indicate your gender. Mark only one item</i>		
	Male	<input type="checkbox"/>	<div style="border: 1px solid black; width: 100px; height: 20px;"></div>
	Female	<input type="checkbox"/>	
1.2	<i>Please indicate your age in years. Mark only one item</i>		
	26 – 30	<input type="checkbox"/>	<div style="border: 1px solid black; width: 100px; height: 20px;"></div>
	31 – 35	<input type="checkbox"/>	
	36 – 40	<input type="checkbox"/>	<div style="border: 1px solid black; width: 100px; height: 20px;"></div>
	41 -45	<input type="checkbox"/>	
	46 -50	<input type="checkbox"/>	
	51 and above	<input type="checkbox"/>	
1.3	<i>Please indicate your professional status. Mark only one item</i>		
	Registered Nurse	<input type="checkbox"/>	<div style="border: 1px solid black; width: 100px; height: 20px;"></div>
	Registered Nurse/Midwife	<input type="checkbox"/>	
1.4	<i>Please indicate your Academic qualification. Mark only one item</i>		
	Diploma in Nursing	<input type="checkbox"/>	<div style="border: 1px solid black; width: 100px; height: 20px;"></div>
	Diploma in Nursing and Midwifery	<input type="checkbox"/>	
	Bachelors in Nursing	<input type="checkbox"/>	
	Masters in Nursing	<input type="checkbox"/>	
	D Litt in Nursing	<input type="checkbox"/>	
1.5	<i>Please indicate years of work experience. Mark only one item</i>		
	< 2 years	<input type="checkbox"/>	<div style="border: 1px solid black; width: 100px; height: 20px;"></div>
	2-3 years	<input type="checkbox"/>	
	4-5 years	<input type="checkbox"/>	<div style="border: 1px solid black; width: 100px; height: 20px;"></div>
	6-7 years	<input type="checkbox"/>	
	8-9 years	<input type="checkbox"/>	
	> 10 years	<input type="checkbox"/>	
	Others - Specify	<input type="checkbox"/>	
1.6	<i>Please indicate your current area of assignment. Mark only one item</i>		
	Intensive Care Unit	<input type="checkbox"/>	<div style="border: 1px solid black; width: 100px; height: 20px;"></div>
	Accident and Emergency ward	<input type="checkbox"/>	
	Male medical ward	<input type="checkbox"/>	
	Female medical ward	<input type="checkbox"/>	
	Male surgical ward	<input type="checkbox"/>	
	Female surgical ward	<input type="checkbox"/>	
	Male orthopaedic ward	<input type="checkbox"/>	
	Female orthopaedic ward	<input type="checkbox"/>	

	Gynaecology ward		9	
	Maternity ward		10	
1.7	<i>Please indicate your formal training in CPR. Mark only one item</i>			<input type="text"/>
	yes / no		1	
	If yes - 1a - in which year		2	
	if yes - 1b- where - name the Institution		3	
DEMOGRAPHIC DATA				2
1.8	<i>Please indicate any additional training courses in CPR that have you taken?</i>			<input type="text"/>
	BLS training certificate -	yes / no	1	
	ACLS training certificate -	yes / no	2	
	In-service education on CPR -	yes / no	3	
1.9	<i>Please indicate the frequency of CPRs performed on patients by you</i>			<input type="text"/>
	Never		1	
	Daily		2	
	Weekly		3	
	Monthly		4	
	Annually		5	
2.0	<i>What was the outcome of CPRs performed?</i>			<input type="text"/>

REGISTERED NURSES

CPR: Perception, barriers, needs experienced by registered nurses in Botswana

Questions on knowledge and skills about CPR to registered nurses

Answer each question by tick (X) in the appropriate

1. What is the most likely cause of cardiac arrest following a myocardial infarction?

Office

A	Ventricular fibrillation		1	
B	Atrial fibrillation		2	
C	Asystole		3	
D	Ventricular Premature contraction		4	

2. Where is the location of the respiratory centre?

A	Cerebrum		1	
B	Brain stem		2	
C	Spinal cord		3	
D	Peripheral nerves		4	

3. How long can the brain survive without Oxygen before the cell death occur?

A	3-5 minutes		1	
B	8-9 minutes		2	
C	6-7 minutes		3	
D	1-2 minutes		4	

4. What is the definitive treatment to get a normal heart rhythm for a client who is having ventricular fibrillation is

A	CPR		1	
B	Rescue breathing		2	
C	Sub-lingual nitro glycerine		3	
D	Defibrillation		4	

5. What is the compression/ ventilation ratio for a single rescuer?

A	15:2		1	
B	30:2		2	
C	20:2		3	
D	10:2		4	

6. What is the compression/ventilation ratio for two rescuers in children?

A	15:2		1	
B	20:2		2	
C	10:2		3	
D	30:2		4	

7. What is the correct rate of compressions in a minute?

A	120		1	
B	140		2	
C	80		3	
D	100		4	

8. What are the minimum time interruptions the rescuer should observe during CPR?

A	15 seconds		1	
B	10 seconds		2	
C	20 seconds		3	
D	30 seconds		4	

9. Which organ cannot survive without Oxygen if the nurse doesn't initiate CPR promptly?

A	heart		1	
B	brain		2	
C	lungs		3	
D	blood vessels		4	

10. The goal of CPR is to maintain the

A	heart beat until respirations are restored		1	
B	respirations until the heart beat is restored		2	
C	consciousness until the heart beat is restored		3	
D	oxygenation and circulation until heart beat and respirations are restored		4	

11. Which one of the following statements describes the best way you can allow the chest to recoil completely after each chest compression?

A	Keep the chest pushed down approximately ½ to 1 inch between compressions		1	
B	Keep your weight on the victims chest so the chest is slightly compressed at all times		2	
C	Compress chest shallowly with each compression so you don't have to release too far		3	
D	Take you weight off your hands allow the chest to come back to its normal position		4	

12. What is the best way to open responsive victim's airway if you don't suspect a cervical spinal injury?

A	Give abdominal thrusts and then sweep out the mouth		1	
B	Use head-tilt-chin lift method		2	
C	Use the tongue lift-finger sweep method		3	
D	Use a mask while giving breaths to the victim		4	

13. Which one of the following describes the best way to give mouth-to-mouth ventilation after the nurse open the airway and pinch the nose of an unresponsive adult?

A	Seal the nurse mouth over the victim's mouth and give 2 breaths, watching the chest to rise.		1	
B	Put the mouth on the victim's mouth and give small puffs		2	
C	Put the mouth on the victim's mouth and give 1 slow breath for 5 seconds		3	
D	Put the mouth on victim's mouth and give 5 slow breaths for 2 seconds		4	

14. What is the indication to start cycles of chest compressions and breathing for an unconscious victim who is unconscious?

