# CARDIO-PULMONARY RESUSCITATION KNOWLEDGE OF REGISTERED NURSES WORKING IN PRIVATE HOSPITAL WARDS

by

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submitted in part fulfillment of the requirements for the degree of

MASTER OF ARTS IN NURSING SCIENCE

at the

UNIVERSITY OF SOUTH AFRICA

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JUNE 2001

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I declare that Cardio-pulmonary resuscitation knowledge of registered nurses working in private hospitals' wards 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.

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SIGNATURE

(MISS P L J HUTCHINGS)

15 June 2007
DATE

ACKNOWLEDGEMENTS

I would like to acknowledge the invaluable help of the following individuals:

- My Lord: Jesus Christ for giving me the ability to undertake and complete this project
- My family and friends for their support and understanding
- Dr ADH Botha for her valuable guidance
- Mrs TA Burger of Unisa's library for her assistance
- The librarians at the Universities of South Africa, Cape Town and Stellenbosch
- An ACLS instructor at the Western Cape Ambulance Training College for his assistance with the questionnaire.
- Jill Ellis for her assistance
- The Nursing Service Managers of the three hospitals for giving me permission to do the study
- The participants who gave of their valuable time to complete the questionnaire.
- Mr Greenink for diligent proofreading
- Mrs T De Waal for organising and delivering the final copy

TITLE: Cardiopulmonary resuscitation knowledge of registered nurses working in private hospital wards

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DEPARTMENT: Advanced Nursing Science

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SUMMARY: Cardiopulmonary resuscitation is a skill that all registered nurses should maintain. In South Africa, a new healthcare trend towards accreditation in this skill is emerging. It is assumed that nurses are competent in cardiopulmonary resuscitation, but studies indicate a problem of poor retention of both knowledge and skills in this area.

A non-experimental, quantitative, descriptive and contextual research project was undertaken with the aim of exploring the knowledge of cardiopulmonary resuscitation of registered nurses working in the wards of selected private hospitals in the Western Cape Peninsula.

A convenience sample of thirty registered nurses completed a multiple-choice questionnaire. The questions in the questionnaire were derived from a literature review as well as the basic and advanced cardiopulmonary resuscitation algorithms. Analysis of the data indicated that the level of knowledge of cardiopulmonary resuscitation was inadequate particularly in the areas of medication and the rationale underlying interventions.

Recommendations that were made included proposals that cardiopulmonary resuscitation training programmes be revised; and that employers ensure that registered nursing staff are formally trained on an annual basis.

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LIST OF ABBREVIATIONS

| | |
|---|---|
| ACLS | Advanced cardiac life support |
| ALS | Advanced life support |
| BLS | Basic Life support |
| CPR | Cardiopulmonary resuscitation |
| DENOSA | Democratic nursing organisation of South Africa |
| ECG | Electrocardiogram |
| HIV | Human immunodeficiency virus |
| ICU | Intensive care unit |
| SANC | South African Nursing Council |
| UK | United Kingdom |
| UNISA | University of South Africa |
| USA | United States of America |

# CHAPTER 1
# OVERVIEW OF THE STUDY

## 1.1 INTRODUCTION

In the past, patients who suffered a cardiac arrest either died or, if they survived, had severe brain damage. Over time a procedure called cardiopulmonary resuscitation (CPR) evolved. CPR consists of a number of practical actions that can be performed in order to ensure that, in the case of cardiac arrest, oxygenated blood reaches the patient's vital organs (e.g. heart, lungs and brain). Basic CPR is administered until treatment that can correct the cause of the cardiac arrest is available. This definitive treatment is often in the form of defibrillation or other advanced CPR measures.

CPR has been shown to improve the patient's chance of surviving a cardiac arrest (Lowenstein 1986: 512).

Since the advent of the twentieth century, there have been numerous developments in the area of CPR including the establishment of: resuscitation councils, accreditation programmes and standardised training programmes. Training of various healthcare personnel in CPR has become commonplace.

Following healthcare trends in the United States of America (USA), various South Africa institutions are now attempting to establish CPR accreditation programmes. The Department of Health in Kwazulu Natal, for example, has informed various South African Universities that they are in the process of implementing an accreditation programme in government hospitals. One of the main aims of accreditation programmes is to ensure that healthcare workers, such as registered nurses, are competent in CPR.

The general public expects registered nurses to be competent in CPR. Effective intervention depends on the registered nurse's ability to diagnose a cardiac arrest, or to identify the warning signs of an impending cardiac arrest, as early as possible. It is also essential that the registered nurse be familiar with the specialised care of the patient who has survived a cardiac arrest.

The registered nurse must first acquire cognitive knowledge and certain psychomotor skills in order to become competent in CPR. Thereafter, frequent refresher courses are necessary in order to maintain that competency.

## 1.2 PROBLEM STATEMENT

Patients who are admitted to hospital wards often have complex medical histories. Their conditions can suddenly deteriorate. Registered nurses who work in the wards thus need to be skilled and knowledgeable in CPR. "Any patient who suffers a cardiopulmonary arrest in hospital has the right to expect the maximum chance of survival as the staff should be appropriately trained and equipped in all aspects of resuscitation" (Colquhoun 1999:38).

In general, private hospitals differ from most government hospitals in that there are no resident doctors immediately available to coordinate CPR efforts. Until the doctor arrives, CPR efforts are usually coordinated by an intensive care trained registered nurse.

The person who first arrives on the scene of a cardiac arrest is expected to initiate basic CPR. It is commonly assumed that registered nurses are competent in CPR, but studies indicate that there is a general problem of poor retention of CPR skills and knowledge (Ragavan 2000:504).

## 1.3 PURPOSE OF THE STUDY

The purpose of this research study is to describe the knowledge of adult CPR of registered nurses working in the medical or surgical wards of selected private hospitals in the Western Cape Peninsula.

## 1.4 OBJECTIVES OF THE STUDY

The objectives of this study are:

- to administer a questionnaire in order to determine the cognitive knowledge of CPR of registered nurses working in the wards of selected private hospitals in the Western Cape Peninsula

- to identify areas where a gap in knowledge exists

- to make recommendations regarding registered nurses' training needs as regards CPR

## 1.5 SIGNIFICANCE OF THE STUDY

This study will benefit the nursing profession as a whole by identifying the training needs of registered nurses regarding CPR. The results will benefit nurse educators who teach CPR by highlighting the problem areas that need to be corrected. Improvement in the knowledge and performance of CPR will hopefully improve the mortality and morbidity rates of cardiac arrest.

## 1.6 DEFINITION OF KEY CONCEPTS

1.6.1 *Registered nurse* – a nurse having completed a basic four-year nursing course leading to registration with the South African Nursing Council as a registered nurse. By law he or she is required to wear maroon epaulettes as proof of registration. Government Notice R2598 of 30 November 1984, as amended, prescribes the responsibilities and scope of practice of registered nurses.

In this study, the term registered nurse specifies a registered nurse that is currently working in a ward.

1.6.2 *Ward* – a 25 or 30 bedded unit in a hospital where patients, who are not critically ill, are admitted for nursing observation and care. There are various types of wards but for the purposes of this study, the term refers only to either medical or surgical wards.

1.6.3 *Cognitive knowledge* - knowledge refers to "specific information about something" (Readers Digest Universal Dictionary 1986:852). As such it includes facts, concepts and ideas.

1.6.4 *Cardiopulmonary resuscitation* - for the purposes of this study, this term refers to all aspects of basic CPR well as to some aspects of advanced CPR of adult patients. Basic CPR refers to techniques such as mouth-to-mouth rescue breathing and closed chest compressions. These techniques don't require specialised equipment. Advanced CPR refers to techniques, such as defibrillation and medication administration, that do require equipment.

1.6.5. *Adult learner* - The term "learner" or "student" is usually applied when a person enters a formal education program such as those offered by a high

school, college or university. In reality, however, this term can be applied to every human being as the process of learning starts at birth and only terminates at death. The concept "adult learner" was conceived in the twentieth century to denote the fact that adults differ from children in that they have different learning needs and thus require different educational methods (Dickinson 1973:11).

## 1.7 ASSUMPTIONS OF THE RESEARCH STUDY

Assumptions " refer to basic principles that are accepted on faith, or assumed to be true, without proof or verification" (Polit & Hungler 1995:10). The assumptions in this study are as follows:

- that registered nurses are professionals and as such possess the characteristics of integrity and honesty

- that all registered nurses currently practicing have been exposed to training in basic CPR

- that few registered nurses working in the wards have the qualification in advanced CPR (also referred to as Advanced Cardiac Life Support)

## 1.8. KNOWLEDGE

Knowledge refers to "specific information about something" (Readers Digest Universal Dictionary 1986:852). Knowledge and skill are both essential for problem solving (Messick 1982:13). Knowledge has various functions. Firstly, it reflects how a person has organized or structured data relating to a specific subject. It reflects, for example, how the registered nurse has mentally organised data relating to CPR. Secondly, knowledge enables an individual to understand tasks and

situations. Thirdly, knowledge enables an individual to plan activities. For example, the knowledge that the registered nurse has regarding CPR will influence her decisions and actions during a cardiac arrest situation. Her knowledge will also influence her daily activities, such as ensuring that the emergency trolley is stocked with essential items (Messick 1982:5).

## 1.9 LEARNING

Current CPR training programmes should incorporate educational methods that not only facilitate learning and which also assist with the retention of new information and skills (Dickinson 1973:14).

## 1.10 RESEARCH DESIGN AND METHOD

### 1.10.1 RESEARCH DESIGN.

A research design is the researcher's overall plan for answering a research question (Polit & Hungler 1995:153). The purpose of this research study is to describe the knowledge of adult CPR of registered nurses working in general medical and surgical wards of selected private hospitals in the Western Cape Peninsula.

### 1.10.2 RESEARCH METHOD.

A non-experimental, quantitative, descriptive and contextual research design was chosen. The research method is explained extensively in Chapter 3.

The research question that needs to be answered is:

What is the level of knowledge of CPR of registered nurses working in the wards of selected private hospitals?

The steps taken to answer this question are described in detail in Chapter 3.

Data collection will be done using a structured multiple-choice questionnaire. The questionnaire will be based on facts compiled from a review of the literature on CPR. In order to establish validity, experts in CPR will review the questionnaire. A pilot study will also be done. Reliability of the questionnaire will be estimated via the spilt half technique. The questionnaire will be handed out at selected private hospitals.

1.10.3 SAMPLING AND POPULATION -. The population of interest is registered nurses working in medical and surgical wards of selected private hospitals. Questionnaires will be handed out to a convenience sample of 30 registered nurses.

1.10.4 DATA ANALYSIS - The data will be tabulated and the researcher will utilise descriptive statistics as well as graphs in order to analyse and discuss the data. The computer package Word for Windows 95 will be used.

## 1.11 SUMMARY

Any patient admitted to the ward of a private hospital could suffer a cardiac arrest. A cardiac arrest, if not treated, is usually fatal. Effective CPR can help save a patient's life by artificially simulating circulation until definitive treatment, in the form of defibrillation and other advanced life support measures, is available.

Registered nurses are adult learners. Nursing educators that train registered nurses in CPR need to be aware of the special needs of adult learners. One of these needs

is that training should be meaningful. This can be achieved by first identifying training needs before developing a training programme. In order to identify these training needs, the registered nurses' current knowledge of CPR must first be described. In Chapter 2, which follows, a review of the literature on cardiac arrest and CPR is presented.

# CHAPTER 2
# LITERATURE REVIEW

## 2.1 INTRODUCTION

This chapter comprises a literature review of adult CPR as well as various related issues. Specialised procedures such as assisting the doctor with intubation do not fall within the scope of this review.

## 2.2 CARDIAC ARREST

2.2.1 *A definition* - cardiac arrest has been defined as "loss of consciousness with absence of circulation, accompanied by absent or gasping respirations" (Quinn 1998:1070). This term has been used to describe a situation where the cardiac output is suddenly and unexpectedly disrupted. In this study, the term cardiac arrest does not refer to an expected death following a serious illness (Colquhoun 1999:1). In adults, the main characteristic of a cardiac arrest is the absence of a carotid or femoral pulse. This indicates that there is no circulation.

2.2.2 *The aim of cardiopulmonary resuscitation* - is to preserve neurological function by using various techniques to ensure that the brain is supplied with oxygenated blood (Stiell 1996:1417).

2.2.3 *The incidence of cardiac arrests* - In the United States of America, statistics show that a quarter of a million people with coronary artery disease die within one hour of onset of symptoms of cardiac arrest. Early access to care, early basic CPR, early defibrillation and early advanced CPR comprise a four-step concept known as the "chain of survival" (Paturas 1998:6).

## 2.3 RESUSCITATION

Knowing the correct CPR procedure is important if death from cardiac arrest is to be averted (Scott Millar 1991:929). Effective basic CPR within the first few minutes of cardiac arrest is critical; and thus thorough training of staff is of prime importance (Bhaskarabhatla 1999: 1421; Wynne 1987:1198). CPR is essentially a practical skill (Colquhoun 1999:55). However, knowledge is an essential foundation (Broomfield 1995:1017). There is as yet no defined minimum body of knowledge and skills regarding CPR (Kaye 1985:917).