A	The victim has a pulse but is having trouble breathing		1	
B	The victim is responsive but is complaining of chest pain		2	
C	The victim is unresponsive, not breathing and does not have a pulse		3	
D	The victim is unresponsive but is breathing adequately		4	

15. Which of the following statements is correct in the priority of assessing an unconscious victim?

A	Determine unresponsiveness, call for help, begin chest compressions		1	
B	Determine unresponsiveness, call for help, open the airway		2	
C	Begin cardiac compressions, call for help, open the airway		3	
D	Determine the unresponsiveness, begin cardiac massage, position the victim on a flat, firm surface		4	

16. Which of the following is least likely to precipitate a respiratory arrest?

A	Drowning		1	
B	Stroke		2	
C	Drug overdose		3	

D	Myocardial infarction		4	
---	-----------------------	--	---	--

17. When assessing the unconscious victim for pulselessness, which of the following is the best artery to check?

A	Radial		1	
B	Femoral		2	
C	Carotid		3	
D	Brachial		4	

18. For how long the nurse should assess a collapsed victim for pulselessness?

A	1 full minute		1	
B	30 seconds		2	
C	20 seconds		3	
D	10 seconds		4	

19. How often should the emergency trolley be checked in the ward?

A	Every day		1	
B	Every Monday		2	
C	Each shift		3	
D	Once weekly		4	

20. What is the first drug of choice given during cardiac arrest?

A	Atropine		1	
B	Vasopressin		2	
C	Adrenaline		3	
D	Magnesium Sulphate		4	

21. What is the benefit of minimising interruptions of chest compressions during CPR?

A	There is no need to worry about interrupting the chest compressions		1	
B	Minimising these interruptions means the rescuer will not be tired giving CPR		2	
C	Only advanced care professionals need to worry about minimising interruptions		3	
D	Minimising the interruptions during chest compressions increases the victim's chances of survival		4	

SECTION C: Practical test: Assessment of skills by one rescuer

Office

Variable	Skill component	Value	Penalty points	
Variable 1	Checking for hazards	Correct Incorrect /not performed	0 5	
Variable 2	Checking responsiveness	Correct Incorrect /not performed	0 5	
Variable 3	Calling for help	Correct Not performed	0 20	
Variable 4	Open airway: Head tilt Chin lift	correct incorrect not performed	0 10 20	
Variable 5	Checking for breathing : Look, listen and feel for 10 seconds	Correct Incorrect Not performed	0 5 10	
Variable 6	Give two slow breaths	Correct Incorrect Not performed	0 10 20	
Variable 7	Ventilation volume	Correct – 76% & over Incorrect – 51-75% Incorrect – below 50%	0 10 20	
Variable 8	Initial pulse check	Correct Incorrect Not performed	0 5 10	
Variable 9	Correct hand position	Correct – 76% & over Incorrect – 51-75% Incorrect – below 50%	0 10 20	
Variable 10	Perform 30 compressions	Correct Incorrect	0 5	
Variable 11	Depth of compressions	Correct – 76% & over Incorrect – 51-75% Incorrect – below 50%	0 10 20	
Variable 12	Release of chest compressions	Correct – 76% & over Incorrect – 51-75% Incorrect – below 50%	0 10 20	
Variable 13	Rate of chest compressions	Correct 80-100 Incorrect 120-140 or 60-80	0 10 20	
Variable 14	Give two slow continuing breaths	Correct Incorrect	0 5	
Variable 15	Compression to breathing ratio 30:2	Correct Incorrect	0 5	
Variable 16	Perform four complete cycles	Correct Incorrect	0 5	
Variable 17	Pulse check	Correct Incorrect	0 5	
Variable 18	Continuing CPR	Correct Incorrect	0 5	
Variable 19	Correct sequence	Correct 18-18 steps Correct 12-15 steps Correct-12 and below	0 10 20	

REGISTERED NURSES

Questions on Focus group discussion

Opening Question: (Ice-breaking question to encourage participation)

Do you have any interesting past experience during the provision of CPR that you want with us?

1. Introductory questions

- a. Describe your training on CPR during your basic nursing training?
- b. What further refresher courses on CPR did you undergo after your basic qualification?

2. Questions on perceptions

- a. What factors influence your performance in providing CPR?
- b. What do barriers (obstacles) do you experience in your work area in performing CPR?
- c. Please explain your experience in relation to what you have learnt in the classroom about CPR (during training) and what is being practised in the clinical setting?

3. Questions on barriers (key questions)

- a. Explain whether you would feel competent to perform CPR during a sudden cardiac arrest.
- b. Explain whether you feel confident to perform CPR during a sudden cardiac arrest.
- c. Based on your observations, what factors have kept the other nurse's from functioning at their best during resuscitation?
- d. Explain what support you got from your colleagues during CPR at your work place.
- e. How do you feel if you have to provide CPR on a client with HIV-AIDS?
- f. Why do you feel that CPR is a stressful situation?
- g. Explain your opinion regarding implementing Do Not Attempt Resuscitation policy in your hospital.

4. Questions on needs

- a. What institutional policies on CPR exist in your hospital?
- b. Why should there be a debriefing session following participating CPR in the ward?
- c. What is your opinion regarding annual CPR certification as a mandatory requirement for nurses in Botswana?

End Question

- a. What are your suggestions to improve the provision of CPR in your hospital setting?
-

ANNEXURE E

Nurse Managers

- 1. Demographic data collection form**
- 2. Questions on CPR perceptions, barriers and needs**
- 3. Semi-structured interview guide**

NURSE MANAGERS

DEMOGRAPHIC DATA

Answer each question by tick (X) in the appropriate box or write down your response in the space provided.

			OFFICE USE
1.1	<i>Please indicate your gender. Mark only one item</i>		
	Male	1	<input style="width: 100px; height: 20px;" type="text"/>
	Female	2	
1.2	<i>Please indicate your age in years. Mark only one item</i>		
	26 – 30	1	<input style="width: 100px; height: 20px;" type="text"/>
	31 – 35	2	
	36 – 40	3	
	41 -45	4	
	46 -50	5	
	51 and above	6	
1.3	<i>Please indicate your professional status. Mark only one item</i>		<input style="width: 100px; height: 20px;" type="text"/>
	Registered Nurse	1	<input style="width: 100px; height: 20px;" type="text"/>
	Registered Nurse/Midwife	2	
1.4	<i>Please indicate your Academic qualification. Mark only one item</i>		
	Diploma in Nursing	1	<input style="width: 100px; height: 20px;" type="text"/>
	Diploma in Nursing and Midwifery	2	
	Bachelors in Nursing	3	
	Masters in Nursing	4	
	D Litt in Nursing	5	
1.5	<i>Please indicate years of work experience. Mark only one item</i>		<input style="width: 100px; height: 20px;" type="text"/>
	< 2 years	1	<input style="width: 100px; height: 20px;" type="text"/>
	2-3 years	2	
	4-5 years	3	
	6-7 years	4	
	8-9 years	5	
	> 10 years	6	
	Others - Specify	7	
1.6	<i>Please indicate your current area of assignment. Mark only one item</i>		<input style="width: 100px; height: 20px;" type="text"/>
	Intensive Care Unit	1	<input style="width: 100px; height: 20px;" type="text"/>
	Accident and Emergency ward	2	
	Male medical ward	3	
	Female medical ward	4	
	Male surgical ward	5	
	Female surgical ward	6	
	Male orthopaedic ward	7	
	Female orthopaedic ward	8	