2.3.1 *The history of cardiopulmonary resuscitation* - The year 1744 marks the first attempt by Tossach of mouth-to-mouth ventilation. In 1950, Safa and Ruben rediscovered mouth-to-mouth ventilation. It was thought, at that time, that mouth-to-mouth ventilation was the most effective means of artificial ventilation (Colquhoun 1999:ix).

In 1878, Boehm first described closed chest cardiac massage. Before that time, the patient's chest wall was opened by means of a thoracotomy so that the heart could be directly massaged. Eighty years later in 1960, Kowenhoven et al established that closed chest cardiac massage was a simpler and more effective method of maintaining a patient's circulation.

In 1956, electrical reversal of ventricular fibrillation by externally applied electrodes meant that a lethal dysrhythmia could be treated without opening the chest (American Heart Association 1992:2172).

Basic CPR was developed as a temporary measure of keeping the patient alive until definitive treatment, such as defibrillation, was available (American Heart Association 1992:2172). In the sixties, specialized coronary care units

were introduced. These units were staffed with registered nurses that were skilled in advanced CPR (Colquhoun 1999:ix).

2.3.2 *Trends* – Currently, the general public have greater access to institutions where skilled CPR is available (Gazmari 1997: 712). CPR outcomes have improved with the establishment of coronary care units, better resuscitation training, the establishment of expert bodies such as the European Resuscitation Council and the ongoing development of modern technology (Hayward 1999:810).

New resuscitation techniques that are being researched include:

- cardiopulmonary bypass using a portable system
- active compression- decompression devices
- balloon occlusion of the descending aorta (Gazmari 1997:714).

2.3.3 *Resuscitation success rates* - If CPR is administered, patients have a greater chance of surviving cardiac arrest (Tunstall-Pedoe 1992:1347). For the purpose of statistics, cardiac arrest survivors are grouped according to whether they survive the initial cardiac arrest as a result of effective CPR (initial survival) or whether they survive and live to go home (survival to hospital discharge) (Gazmari 1997:714).

In a study by Rosenberg (1993:1373), approximately 30 to 50% of patients survived a cardiac arrest. In Miranda's (1994:528) study, 39 % of patients survived to discharge. This contrasts with Ballew's (1994:2427) finding where 16% survived to discharge. In the British BRESUS study, 71% of deaths occurred during the initial resuscitation. Of the total number of

patients who had a cardiac arrest, 38.7% survived to discharge. Of this group, 12.5% were still alive after one year.

On average, resuscitations tend to be unsuccessful (Cummins 1997:ix). This might be attributed to either patient-related problems such as a severe illness or to poorly trained medical and nursing staff (Ragavan 2000:504). Survival rates can be improved if definitive care such as defibrillation is initiated within the first eight to ten minutes of a cardiac arrest (American Heart Association 1992:2176).

2.3.4 *Survival predictors* - have been extensively researched. Survival predictors need to be considered when assisting the patient to make a decision regarding his treatment. In a critically ill patient with a poor prognosis, the patient needs to be included in discussions regarding CPR (Rosenberg 1993:1370). Survival predictors include the type of dysrhythmia, the duration of CPR efforts, and early access to advanced CPR. Of the various cardiac dysrhythmias, Rosenberg observed that patients had a better prognosis if they were in ventricular tachycardia than if they were in either complete heart block or asystole. The duration of CPR efforts is also a possible survival predictor. Rosenberg found that if CPR was successful within the first 30 minutes then the patient had a greater chance of surviving to discharge. Early access to basic CPR and definitive treatment also greatly increased the patient's chances of survival (Eisenberg 1979 cited in Kaye 1985:916). Laboratory values are not considered good survival predictors (Ballew 1994:2430). Ballew 1994 noted that there was a negative correlation between survival and pre-cardiac arrest "level of function" (i.e. the ability to eat, groom, bathe, and dress independently).

2.3.5 *Long-term survival* - is determined by several factors such as:

- the patient's pre-existing condition or primary diagnosis

- the cause of the arrest
- the duration of the arrest before CPR is started
- the speed with which basic and advanced CPR is initiated
- post-resuscitation care and
- rehabilitation (Kay 1985: 916)

Additional factors include:

- the use of nitroglycerin by the patient while waiting for the ambulance and
- early defibrillation by the paramedics (De Maio 2000:139)

2.3.6 *Quality of life after surviving resuscitation* – during cardiac arrest vital organs such as the brain suffer damage as a result of hypoxia. Almost a third of survivors will have either a cognitive or a motor deficit (Nolan 1998:1870). In a study done in the Netherlands, survivors of cardiac arrest were contacted six months after discharge and asked to complete a self-administered questionnaire regarding their quality of life (Miranda 1994:529). The study found that, while there was no significant physical handicap nor deterioration in the survivor's ability to perform the activities of daily living, their ability to work was impaired. A follow-up study done two years later found that the survivors had a higher incidence of disorientation and detachment from their surroundings.

2.3.7 *Death* – Death due to complications is one of the main reasons why patients often do not survive to discharge following resuscitation. Common complications include:

- heart failure
- cardiogenic shock
- severe ischaemic encephalopathy

Or a combination of the above. Age was not found to be a significant factor (Gazmari 1997:713).

## 2.4 ORGANISATIONS

Various professional bodies have been formed in the past few decades to provide guidelines on CPR. The International Liasion committee on Resuscitation (ILCOR) was formed in 1992 to improve the management of cardiac arrest. Resuscitation councils from Europe, Northern America, Southern Africa, Australasia and South America are represented on this committee (Colquhoun 1999:x). Guidelines for advanced CPR were published by the European Resuscitation Council in 1992 (Colquhoun 1999:8). The ILCOR guidelines were adopted in 1997 by the UK and in 1998 by the USA. The Resuscitation Council of Southern Africa is a voluntary organisation. Its' role is to establish standard resuscitation techniques as well as to coordinate training in resuscitation. It also provides up-to-date algorithms or resuscitation charts.

2.4.1 *Hospital standards* - COHSASA is a South African organization linked with international organizations that accredits hospitals according to specific standards. With regards to CPR, these standards specify that nursing staff

demonstrate adequate knowledge of CPR and life saving equipment (such as the defibrillator). Staff are expected to maintain their skills and knowledge of CPR by attending regular refresher courses in CPR. This organisation also requires that certain wards possess certain types of resuscitation equipment. For example, specialised areas such as the coronary care unit should have access to external pacing pads. The onus is on the hospital to ensure that these standards, once achieved, are maintained.

2.4.2 *The algorithms* - are treatment strategies for basic and advanced CPR. These were developed by the American Heart Association and aim to guide decisions during resuscitation (American Heart Association 1992:2172). Algorithms for both basic and advanced CPR are available from the Resuscitation Council of Southern Africa.

## 2.5 REGISTERED NURSES' SCOPE OF PRACTICE

In South Africa, the registered nurse's scope of practice is regulated by regulations published under the Nursing Act (No 50 of 1978, as amended) in Government Notice R2598 of 30 November 1984, as amended. In essence, the scope of practice broadly describes a registered nurse's responsibility towards a patient in terms of the nursing process. Ideally, the registered nurse should utilize the nursing process when planning for emergencies such as a cardiac arrest.

According to the above Nursing Act, the registered nurse, as either an independent or dependent practitioner, is responsible for all acts and omissions. During resuscitation, the registered nurse directs most interventions until more skilled help arrives. With the arrival of a medical doctor or an intensive care registered nurse, the registered nurses' role changes and she now functions more as a dependent practitioner carrying out the doctor's prescriptions or orders.

## 2.6 THE REGISTERED NURSES' ROLE IN CARDIOPULMONARY RESUSCITATION

It is the individual registered nurse's responsibility to ensure that she is competent in CPR. The registered nurse in charge of a ward has the added responsibility of ensuring that the ward has the necessary resuscitation equipment and that her staff are competent in CPR.

Equipment should be clean, in good working order and easily available. Equipment that is broken or faulty needs to be repaired as quickly as possible. Registered nurses benefit from checking the resuscitation trolley in that they become familiar with where everything is kept. The resuscitation trolley should be checked twice a day by the nursing staff, once by the day staff and then later by the night staff. A method should be devised of ensuring that the medicines' expiry dates are not exceeded. Cardiac monitors as well as oxygen and suctioning facilities are essential items. A patient should not be placed in a bed where emergency equipment such as the suction unit or oxygen port is faulty.

The resuscitation trolley should only be stocked with equipment that is routinely used during CPR. Missing items should be replaced immediately. Equipment that is faulty needs to be repaired as quickly as possible. It is helpful to have a checklist which should include medical supplies such as anti-dysrhythmic drugs, intravenous fluids, fluid transfusion sets, needles and syringes. Spare batteries such as those used for the laryngoscope should be available. The checklist should also include specific equipment such as the instruments needed for intubation, a mobile oxygen cylinder and a defibrillator. Universal infection control measures - such as a sharps box, gloves and goggles - should also be available (Quinn 1996:10).

Electrical equipment such as the defibrillator, which can work off a battery, must be plugged into an electrical outlet which should always be switched on. This ensures

that the defibrillator's battery remains fully charged. This is vital in an emergency situation. If a patient collapses in an area where an electrical outlet is not available, for example in a bathroom, the defibrillator can then work off its' battery.

The registered nurse in charge of a ward must also ensure that her staff are competent in CPR. This can be achieved by making it a condition of employment that the staff attend a CPR training programme annually, and that they obtain a certificate of competency. Training should be based on current CPR algorithms.

Adequate staffing needs to be briefly mentioned. When making out off-duties the registered nurse in charge of the ward needs to ensure that there is an adequate number of CPR certified registered nurses. Registered nurses that are new or that are working for a nursing agency should be orientated as to the location of the resuscitation trolley as well as that of the emergency button. They need to know who to contact in the event of a cardiac arrest.

Everything and everyone in a ward should be "ready to go" in the event of a cardiac arrest.

## 2.7 RESPIRATORY ARREST

2.7.1 *Causes of respiratory arrest-* respiratory arrest can be caused by:

- airway obstruction which could be due to an object such as a grape, a toy or vomitus. It could also be due to swelling following, for example, an allergic reaction to penicillin.

- hypoventilation

- cardiac arrest

- stroke (Paturas 1998:29)

Respiratory failure can follow altered pulmonary structures. Multiple rib fractures following trauma, for example, can limit lung expansion and thus impair ventilation. Ventilation can also be impaired following muscular weakness. This can occur as a result of a disease such as muscular dystrophy; or as a result of medical interventions such as the administration of a muscle relaxant.

Altered neurological structures can also result in respiratory failure. Central nervous system areas that control breathing can be impairment following head injury, electrocution, poisoning, hypoxia, hypercarbia, or hypotension. Damage to peripheral nervous system areas that coordinate respiratory efforts, such as occurs following spinal cord injury, can also result in respiratory failure.

Other causes include changes in homeostasis as a result of electrolyte or acid-base imbalances. Contact with poisonous environmental elements such carbon monoxide or organophosphates can also impair ventilation (Baskett 1989:3).

2.7.2 *Consequences of respiratory arrest* - these can range from mild (e.g. loss of consciousness) to severe (e.g. sudden death) (Paturas 1998:29).

## 2.8. DYSRHYTHMIAS

### 2.8.1 *The hearts' electrical system:*

Cardiac activity is initiated by electrical impulses. Normally, these impulses originate in the sinus node in the right atrium and then travel via a specific conduction pathway through the atria to the atrio-ventricular node. This node then transmits the signal via the bundle of His to the Purkinje fibres located in the ventricles. The ventricles then contract and blood is propelled forward (Paturas 1998:7).

### 2.8.2 *Abnormal electrical activity*

Dysrhythmias, such as ventricular fibrillation, occur as a result of abnormal electrical activity in the heart. Dysrhythmias can result in cardiac arrest.

2.8.3 *Ventricular fibrillation* - the most common dysrhythmia in a cardiac arrest event is ventricular fibrillation. Ventricular fibrillation occurs in response to electrical impulses from multiple sites in the ventricles. This results in uncoordinated and thus inadequate ventricular contraction. On a cardiac monitor the waveform is initially large (coarse) becoming progressively smaller (fine) with time as the myocardium uses up its oxygen and energy stores. Fine ventricular fibrillation is often mistaken for asystole. The treatment of ventricular fibrillation is defibrillation (Colquhoun 1999:5).

2.8.4 *Asystole* - In asystole, because there is no ventricular activity, the electrocardiograph (ECG) presents as a straight line.

2.8.5 *Ventricular tachycardia* – In ventricular tachycardia, the ventricles contract at a rapid rate of between 150 and 200 beats per minute in response to an

ectopic ventricular focus. At this rate the cardiac output is inadequate. (Paturas 1998:52).

2.8.6 *Electromechanical dissociation-* In electromechanical dissociation, electrical activity fails to result in ventricular contraction. Thus although the heart monitor may show an ECG tracing, the patient has no cardiac output. Primary electromechancial dissociation can occur following massive myocardial infarction especially of the inferior wall; drug poisoning due to beta blockers or calcium antagonists; or electrolyte disturbances such as hyperkalaemia.