	Gynaecology ward			9	
	Maternity ward			10	
1.7	<i>Please indicate your formal training in CPR. Mark only one item</i>				
	yes / no			1	<input type="text"/>
	If yes - 1a - in which year			2	
	if yes - 1b- where - name the Institution			3	
DEMOGRAPHIC DATA					2
1.8	<i>Which of the following additional training courses in CPR have you taken?</i>				
	BLS training certificate -	yes / no		1	<input type="text"/>
	ACLS training certificate -	yes / no		2	
	In-service education on CPR -	yes / no		3	
1.9	<i>Please indicate the frequency of CPRs performed on patients by you</i>				
	Never			1	<input type="text"/>
	Daily			2	<input type="text"/>
	Weekly			3	
	Monthly			4	
	Annually			5	
2.0	<i>what was the outcome of CPRs performed?</i>				
					<input type="text"/>

INTERVIEW SCHEDULE - for the nurse managers

CPR: Perception, barriers and needs encountered by registered nurses in Botswana

PERCEPTIONS on CPR

1. How often do you participate in CPR?

OFFICE USE

Daily		1	
Weekly		2	
Fortnightly		3	
Monthly		4	
Never participated		5	

Any other/specify-----

2. Are all the registered nurses in your unit competent enough to provide CPR?

All of them are competent		1	
Most of them are competent		2	
Some of them are competent		3	
A few of them are competent		4	
None of them are competent		5	

Explain the reasons.

3. Are the registered nurses in your unit are confident enough to provide CPR?

All of them are confident		1	
Most of them are confident		2	
Some of them are confident		3	
A few of them are confident		4	
None of them are confident		5	

Explain the reason.

4. Do you provide orientation to the novice nurses on CPR in your unit?

Always		1	
Most of the time		2	
Sometimes		3	
Rarely		4	
Never		5	

BARRIERS IN PROVIDING CPR

5. Do you get adequate team support during CPR?

Always		1	
Frequently		2	
Sometimes		3	

Rarely		4	
Not at all		5	

Explain the reasons.

6. How soon do you get access to the resuscitation team members (doctors, anaesthetists) during CPR?

Immediately		1	
Within 15 minutes		2	
Within 30 minutes		3	
Within an hour		4	
Later than an hour		5	

7. Which resuscitation council guidelines are being followed in your unit?

South African guidelines		1	
American guidelines		2	
European guidelines		3	
UK guidelines		4	
None of the above		5	

8. Is it important to have adequate cardiac monitors, defibrillators, O2 saturation monitors to provide efficient CPR?

Absolutely		1	
Very much		2	
Somewhat		3	
Not so much		4	
Not at all		5	

PERCEIVED NEEDS ABOUT CPR

9. Is it important to report and document about CPR to improve the quality of care?

Absolutely		1	
Very much		2	
Somewhat		3	
Not so much		4	
Not at all		5	

10. Is it important for the registered nurses to attend classes on concepts of death and grieving?

Absolutely		1	
Very much		2	
Somewhat		3	
Not so much		4	
Not at all		5	

Semi-structured interview guide: Research questions

1. What is your experience as a nurse manager during performance of CPR?
2. What are the barriers experienced by the nurses in providing CPR?
3. What are the barriers experienced by you in providing CPR? Explain
4. In your opinion how the management should help the nurses to equip with the nurses in - order for them to perform CPR better ?
5. How often the simulation of CPR is conducted in your unit?
6. Do you provide periodic in service education for registered nurses on CPR? Explain
7. Do you believe that debriefing session is important for registered nurses after participating in CPR?
Yes/ No Explain the reasons.
8. Do you provide debriefing session for registered nurses after participating in CPR
Yes/No Explain.
9. What is opinion regarding the annual mandatory certificate for the registered nurses as a pre-requisite before employment?
10. What is your opinion regarding the policy on resuscitation in relation to HIV-AIDS client? Explain
11. Do you think that the nursing council should include CPR in the scope of practice? Explain.
12. What is your suggestion to improve the provision of CPR?
13. Is there any policy available on "Do Not Attempt Resuscitation?"

ANNEXURE F

Sample size – Calculations

SAMPLE SIZE CALCULATIONS

Population Size	Percentage Picking	Confidence Interval	Confidence level	Sample Size
370	0.5 (50%)	0.09(+/-9)	95% = 1.96	89.9
			90% = 1.645	68.3

Source: Creative Research Systems - www.surveysystem.com/sscalc.htm

Sample size formulae:

$$SS : \frac{Z^2 * (p) * (1-p)}{c^2}$$

Where:

Z = Z value (e.g. 1.96 for 95% confidence level);

p = percentage picking a choice, expressed as decimal- (.5 used for sample size needed)

c = confidence interval, expressed as decimal- (e.g., .04 = ±4)

Correction for Finite Population

$$\text{new SS} : \frac{SS}{1 - \frac{SS-1}{pop}}$$

Where: pop = population

WORKINGS FOR THIS RESEARCH-

$$SS : \frac{1.96^2 * (0.5) * (1-0.5)}{0.09^2}$$

$$SS : \frac{3.8416 * 0.25}{0.0081}$$

ss= 118.57

$$\begin{array}{r} \text{new SS :} \\ \hline 118.57 \\ 1 - \frac{117.57}{370} \end{array}$$

$$\begin{array}{r} \text{new SS :} \\ \hline 118.57 \\ 1.3178 \end{array}$$

New SS (sample size) = 89.97

ANNEXURE G

**Recommended
Minimum Equipment for
In-hospital adult resuscitation**

RECOMMENDED MINIMUM EQUIPMENT FOR IN-HOSPITAL ADULT RESUSCITATION

Proposed recommended minimum equipment for in-hospital adult resuscitation Source-Resuscitation Council (UK), 2004

Introduction:

Provision should be made in all clinical area to have immediate access to resuscitation drugs and equipment to facilitate rapid resuscitation of the patient in cardiopulmonary arrest. Ideally, the equipment used for cardiopulmonary resuscitation (including defibrillators) and the layout of equipment and drugs should be standardised throughout an institution.

In addition to the resuscitation equipment listed below, clinical areas should have immediate access to stethoscopes, blood pressure machine, a pulse oximeter, a 12 lead ECG and facilities for blood gas analysis. The Resuscitation Council (UK) recommends that equipment and drugs are replaced before they expire.