Secondary electromechancial dissociation occurs when ventricular filling or cardiac output is restricted following structural changes such as occurs with tension pneumothorax, pericardial tamponade, cardiac rupture, or pulmonary embolism.

Treatment includes basic CPR as well as the administration of epinephrine and atropine.

There are many more dysrhythmias but, due to the limited scope of this dissertation, they are not discussed here.

## 2.9 CARDIAC ARREST

2.9.1 *Underlying dysrhythmias* - cardiac arrest is usually the result of a cardiac dysrhythmia (Desforges1992:1075). There are three common types of dysrhythmias each with varying incidences and prognoses (Colquhoun (1999:11). Cardiac arrests that occur outside of a hospital are frequently due to either ventricular fibrillation (80 -90% of cases), asystole (10% of cases) or electromechanical dissociation (5% of cases). There appears to be a link,

which is still not fully established, between the dysrhythmia and the type of medical condition. For example, patients with a history of myocardial ischaemia often arrest as a result of ventricular fibrillation. Asystole often follows vagal stimulation. Cardiac arrest following a cardiac tamponade often presents as electromechanical dissociation. Cardiac arrest secondary to airway obstruction commonly presents as either asystole or electromechanical dissociation (Baskett 1989:2).

2.9.2 *Causes of cardiac arrest* – early identification of the cause of cardiac arrest increases the patient's chance of surviving (Cummins 1997: 1-71). The causes of cardiac arrest can be categorised as being either primary or secondary (Baskett 1989:5). Primary causes of cardiac arrest are cardiac in origin and can have either a direct or indirect effect on the heart. The most common cause of cardiac arrest is myocardial ischaemia (Nolan 1998: 1863).

Secondary causes are those which are non-cardiac in origin and include:

- sequelae following trauma
- alterations in nervous system function (e.g. electrocution, stroke)
- chemical disruptions (e.g. drug overdose, poisoning)
- disturbances of homeostasis (e.g. hypoglycaemia, electrolyte imbalance, acid-base imbalance, hypovolaemia, shock, hypothermia or hypoxia)
- immune system activation (e.g. infection, anaphylaxis)
- changes that occur with pregnancy

The mechanism of cardiac arrest can be described as either electrical or mechanical in nature. Ventricular tachycardia or ventricular fibrillation tend to occur when the heart's electrical conduction system is damaged during, for example, myocardial infarction. Asystole or electro-mechanical dissociation tends to occur when there is damage to the structure of the heart as occurs, for example, following congestive cardiac failure (De Maio 2000:143).

2.9.3 *Consequences of cardiac arrest* - During cardiac arrest, vital organs such as the brain are poorly perfused. Cerebral brain damage often presents as a stroke or a persistent vegetative state (Hayward 1999:810). Irreversible cerebral damage occurs after approximately five minutes of hypoxia (Baskett 1989: 5). In certain situations such as hypothermia or following the use of barbiturates, the survival time is prolonged. Survivors whose cardiac arrest time is short (less than six minutes) and whose CPR time is brief (less than 30 minutes) tend to have a lower incidence of cerebral damage (Abramson et al 1985: 930).

2.9.4 *Cardiac arrest - making the diagnosis* - Sudden loss of consciousness can be due to causes other than cardiac arrest (Millar 1991:929). In the case of a patient who is unresponsive, the diagnosis of cardiac arrest can only be made if there is no pulse or spontaneous respiration (Desforges 1992:1075).

2.9.5 *Making the decision to resuscitate* –It is generally recommended that registered nurses should initiate CPR on all patients unless a doctor specifically orders otherwise (Page 1996:321). Patients who require CPR vary in terms of the severity of their primary illness. Many doctors are concerned with the ethics of resuscitating a patient who has a poor prognosis (Hayward 1999:810). CPR should be done if there is a reasonable chance of a successful initial and long-term outcome (Goodlin 1999:2333).

All too frequently, a patient who is successfully resuscitated suffers severe cerebral damage necessitating residential care. As a result of the cerebral damage, the patient's quality of life is extremely poor in comparison to his previous lifestyle. The family's quality of life also suffers as they attempt to find the resources to cope with this new and often lifelong financial and emotional burden.

2.9.6 *Do-not-resuscitate orders* Because of the unpredictability of cardiac arrests, a plan for each patient should be in place from the time of admission to prevent inappropriate action (Hayward 1999:812).

In one study where a group of geriatric patients were informed of the low survival rates of CPR, 94% chose not to be resuscitated (Murphy et al 1993 cited in Hayward 1999:813).

The decision not to resuscitate can only be made after careful consideration of various factors. One of these factors is the severity of an existing primary illness (Goodlin 1999:2333). The success rate is almost nil when patients have multiple organ failure or metastatic cancer (Pottle 1992:32). Other important factors are patient and family preferences as well as quality of life.

In the United States of America, a do-not-resuscitate order is only legally valid if the patient has given consent. In Britain, medical doctors disagree with this approach (Florin 1994:1653).

Registered nurses, as advocates for the patient, should become involved in resuscitation decisions (Pottle 1992:32 – 33). It is also important that each hospital management section have clear policies regarding living wills and do-not-resuscitate orders. These policies should specify:

- whether patients should be included in the decision
- interventions to assist the patient to cope with death and dying
- what steps should be taken to support surviving family members

Recent guidelines suggest that CPR should not be given in the following situations:

- where a patient, who is mentally competent and fully informed, refuses CPR
- where it is not in the patients' best interests
- where the chances of survival are low

While most patients want to be included in discussions regarding resuscitation, few want to make the final decision (Florin 1994:1653). Do-not-resuscitate decisions need to be regularly reviewed with the patient. In one study, almost a third of the patients who were successfully resuscitated later stated that if they had first been consulted that they would have preferred a do-not-resuscitate order (Bedell and Delbanco1984 cited in Hayward 1999:813).

2.9.7 *Common contra-indications* - are usually obvious and include incineration, extensive life-threatening burns, decapitation or signs of prolonged death such as rigor mortis (Paturas 1998:8).

2.9.8 *A typical scenario* - cardiac arrest events tend to occur in the early hours of the morning such as at 6 am (Paturas1998:16).

2.9.9 *Patient profile - precursors to cardiac arrest* - In the British BRESUS study, cardiac arrest was more common when the patient had a pre-existing respiratory or cardiovascular dysfunction. In this study, 56% of patients had cardiovascular dysfunction, 18 % respiratory dysfunction and the remaining 18% a combination of both respiratory and cardiovascular dysfunction (Tunstall-Pedoe 1992:1349). In another study of patients who survived cardiac arrest after receiving CPR, 59.3% of the survivors' primary pre-existing diagnosis was cardiovascular dysfunction (Miranda 1994:525). Of this group of patients, the severity of the cardiovascular dysfunction varied as is reflected in Table 2.1.