Airway equipment

- Pocket mask with oxygen port (should be available in all clinical areas)
- Self inflating resuscitation bag with oxygen reservoir
- and tubing
 - Clear face masks, sizes 3,4, & 5
 - Oropharyngeal airways, sizes 2,3 & 4
 - Nasopharyngeal airways, sizes, 6 & 7
 - Portable suction equipment
 - Yankauer suckers
 - Tracheal suction catheters, sizes 12 & 14
 - Laryngeal mask airways (sizes 4&50)
 - Magill forceps
 - Tracheal tubes – oral, cuffed, sizes 6, 7, & 8
 - Gum elastic bougie or equivalent device
 - Lubricating jelly
 - Laryngoscope handles (2) and standard blades
 - Spare batteries for laryngoscope and spare bulbs
 - Fixation for tracheal tube (e.g., ribbon gauze)
 - Scissors
 - Selection of syringes
 - Oxygen mask with reservoir (non-breathing) bag
 - Oxygen cylinders
 - Cylinder key

Circulation equipment

Defibrillator (shock advisory module)
ECG electrodes
Defibrillation gel pads or self adhesive defibrillator pads
Selection of intravenous cannulae (16, 18, 20, 22).
Selection of syringes and needles
Cannula fixing dressings and tapes
Seldinger central venous catheter kit
Intravenous infusion sets
0.9% sodium chloride-1000 ml x 2
Arterial blood gas syringes
Tourniquet

Drugs

a) Immediately available drugs

Adrenaline (epinephrine) 1 mg (1:10.000)x4
Atropine 3 mg x 1
Amiodarone 300 mg x 1

b) Other readily available drugs

Intravenous medications
Adenosine 6 mg x 10
Adrenaline 1 mg x 2
Amiodarone 300 mg x 1
Calcium chloride 10 ml of 100 mg per ml x 1
Chlorphenamine 10 mg x 2
Furosmide 50 mg x 2
Glucose 10% 500 ml x 1
Hydocortisone 100 mg x 2
Lidocaine 100 mg x 1
Magnesium Sulphate 50% solution 2 g (4 ml) x 1
Midazolam 10 mg x 1
Naloxane 400 mcg x 5
Normal saline 10 ml ampoules
Potassium chloride for injection
Sodium Bicarbonate 8.4 %- 50 ml x 1
Other medications

c) Other medications/equipment

Salbutamol (5 mg x2)
Nebuliser device and mask
GTN spray
Aspirin 300 mg

Additional items

Clock/ Audit forms
Gloves/goggles/aprons
Sharps container and clinical waste bag
Large scissors/Alcohol wipes/Blood sample bottles
Blood sample bottles
A sliding sheet or similar device should be available
for safer handling

ANNEXURE H

**Recommended
Audit Form for CPR**

Recommended Audit Form for CPR

(Name of hospital)

Resuscitation record

SURNAME.....
 FIRST NAMES.....
 DATE OF BIRTH:/...../.....; SEX.....
 Please attach patient details here

Hospital- A Resuscitation Record		Date:/...../.....
Location <input type="checkbox"/> MMW <input type="checkbox"/> ICU <input type="checkbox"/> MSW <input type="checkbox"/> A&E <input type="checkbox"/> MOW <input type="checkbox"/> FMW <input type="checkbox"/> FSW <input type="checkbox"/> FOW <input type="checkbox"/> PMW <input type="checkbox"/> GYN <input type="checkbox"/> MAT	Witnessed? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown Monitored? <input type="checkbox"/> Yes <input type="checkbox"/> No Interventions immediately prior to event (Tick all that apply) IV access <input type="checkbox"/> None <input type="checkbox"/> Peripheral <input type="checkbox"/> Central <input type="checkbox"/> IV medication <input type="checkbox"/> ECG Monitor <input type="checkbox"/> Intubation <input type="checkbox"/> Implantable defibrillator/Cardioversion <input type="checkbox"/> Medical ventilation <input type="checkbox"/> Intra-arterial catheter <input type="checkbox"/> Pacemaker	
CALL TYPE		
<input type="checkbox"/> Blue 100 <input type="checkbox"/> Chest Opening <input type="checkbox"/> Paediatric resuscitation		<input type="checkbox"/> AED Surgical call
<input type="checkbox"/> Code red <input type="checkbox"/> Obstetric resuscitation <input type="checkbox"/> Neonatal resuscitation		<input type="checkbox"/> AED Medical call <input type="checkbox"/> AED Trauma call
EVENT VARIABLES		
Immediate call (Tick one) <input type="checkbox"/> Arrythmia <input type="checkbox"/> Hypertension <input type="checkbox"/> Respiratory depression <input type="checkbox"/> Metabolic <input type="checkbox"/> MI or Ischemia <input type="checkbox"/> Unknown <input type="checkbox"/> Others _____ Resuscitation attempted? <input type="checkbox"/> Yes <input type="checkbox"/> Chest Compression <input type="checkbox"/> Defibrillation <input type="checkbox"/> Airway <input type="checkbox"/> NO <input type="checkbox"/> Found dead <input type="checkbox"/> Considered Futile <input type="checkbox"/> NFR documented previous event	Initial Condition Conscious? <input type="checkbox"/> Yes <input type="checkbox"/> No Breathing? <input type="checkbox"/> Yes <input type="checkbox"/> No Pulse? <input type="checkbox"/> Yes <input type="checkbox"/> No Initial Rhythm <input type="checkbox"/> VF <input type="checkbox"/> VT <input type="checkbox"/> PEA <input type="checkbox"/> Bradycardia <input type="checkbox"/> Asystole <input type="checkbox"/> Profusing rhythm Event times Collapse onset -----, ----- Team called-----, ----- Team arrived-----, ----- Arrest confirmed-----, ----- CPR started-----, ----- First fibrillation-----, ----- Airway achieved-----, ----- ET Intubation-----, ----- First dose Adrenalin-----, -----	CPR Stopped _____ . _____ Why? <input type="checkbox"/> Return of Spontaneous Circulation <input type="checkbox"/> Death <input type="checkbox"/> Considered futile by team <input type="checkbox"/> NFR previously documented Spontaneous circulation <input type="checkbox"/> Returned Time ----- <input type="checkbox"/> Never achieved <input type="checkbox"/> Unsustained <input type="checkbox"/> < 20 min <input type="checkbox"/> 20 min – 24 hrs <input type="checkbox"/> > 24 hrs If ROSC <input type="checkbox"/> Remained in correct location <input type="checkbox"/> Transferred to _____

Fill out this form for ALL Resuscitation CALLS

This is important information for the medical record / ongoing audit of our in-hospital resuscitations(Please take time to complete all sections if possible)

ANNEXURE J

**Recommended
Procedure Manual for
CPR**

RECOMMENDED PROCEDURE MANUAL FOR CPR

Policy/ Guideline title: Resuscitation Policy

Author/Lead	
Consultation:	
Date of Last Review	
Next Formal Review Date:	
Approval Date	
Distribution	

Description of Change(s)	Reason for Change	Author & Group(s)	Date:

Synopsis:

This policy outlines key guidelines for all staff covering resuscitation, 'Do Not Attempt Resuscitation' decisions, training requirements and the audit process.