TABLE 2.1: COMMON PRIMARY DIAGNOSES

| Miranda's (1994:525) List | Ballew's (1994:2430) List | Stiell (1996:1419) |
|---|---|---|
| • unstable angina pectoris<br>• coronary surgery<br>• congestive heart failure<br>• rhythm disturbances<br>• cardiogenic shock. | • Coronary artery disease<br>• Hypertension<br>• Congestive heart failure<br>• Diabetes mellitus<br>• Myocardial infarction | • ischaemic heart disease<br>• circulatory disease<br>• hypertension<br>• diabetes mellitus<br>• respiratory disease<br>malignant neoplasm |

2.9.10 *Early warning signs of an impending cardiac arrest* - Both the patient and the registered nurse benefit from knowing the early warning signs of an impending cardiac arrest (De Maio 2000:144). Early intervention may prevent an actual cardiac arrest or increase the chance of successful CPR.

Warning signs are often mild and patients as well as registered nurses often wait too long before taking action (Paturas 1998:4).

Warning signs include:

- chest pain or discomfort that worsens with exercise. This symptom may be accompanied by additional symptoms such as fainting, sweating, nausea or shortness of breath.

- a burning sensation in the jaw or throat. This symptom is often thought by the patient to be heartburn or indigestion.

- pain radiating to the left arm, shoulder, neck or back

- gastro-intestinal symptoms

- non-specific pain

- weakness

- seizure

Certain symptoms may reflect an underlying dysrhythmia. Some studies suggest that patients presenting with chest pain may have a higher survival rate (almost fives times more) that patients presenting with dyspnea (De Maio 2000:141).

2.9.11 *Physical location of cardiac arrests* - Cardiac arrests have been reported in various locations in hospitals. They often occur in the ward (Miranda (1994:525). In the Bresus study, it was found that almost 50% of cardiac arrests occurred in the wards (Tunstall-Pedoe 1992:1348). Coronary care

units and other specialised areas, because of the availability of specially trained registered nurses, have higher survival rates for cardiac arrests compared to that of general wards (Cumming and Stewart 1995 cited in Hayward 1999:810).

## 2.10 GENERAL PRINCIPLES OF CARDIOPULMONARY RESUSCITATION - SAFETY AND PREPARATION

The registered nurse needs to be prepared both physically and mentally with regards to certain aspects of CPR (Paturas 1998:3). The physical and mental preparation includes:

- staying up-to-date on developments regarding CPR techniques and medication protocols
- regularly rehearsing CPR
- attending refresher courses on CPR
- physical fitness
- familiarity with the equipment and the supplies used during resuscitation
- personal safety

The registered nurses' personal safety should not be ignored (Baskett 1989:6). In a hospital resuscitation situation, the registered nurse is mostly at risk of infection. Although the risk is very small, there have been reports of cutaneous tuberculosis, herpes labialis, meningococcal meningitis and shigellosis. Blood or bloodstained

body fluids are the most important source of the HIV or Hepatitis B virus (Colquhoun 1999:52).

General safety recommendations include:

- use of protective wear such as gloves, masks, spectacles, and mouth-to-mouth barrier devices

- ensuring an adequate immunisation status (e.g. against Hepatitis B)

- handwashing, which remains the gold standard of infection control

The registered nurse should take extra precautions, such as using a mask and non-return valve system, when resuscitating a patient who has had a cardiac arrest as a result of exposure to poisonous gases such as hydrogen cyanide or chemicals such as organophosphorus compounds. Gloves and other protective clothing items help minimise contact with chemicals that may have splashed onto the patients' skin or clothes (Nolan 1998:1870).

2.10.1 *When to get help* - If the registered nurse is alone, then she should commence CPR. If airway obstruction is suspected, then mouth-to-mouth breathing and chest compressions should first be done for at least one minute before going for help. When more than one person is available, one person should start CPR while the other goes for help.

It is important to identify whether the cause of the cardiac arrest is respiratory or cardiac in origin. If a cardiac cause is suspected, then a defibrillator is needed and the registered nurse should rather go for help immediately (Nolan 1998:1874).

2.10.2 *Familiarity with equipment* - training in the use of specialised equipment, such as the ambubag, is essential (Morris 1991:627).

2.10.2 *Identifying aggravating factors* - while administering CPR, underlying aggravating factors such as the following need to be identified and corrected (Nolan 1998:7):

- electrolyte imbalance
- hypothermia
- drugs
- toxic agents
- myocardial disease
- electrolyte disturbances
- anoxia

## 2.11 BASIC CARDIOPULMONARY RESUSCITATION

In order for the heart to resume spontaneous activity, an adequate blood supply is necessary. This is the aim of CPR and, more specifically, of basic CPR (Gazmari 1997:714).

Basic CPR, which is also known as basic life support, has been defined as performing actions such as opening and maintaining the airway; and providing

respiratory and circulatory support. These actions do not require any specialised equipment other than a protective shield (Nolan 1998:1870).

Basic CPR includes:

- initial neurological and cardiopulmonary assessment
- airway maintenance and rescue breathing
- closed chest compressions.

While administering basic CPR, the registered nurse should also take measures to ensure personal safety and to obtain more skilled help as soon as possible (Quinn (1998:1072). In the future, defibrillation might be included as a basic CPR skill.

Basic CPR is the best care that a cardiac arrest patient can receive until more definitive treatment, such as defibrillation, can be given. Basic CPR should not be interrupted for more than ten seconds at a time (Scott Millar 1991:930).

## 2.12 NEUROLOGICAL ASSESSMENT

Medical doctors, registered nurses and lay persons often tend to initiate CPR without first confirming the diagnosis of cardiac arrest (Kaye 1986:620). The patient's level of consciousness should first be determined before administering CPR(Quinn 1998:1072). If a patient responds to the "shake and shout manoeuvre", then he is unlikely to be in cardiac arrest. However, if the patient is unresponsive then the registered nurse should proceed to assess the respiratory and circulatory system.

## 2.13 RESPIRATORY ASSESSMENT

A respiratory assessment should involve the "look, listen and feel" method (Colquhoun 1999:1). In this method, one should:

- look for chest movement
- listen for breath sounds
- feel for breaths emerging from the patient's nose or mouth (Paturas 1998:20)

The registered nurse should be able to perform an initial respiratory assessment in under ten seconds; subsequent re-evaluations should be completed in under three to five seconds.