Policy Statement

All patients within the healthcare facilities in Botswana will be deemed suitable for cardiopulmonary resuscitation (CPR) unless there is a clear entry in patients' medical notes to the contrary. Anyone initiating CPR in such circumstances should be supported by their senior medical and nursing colleagues. Relatives and members of staff will also be deemed suitable for CPR in the unfortunate event of suffering a respiratory or cardiac arrest. The healthcare system in Botswana has to ensure that in all circumstances of acute collapse for all patients, visitors and staff in the hospital the response is rapid, competent, yet realistic and humane. In some patients cardiopulmonary arrest represents a terminal event to which CPR is inappropriate.

Aims & Objectives: Aim of the Resuscitation Service

The overall aim of the resuscitation service is to achieve the goals of resuscitation, which are:

- Preservation of life
- Relieving suffering
- Restoring health
- Limiting disability

The above will be achieved through the provision of the following:

- Sound information for users of the resuscitation service
- Adequate & appropriate training for all staff
- Adequate & appropriate equipment
- Commitment to Patients, Relatives & Care givers and staff

Who the policy/guideline applies to/is relevant to:

This policy applies to the two referral hospitals in Botswana.

Training implications:

All courses below are mandatory and must be completed every twelve months.

The following personnel require basic life support training:

All staff going on to advanced life support training

All grades of doctors

Pre-clinical medical students

All nurses, qualified and unqualified

All midwives

Radiographers

Physiotherapists

Occupational therapists

Speech therapists

The following personnel require training, to a variable level, in advanced life support techniques:

All doctors

Trained nurses (use of bag-valve-mask and possibly defibrillation)

All consultants that have contact with patients require the following:

Must attend annual adult basic life support training.

Should attend BLS, Advanced Life Support Course if a specialist in accident and emergency medicine, cardiology, acute general medicine, intensive care or seen as an expert in the field of resuscitation. Those consultants involved in acute direct clinical management should be as up to date as their specialist registrars.

Should attend annual Medical Advanced Life Support (MALS) training if a consultant anaesthetist or any other consultant undertaking invasive or procedures involving sedation without the assistance of an anaesthetist. This will include airway management (except for anaesthetists), an overview of the ALS algorithm and manual defibrillation.

Must attend annual paediatric basic life support training if clinically involved with Children. This will be in the form of the Paediatric Emergency Resuscitation Skills (PERS) session.

All Specialist Registrars:

Must attend adult basic life support training within 6 weeks of commencing employment with the healthcare facilities and annually thereafter. This is in the form of the Medical Advanced Life Support (MALS) session.

Must attend annual training if an anaesthetist or a doctor undertaking invasive or non invasive procedures involving sedation without the assistance of an anaesthetist. This is in the form of the Medical Advanced Life Support (MALS) session.

All Specialist Registrars who are cardiac arrest team members should be in possession of a current Resuscitation Certificate. In addition to this, annual attendance is mandatory at an advanced life support update arranged in-house by the Resuscitation Officers.

All Senior House Officers require the following:

Must attend a 3-hour advanced life support study session on an annual basis which is arranged by the institution. This must first occur within 6 weeks of commencing employment. This is in the form of the Medical Advanced Life Support (MALS) session.

Must be encouraged to attend Advanced Life Support Course as soon as possible if not already in possession of a current provider certificate

Must attend annual paediatric basic life support training if clinically involved with children. This will be in the form of Paediatric Emergency Resuscitation Skills (PERS) session.

Must be encouraged to attend a Paediatric Advanced Life Support Course (PALS) or an Advanced Paediatric Life Support Course (APLS) of an SHO anaesthetist. SHO paediatrician or an SHO working in the accident and emergency department.

Must be encouraged to attempt trauma training every four years in the form of a Royal College of Surgeons Advanced Trauma Life Support Course (ATLS), if an SHO anaesthetist, surgical SHO or a SHO working in the accident and emergency department.

All Pre-Registration House Officers require the following:

Must attend a 3-hour advanced life support study session on an annual basis which is arranged by the Resuscitation Officers. This must first occur within 6 weeks of commencing employment. This is in the form of the Medical Advanced Life Support (MALS) session.

Should be encouraged to attend a Advanced Life Support Course.

Medical Students require the following:

Medical students are required to attend annual adult basic life support training.

Prior to qualifying as doctors, medical students in their final year should start to become proficient in advanced life support as required by a house officer.

Where possible, medical students should attend cardiac arrests as part of their resuscitation training experience.

Responsibilities Regarding Medical Staff Training:

The responsibility for the provision of appropriate training lies with hospital management.

Professions Allied to Medicine & clinically in contact with patients require the following:

Qualified Nurses/ Midwives/ ODPs/ EMA's/ CAP's:

All qualified nurses must attend annual adult basic life support updates which will also include basic airway management. This will be in the form of Core Advanced Life Support (CALS).

All qualified midwives must attend annual paediatric based resuscitation training. This will be in the form of Midwifery Emergency Life Support (MELS).

Qualified nurses/ working in acute areas like A&E, ITU, CCU and recovery should attend, on an annual basis, the Manual Defibrillation Study Day

Qualified nurses working on the acute medical wards, should attend the Manual Defibrillation Study Day

Qualified nurses working in areas where automated external defibrillators are deployed (AEDs) must attend, on an annual basis, basic life support with airway management and AED training.

Qualified nurses working in areas where children are catered for must attend both adult and paediatric basic life support on an annual basis. These are CALS and PERS.

Qualified nurses working in A&E should attend some form of trauma training. Nurses in A&E should be in possession of an accredited trauma course such as ATLS. Trauma training is recommended every four years.

Qualified midwives working in acute areas such as Delivery ward and neonatal nurses in SCBU, should receive annual neonatal advanced life support training. Suitable senior midwives/neonatal nurses should be encouraged to attend an accredited Neonatal Advanced Life Support Course (NALS).

Any qualified nurse or ODP that has a responsibility to respond to a major incident and be part of the mobile surgical team must receive trauma training every four years.

Other Professions Allied To Medicine require the following:

All other staff i.e. auxiliary nurses, healthcare assistants, radiographers, occupational therapists, speech therapists, physiotherapists, must receive annual basic life support and basic airway management training.

Responsibilities Regarding Non-Medical Training:

The responsibility for ensuring staff attendance lies with the appropriate Ward/Unit Manager as well as the individual obliged to receive the training.

A record of attendance will be kept by the, the individual's line manager as well as the individual obliged to receive the training.

The ward managers have the responsibility to inform the Quality Assurance Manager if a ward/department consistently achieves a poor percentage of staff trained overall on an annual basis

Where certain individual staff may persistently avoid training, the Resuscitation Officers have the responsibility to report this to the ward/department's clinical manager. The ward/department's clinical manager must act upon this appropriately.

Equipment:

All Resuscitation Trolley's **MUST** be checked by a suitably qualified member of staff on a daily basis.

A record must be kept with each resuscitation trolley and signed and dated each time the equipment has been checked.

All deficiencies must be rectified immediately.

The Resuscitation Service must be informed of any issues relating to this equipment.

Outcome measures:

Audit & Review:

Audit, as a key element of clinical governance will be carried out to seek improvement to the resuscitation service and patient outcome following attempted cardiopulmonary resuscitation.

Auditing of the process, outcome, availability, response and performance of the resuscitation team will be done using the Cardiac Arrest Report form (Annexure -).

The Cardiac Arrest Report form should be completed at the time that the cardiac arrest is being managed. This form **MUST** be checked and signed by the cardiac arrest team leader.

The cardiac arrest report form **MUST** be inserted into the patient's notes and a photocopy of the form sent to the resuscitation officers.

Appropriate use:

This policy outlines key guidelines for all staff covering resuscitation, 'do not attempt resuscitation' decisions, training requirements and the audit process.

All staff should be familiar with this policy and relevant resuscitation procedures.

The overall aim of the resuscitation service is to achieve the goals of resuscitation, which are:

- Preservation of life
- Relieving suffering
- Restoring health
- Limiting disability

The above will be achieved through the provision of the following:

- Sound information for users of the resuscitation service
- Adequate & appropriate training for all staff
- Adequate & appropriate equipment
- Commitment to Patients, Relatives & Care givers and staff

PROCEDURE/ GUIDELINE**Attendance at Cardiac Arrests.**

In the event of a cardiac arrest occurring two referral Hospital the staff **MUST dial emergency number** using the internal telephone system and state the following:

"Cardiac Arrest" and state "location of the patient".

- In the event of a cardiac arrest, the appropriate personnel will be alerted via the t bleep system.
- The cardiac arrest situation will be managed by the senior attending member of staff. They will ensure a team approach implementing appropriate practice according to current guidelines, policies and protocols.

Composition of the Resuscitation Team

Ideally, the team should include at least two doctors with current Advanced Life Support training. The team composition should include staff who have skills in:

1. Airway interventions, including tracheal intubation
 2. Intravenous cannulation, including central venous access
 3. Defibrillation (manual) and cardioversion
 4. Drug administration
 5. The ability to undertake advanced resuscitation skills e.g. external pacing
 6. Skills required for post-resuscitation care. It is important, where appropriate, that a member of staff who has knowledge of the patients care and condition is present and is incorporated within the team.
- For a paediatric cardiac arrest, staff should follow the above procedure of alerting switchboard but should state that it is a paediatric cardiac arrest. This will require the attendance of a senior anaesthetist.
 - Where possible, those team members involved in any kind of resuscitation should take time to debrief as soon as possible after the event. This aids learning by focusing on what went well during the resuscitation but also on what could possibly have been improved. Debriefing is also recommended as an aid to diffuse stress incurred by individual staff members during the resuscitation situation.
 - Following the cardiac arrest the Team Leader should ensure the Completion of the Cardiac Arrest Form which he/she should sign. The Nursing staff should ensure that the original form is placed in the patient's notes and a photocopy taken and sent to the Resuscitation Service.

Patient Transfer and Post-Resuscitation Care

- Immediately after resuscitation, most patients are clinically unstable and likely to require admission to a coronary care or critical care unit. This will depend on factors such as previous health, severity of illness, and underlying diagnosis. Facilities for continuing care may not be available where the cardiac arrest occurred, transfer may be necessary.
- Continuity of care during this period is vital. Senior staff should be involved before transfer. It is the responsibility of the Team Leader to ensure that the transfer of the care from one group of clinicians to another is efficient.
- The patient's condition should be stabilized as far as possible before transfer, but this should not delay definitive treatment.
- Intra/inter hospital transfers requires careful planning and co-ordination of activities. This co-ordination should take place between the clinicians involved with the patient at the bedside and staff at the designated location.
- If inter-hospital transfer is necessary, careful co-ordination must occur between the destination location, the original location and the transportation body involved.
- The decision to use the ambulance Service or other appropriate transportation service must be made with all relevant personnel.
- A patient being transferred should be accompanied by staff appropriately trained in the safe transfer of patients.

Cardiopulmonary Arrest Prevention

- Most adult survivors of in-hospital cardiac arrest have a witnessed and monitored ventricular fibrillation (VF) arrest and are defibrillated immediately. The underlying cause of arrest in this group is usually primary myocardial ischemia and an irritable myocardium. In comparison, cardiac arrest in patients in unmonitored ward areas is usually a predictable event not caused by primary cardiac disease. In this group, arrest often follows a period of slow and progressive physiological deterioration involving unrecognized or inadequately treated hypoxaemia and hypotension. The underlying cardiac arrest rhythm is usually asystole or PEA, and the survival to hospital discharge is extremely poor. Regular monitoring and early, effective treatment of seriously patients appear to improve clinical outcomes and prevent some cardiac arrests (Resuscitation Council (UK) 2005)
- Using a Modified Early Warning System (MEWS) to attempt to identify patients who are critically ill and therefore at risk of cardiopulmonary arrest.
- Please see annexure for full activation protocol.

Resuscitation Steering Committee

The Resuscitation Committee comprises of the resuscitation officer, senior medical and nursing personnel from Accident & Emergency, Coronary Care Unit, Intensive Care, Anaesthetics, professional development and midwifery.

The primary responsibilities of the resuscitation steering committee are as follows:

- Ensuring adherence to national resuscitation guidelines and standards;
- Defining the role and composition of the resuscitation “crash” team;
- Ensuring appropriate resuscitation equipment for clinical use is available;
- Ensuring appropriate resuscitation drugs (including those for peri-arrest situations) are available;
- Determining requirements for and choice of resuscitation training equipment;
- Audit of resuscitation outcomes;
- Recording and reporting of critical incidents in relation to resuscitation;

Making ‘DO NOT ATTEMPT RESUSCITATION’ Decisions. (DNAR)

An ideal resuscitation policy should aim to offer CPR to all those patients who are likely to benefit from it and who want it, while excluding patients who do not want it or who are unlikely to benefit. Patient placement within this category requires the doctor to have accurate knowledge of the patient’s condition, diagnosis, and prognosis.

The overall responsibility for resuscitation status decisions lies with the consultant concerned. Each consultant should ensure that the policy is understood by all staff who may be involved. This is of particular importance for temporary or locum staff.

Although overall responsibility for CPR decisions for in-patients rests with consultants, the most senior admitting doctor should consider resuscitation status in all patients. Not making a DNAR decision amounts to a positive “for CPR” decision in practice. He/she may wish to discuss this time with the consultant at the time of admission if the situation is unclear, but if there is doubt then the patient should be CPR.

Doctors should always be prepared to discuss the decision for an individual patient with other health professionals involved in the patient's care, with due regard to patient confidentiality. The importance of team-work cannot be overemphasized. Decisions must be taken in the best interests of the patient, an assessment of which should include likely clinical outcome and the patient's known or ascertainable wishes.

There is no good evidence that advanced age is independently associated with a poorer outcome. Selected elderly patients (mostly with acute cardiac events) can do as well as selected younger ones. However, older hospital inpatients, especially those with multiple medical problems, have sorts of conditions which make CPR unlikely to succeed and these clinical factors should be considered when making DNAR decisions. Advanced age should not be used as a basis for excluding patients from CPR (or any other treatment).