2.13.1 *Respiratory support* - In an unconscious patient, the tongue often flops back and occludes the throat or pharynx. In order to move the tongue away from the throat, the airway should be opened by using the head-tilt and chin-lift manoeuvre (Paturas1998:20). Where a spinal injury is suspected, the jaw-thrust manoeuvre should be used instead. The registered nurse should then examine the mouth for any obstructing object. Well-fitting dentures can be left in place (Colquhoun 1999:2).

If the registered nurse is alone, she should administer one rescue breath after fifteen chest compressions. If help is available, the ratio changes to two rescues breaths after a set of five chest compressions. Each breath should last at least one-and-a-half to two seconds. The registered nurse should not administer closed chest compressions while rescue breathing is being done (Nolan 1998:1874). If the chest wall does not rise and fall with each rescue breath, then the rescue breathing is ineffective. Ineffective rescue breathing

could result in air entering and distending the stomach. If this occurs, then there is a risk of the patient vomiting and passively regurgitating his stomach contents into his lungs (Colquhoun 1999:2). Endotracheal intubation is the most effective method of protecting the airway and ensuring airway patency during CPR (Desforges 1992:1076).

If the patient recovers, then he should be positioned on his left side (known as the recovery position) in order to maintain an open airway and to allow any fluid or vomit to drain away from the mouth.

Mouth-to-mouth resuscitation is really indicated for out-of-hospital cardiac arrests. In hospitals, registered nurses should be familiar with the use of the ambubag.

In one study, poor performance of rescue breathing was found to be related to the rescuers' reluctance to resuscitate a patient who "was dirty" from, for example, vomit (Wynne 1986:31). In a survey of a group of medical and nursing staff, 91% were not prepared to use mouth-to-mouth techniques to ventilate "dirty patients". It was concluded that mouth-to-mask, bag-to-valve-masks and oxygen-powered resuscitators were more acceptable and should thus be made available.

2.13.2 *Respiratory equipment* – This includes equipment such as suction devices and artificial airways. Artificial airways keep the tongue from occluding the pharynx (Paturas 1998:48). Oral airways are used in the unconscious patient who doesn't have a gag reflex; and nasal airways are used in the patient who does have a gag reflex.

Ventilation bag-valve masks, such as the ambubag, should be available. They should fulfill the following criteria:

- fit well
- have a one-way valve in order to prevent the patient from inhaling exhaled air
- be made of a transparent material
- have an oxygen port
- be available in infant, paediatric and adult sizes.
- be self-inflating

## 2.14 CARDIAC ASSESSMENT

Cerebral damage becomes irreversible after approximately three to four minutes of inadequate cerebral perfusion (Nolan 1998:1870). Circulation needs to be maintained by closed chest compressions. If a dysrhythmia is the underlying cause of the cardiac arrest, then advanced CPR measures such as defibrillation need to be administered (Colquhoun 1999:3).

The carotid pulse should be used when performing a cardiac assessment in adults or children over the age of eight (Paturas 1998:21). This is done by lightly placing two fingers in the groove adjacent to the Adam's apple or larynx. The registered nurse should palpate for ten seconds before deciding that there is no pulse. Initiating closed chest compressions on a patient who has a pulse could result in a lethal dysrhythmia. The registered nurse should avoid resting both hands on the patients' throat as this could obstruct the patient's airway. The registered nurse should also

avoid simultaneously palpating both the left and the right carotid arteries as this could block circulation to the brain.

2.14.1 *Cardiac support* - Closed chest compressions, by helping to circulate oxygenated blood, maintain perfusion of vital organs such as the brain (Paturas 1998:6). For closed chest compressions to be effective it is essential that the patient be placed on a firm surface (Cummins 1997:1 – 6). In the hospital situation, a plywood board is often used. In the past, CPR educators recommended that an initial precordial (chest) thump be given to correct a dysrhythmia. This is usually only effective where the cardiac arrest has been witnessed on a cardiac monitor and the dysrthymia identified (Colquhoun 1999:3).

In order to achieve a closed chest compression rate of 80 to 100 compressions a minute, the registered nurse should count out loud at the following pace: "one and, two and, three and ...". Where the registered nurse is alone, she should give the patient two slow breaths after a set of fifteen closed chest compressions. Where she has an assistant, a set of five compressions can be given after each rescue breath. This cycle should be continued for one minute before pausing to check for a pulse or to administer medications.

2.14.2 *The mechanism of closed chest compressions* – Up to 85% of the damage to the heart occurs in the first two hours of a heart attack (Paturas 1998:4). The ischaemic myocardial muscle becomes stiff and as a result is unable to maintain normal stroke volumes. Higher coronary perfusion pressures must then be generated in order to maintain an adequate cardiac output (Gazmari 1997:714).

In the past, it was thought that closed chest compressions, by squeezing the heart, provided an artificial circulation. However echocardiographic studies in the 1970s showed that the cardiac valves became incompetent during cardiac arrest and that closed chest compressions worked by altering intra-thoracic pressures. It was these fluctuations in intra-thoracic pressures that helped to propel blood forwards (Desforges 1992:1076). Closed chest compressions produce less than 20 –30 % of the normal cardiac output (Nolan 1998:1870).

According to basic CPR algorithms, in order to achieve an optimal cardiac output, the chest should be depressed by 4 to 5 cm at a rate of 80 to100 compressions per minute. It is important that the registered nurses' hands are correctly positioned on the patient's chest wall (Gazmari 1997:714). Incorrect hand positioning results not only in ineffective chest compressions but also increases the risk of iatrogenic trauma to the chest wall. A central and not a peripheral pulse should be relied upon to assess the adequacy of systemic perfusion during closed chest compressions. Arterial blood gases are not an accurate reflection of systemic perfusion (Desforges 1992:1077).

It is debatable whether enough scientific evidence exists to prove that a compression:ventilation ratio of 15:2 achieves a better cardiac output than one of 10:2. Instead of emphasising ratio, rate or depth of compressions when evaluating the effectiveness of closed chest compressions, registered nurses should use the criterion of whether an artificial pulse is being generated (Kaye 1985:918).

2.14.3 *The complications of closed chest compressions* - Closed chest compressions can result in iatrogenic trauma when unconventional sites,

excessive force or unconventional positions are used. Common examples include:

- rib or sternal fractures
- rib cartilage separation
- heart or lung contusion
- fractured ribs that could puncture the lungs, liver, spleen or heart
- lung rupture, which is associated with excessive inflation of lungs in children and infants (Paturas 1998:29)

It is important to note that the patient or the patient's family can take legal action if a registered nurse fails to act or fails to meet the required standard of care.