It is appropriate to consider a 'do not attempt resuscitation' (DNAR) decision in the following circumstances:

For competent patients

(i.e. those who, in the opinion of their doctor, are well enough physically and mentally to participate in decisions about their treatment and to understand what is being discussed).

a. Where attempting CPR will not restart the patient's heart and breathing:

That is where the patient's condition indicates that cardiopulmonary resuscitation is unlikely to be successful. This is a medical judgment based on clinical circumstances before the arrest, so there is no ethical obligation to get consent from patients before making decisions on this basis. Other aggressive or potentially lifesaving forms of treatment may, however, be appropriate and each should be considered on its merits.

b. Poor quality of life:

The patient's view of his/her quality of life is so poor that he/she would not want CPR (assuming that it has not been excluded on the basis of where attempting CPR will not restart the patients heart and breathing) or other lifesaving or prolonging treatment.

In these circumstances it is the patient's perception of quality of life that is important (not that of the doctor, nurse or family members), and other treatments apart from CPR are also affected. A competent patient should ideally make a decision after being given full information about CPR by a consultant.

In some exceptional circumstances a consultant may consider that discussion about CPR would be detrimental to his patient's well-being and will make a DNAR decision on 'quality of life' grounds without discussing it with the patient. There needs to be full documentation of this process by the consultant.

c. Refusal:

A mentally competent and fully informed patient states that he/she doesn't want CPR. These wishes must be sustained and recorded. This also includes valid applicable advance directives (anticipatory refusal or living will). A patient's informed and competently made refusal that relates to the circumstances which have arisen is legally binding upon doctors. This may also be inferred by a patient who refuses life prolonging treatments in general.

For incompetent patients

a. Where attempting CPR will not restart the patient's heart and breathing.

That is where the patient's condition indicates that cardiopulmonary resuscitation is unlikely to be successful. This is a medical judgment based on clinical circumstances before the arrest, so there is no ethical obligation to get consent from patients before making decisions on this basis. Other aggressive or potentially lifesaving forms of treatment may, however, be appropriate and each should be considered on its merits.

b. Poor quality of life:

The clinician (not the family) has the legal responsibility for making decisions in the best interest of incompetent patients. In these circumstances the consultant may make a 'quality of life' decision on behalf of the patient and he is not legally obliged to consult relatives.

Good practice suggests that it would, however, be sensible for the clinician to inform the patient's family of developments and perhaps to get some idea from them of what the patient's view of quality of life might have been in the current circumstances.

Documenting DNAR Decisions:

Proper understanding of the DNAR decision is impossible without knowing the rationale behind it. The entry in the medical records of the decision and reasons for it should be made by the most senior member of the medical team available.

A DNAR decision applies solely to CPR. It should be made clear that all other treatment and care which are appropriate for the patient are not precluded and should not be influenced by a DNAR decision. To avoid all confusion, the expression **"Do Not Attempt Resuscitation"** should be used and included in the patient's medical notes. Reasons for this decision should also be included in the patient's medical notes.

Generally, junior doctors should avoid making DNAR decisions on 'quality of life' grounds unless they have discussed it with a consultant or the patient is very clearly terminally ill at the time. Juniors may also wish to write **"for CPR"** decisions in the medical notes if they feel that there may be doubt among other team members.

Recording in the nursing notes should be made by the primary nurse or the most senior member of the nursing team whose responsibility it is to inform other members of the nursing team. The nurse admitting the patient will record the resuscitation status in red ink in the nursing admission sheet as part of the admission procedure.

To aid standardization of documenting decisions made, reviews and communication, the should be inserted prominently inside the front cover of the patient's notes to record decisions made regarding resuscitation status. This will allow staff unfamiliar with patients to recognize immediately a patient's CPR status.

As overall responsibility regarding resuscitation status rests with the consultant and it , t must be signed by the consultant. In the consultant's absence, their designated deputy (Specialist Registrar) may sign the pro forma after discussion with the consultant. This consultant should countersign the pro forma within 48 hours.

Any discussions with patients or relatives regarding resuscitation, and any anticipatory decisions, should be documented, signed and dated in the patient's medical notes. This should also be noted on the DNAR pro forma.

The most senior member of the medical team available should ensure that the decision is effectively communicated to other members of staff, and where appropriate, general practitioners and ambulance

staff for patients in the community.

It is the responsibility of both medical and nursing staff to ensure they are aware of each patient's CPR status. Each should establish a mechanism to ensure this is achieved.

Reviewing DNAR Decisions:

All reviews must be documented in the patient's medical notes and in the DNAR pro forma. This review should be done by a doctor of at least Specialist Registrar grade in consultation with the patient's consultant and the nurse on charge of the patient's care.

Patients should have their CPR status reviewed within 48 hours of admission and at least weekly thereafter unless it is a patient with known terminal illness. In this instance a time limit on CPR status recorded as unlimited should be made.

Decisions should be reviewed by a consultant at the earliest available opportunity. Review of junior doctors' decisions should take place on ward rounds.

Discussing DNAR Decisions With Patients and Their Families:

It may be appropriate to encourage the involvement of patients, and people close to the patient (relatives & care givers) in decision making in order to obtain their wishes concerning resuscitation. Patients and relatives should be involved only as much as is likely to bring greater benefit than harm to them.

This is a difficult area which should usually be dealt with by consultants, not by junior medical staff. There is a general feeling that more discussion should take place, but some patients' representative groups have been reported to have reservations about this. There has also been some press criticism of clinicians who have tried to discuss DNAR decisions with their patients.

For incompetent patients the clinician (not the family) has legal responsibility for making a decision in the best interest of the patient. Relatives and others close to the patient cannot determine a patient's best interests, nor give consent to or refuse treatment on a patient's behalf. Relatives and others close to the patient should be assured, however, that their views on what the patient would have wanted will be taken into account in decision making.

If DNAR is decided on the basis of where CPR will not restart the patient's heart or breathing, then this does not require the patient's consent, as it is a clinical judgment. Many authorities would argue that, in these circumstances, it is unnecessary, and perhaps even counterproductive, to inform patients about DNAR decisions.

Junior doctors may become involved in discussing decisions with patients and families if there is a specific request, by a competent patient, to avoid CPR and/or other potentially lifesaving procedures. If this is the case (ensuring that the patient is not suffering from depression) then this should be clearly documented and the patient's wishes complied with. More often, families may state that a seriously ill patient would not have wanted to survive in the present circumstances. Although this sort of statement has an uncertain legal status at present it should be taken into account by medical staff when reaching a decision. Junior doctors will usually want to discuss such cases with their consultants at the time.

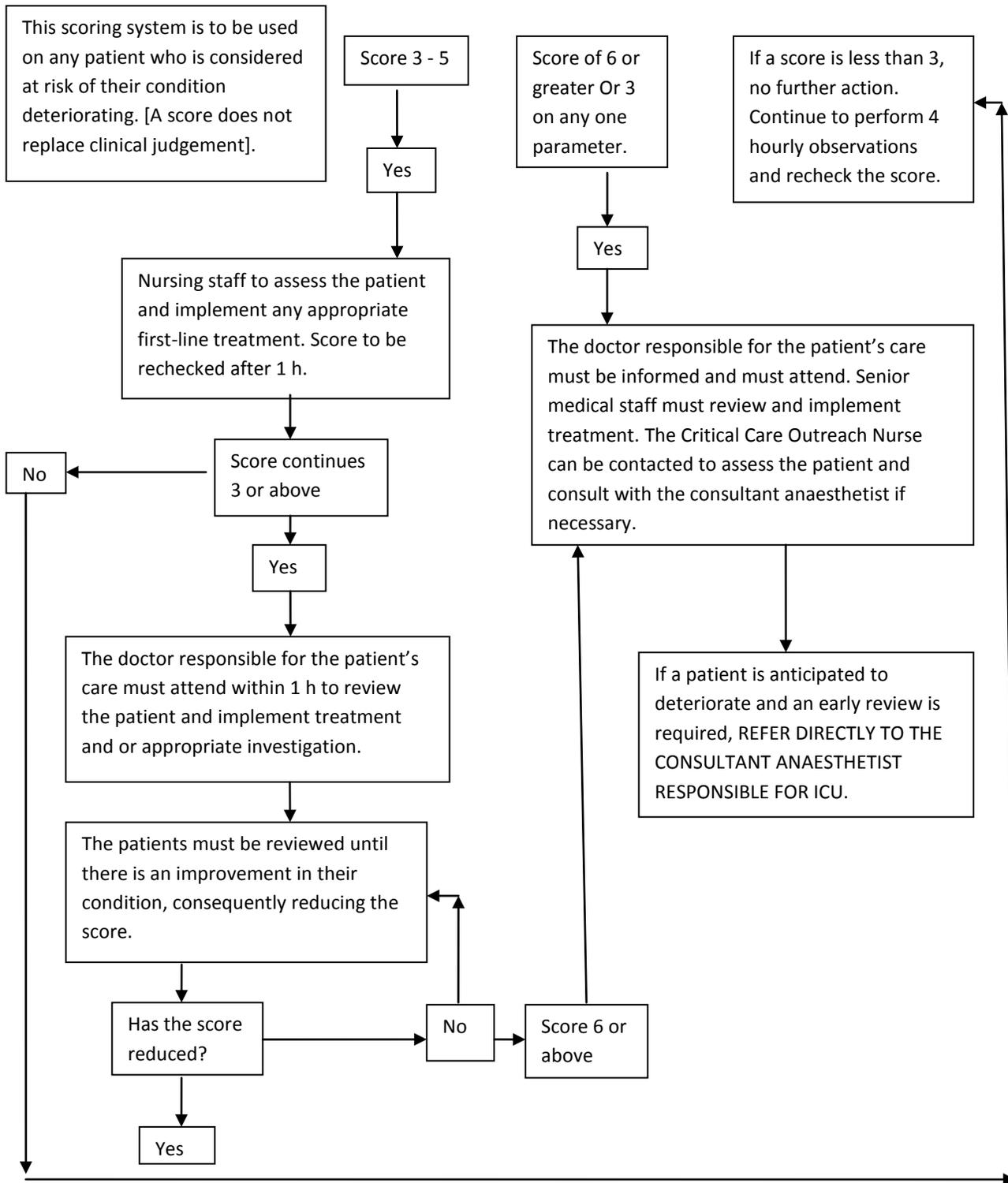
ANNEXURE K

**Recommended guideline for
Early Warning Scoring System**

**RECOMMENDED GUIDELINE FOR
EARLY WARNING SCORING SYSTEM**

Early Warning Scoring System

Score	3	2	1	0	-1	-2	-3
Response to stimulus				Alert	Voice	Pain	Not responsive
Temperature (C*)		<35		35 – 37.5	>37.4-38.4	>38.5	
Systolic blood pressure (mmHg)	Normal - 50	Normal – 30/40	Normal - 20	Normal	Normal + 20	Normal + 30/40	Normal + 50
Heart rate		<40	40-50	51-100	101-110	111-129	>130
Respiratory rate		<8		9-14	15-20	21-29	>30
Urine output	Nil	<30	<50		>100		



Source – Sharpley and Holden (2004:98).

Figure: THE EARLY WARNING SCORING SYSTEM FLOWCHART

DR OMOKHUDU IDOGHO
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PO Box 1890; Garki 900001, Abuja, Nigeria

March 3rd 2009

Director of Policy, Strategy and Communication
National Agency for the Control of AIDS
The Presidency
823 Ralph Shodiende Street
Central Area
Abuja Nigeria

Dear Sir,

REQUEST FOR PERMISSION TO CONDUCT A RESEARCH ON DETERMINANTS OF VOLUNTARY HIV COUNSELLING AND TESTING UPTAKE IN THE FEDERAL CAPITAL TERRITORY OF ABUJA, NIGERIA AS PART OF MY UNIVERSITY OF SOUTH AFRICA MASTERS IN PUBLIC HEALTH PROGRAMME

I hereby request for permission to carry out the above named research within Abuja Federal Capital Territory as my dissertation for the University of South Africa Masters in Public Health Programme. The research is non invasive and aims to use interview schedule to ascertain respondents views on what shapes their use or non use of VCT services and the policy and programmatic implication of this.

I have here attached the research proposal for your kind consideration. Please note that the proposal has been duly vetted and approved by Professor S.P Hattingh, my study supervisor and the University of South Africa Research and Ethics Board.

I look forward to your expedited action on my request.

Yours Sincerely

Omokhudu Idogho

UNISA Student number: 35670096



**NATIONAL AGENCY FOR THE CONTROL OF AIDS
(NACA)
The Presidency**

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March 31ST 2009

Dr Omokhudu Idogho
House 12, C-Close Kado Estate
Po Box 1890, Garki 900001, Abuja, Nigeria

Dear Sir,

Re: REQUEST FOR PERMISSION TO CONDUCT A STUDY ON DETERMINANTS OF VOLUNTARY HIV COUNSELLING AND TESTING UPTAKE IN THE FEDERAL CAPITAL TERRITORY OF ABUJA, NIGERIA.

Thanks for your letter dated 3rd of March 2009 on the above subject matter and subsequent meeting held with you on 19th March 2009. It is my pleasure to convey the approval of NACA for the study: **DETERMINANTS OF VOLUNTARY HIV COUNSELLING AND TESTING UPTAKE IN THE FEDERAL CAPITAL TERRITORY OF ABUJA, NIGERIA.**

Kindly ensure strict compliance with the approved research proposal and National research ethical guidelines. Please share one copy of the study report with this office.

Best of luck in your academic pursuit

Yours Sincerely,

Alex Ogunlape MPSN

Director, Policy & Strategy

NACA