## 2.15 ADVANCED CARDIOPULMONARY RESUSCITATION

Advanced CPR, also known as advanced cardiac life support (ACLS), was introduced by the American Heart Association in 1974 (Braunohler 2000:118). The first advanced CPR training package was developed in 1975 by the American Heart Association (American Heart Association 1992: 2173). South Africa's first advanced CPR or ACLS course was held in 1995. The ACLS is designed to provide a systematic way of thinking and responding to a cardiac arrest situation (Cummins 1997:ix). Some studies found that initial survival rates improved from 32 to 60% after medical doctors had received training in ACLS (Tweeds 1986:515). Basic CPR cannot correct the cause of the cardiac arrest. Cardiac arrest is only reversed

by definitive treatment such as emergency medication and, where appropriate, defibrillation (Quinn 1996:4).

Advanced CPR algorithms serve as a guideline for managing cardiac arrest situations. These algorithms outline step by step a plan of action. CPR algorithms are based on research and serve as a useful standard.

Advanced CPR or ACLS includes the following knowledge areas and skills:

- dysrhythmia management
- defibrillation
- emergency medication
- insertion of peripheral and central lines
- endotracheal intubation
- fluid therapy
- management of electrolyte and acid-base imbalances
- specialised techniques such as decompression of a pneumothorax

## 2.16 DEFIBRILLATION

Defibrillation, by providing a large shock to the myocardium, short-circuits uncoordinated electrical activity of the heart. This enables the heart's intrinsic pacing system to recover. In the past, defibrillation was classified as an advanced CPR skill.

However, because of the importance of early defibrillation in the chain of survival, there is a growing move for it to be included as a basic CPR skill (Quinn 1998:1077).

Approximately eight minutes after the onset of ventricular fibrillation, the heart's supply of stored oxygen is exhausted and electrical activity of the heart ceases. This is represented as a flattened line or asystole on the ECG monitor. Early defibrillation is essential (Paturas 1998:52). Defibrillation within one minute of cardiac arrest gives a patient a 90 % chance of survival (Paturas 1998:7). Where defibrillation is delayed by six minutes the chance of surviving drops to 50 %. It has been estimated that the patients' chances of returning to normal sinus rhythm decreases by 2 to 10 % with each minute that defibrillation is delayed.

2.16.1 *Energy requirements* - The standard energy requirement for treating ventricular fibrillation is 200 to 360 joules. Adult body size has not been shown to affect the amount of energy (measured in joules) required. Groups of three shocks, with the initial sequence having energy levels of 200J, 200J and360J, are generally recommended. Subsequent shocks, if required, should have energy levels of 360J. There is evidence that myocardial injury is greater with increasing energies. If the shock is effective in converting the dysrhythmia to a sinus (normal) rhythm, then the registered nurse should pause to check for a pulse before continuing with defibrillation or closed chest compressions (Colquhoun 1999:6).

2.16.2 *Electode (paddle) position* - The electrodes or paddles should be correctly placed. One electrode should be placed to the right of the sternum just below the clavicle. The other electrode should be placed on the left of the sternum and centred over the fifth intercostal space in the mid-clavicular line (Colquhoun 1999:6). The paddles should not be positioned directly over the

sternum as the bone will absorb much of the energy delivered and thus reduce the effectiveness of the shock (Quinn 1996:3).

2.16.3 *Trans-thoracic resistance* – Trans-thoracic impedance (or resistance) is influenced by the patient's size, the amount of pressure of the paddles against the chest wall and the paddle's size (Quinn 1996:3).

Impedance reduces the effectiveness of the electrical shock. It can be reduced by the use of defibrillator pads. Electrode gel smeared across the chest wall is no longer recommended (Millar 1991:932).

2.16.4. *Precautions* – When operating a defibrillator, the following precautions Should be adhered to:

- do not use alcohol to wipe the patient's chest wall beforehand
- do not defibrillate anyone with a pulse
- do not defibrillate a patient lying on a metal surface (as it could conduct electricity)
- do not depress the shock button until everyone is clear of the patient
- do not defibrillate without first removing any nitroglycerin patches from the patient (Paturas1998:54)

Wet surroundings should also be regarded as a risk factor (Colquhoun 1999:9).

## 2.17 ESSENTIAL MEDICATIONS

Advanced CPR involves the administration of intravenous fluids and medications to help stabilise the patient and to prevent recurrence of cardiac arrest (Paturas 1998:7).

2.17.1 *Adrenaline* - can be used for all three types of cardiac arrest such as electro-mechanical dissociation, asystole or fibrillation.

Adrenaline should be given every three minutes which is the time that it takes for the performance of one loop of advanced CPR. A loop consists of administering three defibrillation shocks after one minute of basic CPR (Nolan 1998:7). The dose of adrenaline is usually 1mg given as a bolus intravenously.

Adrenaline, by causing vasoconstriction of peripheral arteries, increases diastolic arterial pressure and thus promotes coronary and cerebral perfusion (Scott Millar 1991:936). Adrenaline also, by exerting a beta-adrenergic effect, encourages normal cardiac pacemaker function (Colquhoun 1999:12). So far no alpha-adrenergic agonist has been shown to be superior to adrenaline (Desforges 1992:1077).

2.17.2 *Atropine* - Atropine may improve atrio-ventricular conduction and thus is used to treat haemodynamically compromising bradycardia and some forms of heart block (Scott Millar 1991:936).

In asystole, 3mg of atropine can be given as a bolus dose with the aim of reducing vagal tone.

2.17.3 *Isoprenaline* - Isoprenaline is used as an interim measure to increase the ventricular rate in complete heart block until temporary pacing can be instituted. It is also used in the management of beta-blocker overdose (Millar 1991:934).

The normal dosage of Isoprenaline is three ampoules (each ampoule contains 0.6mg) in a 200ml intravenous bag of 5% dextrose. The infusion should be gradually titrated until a heart rate of between 50 and 80 beats per minute is obtained.

2.17.4 *Anti-dysrhythmic drugs* Anti-dysrhythmic drugs include Lignocaine and Amiodarone. This class of drugs have the following goals:

- to prevent lethal dysrhythmias such as ventricular fibrillation or ventricular tachycardia
- to terminate ventricular tachycardia and ventricular fibrillation
- to facilitate electrical defibrillation and
- to prevent ventricular fibrillation or ventricular tachycardia from reocurring (Colquhoun 1999:74)

Anti-dysrhythmic agents have the adverse effect of depressing myocardial function as well as being pro-arrhythmic.

Lignocaine prevents ventricular fibrillation and ventricular tachycardia from reoccuring (Kaye 1986:103). Lignocaine can be given after 2 to 4 sets of

defibrillatory shocks. The usual dose of lignocaine is 1 to 2 mg per kilogram of the patient's weight.

2.17.5 *Calcium* –There is no definite proof that calcium is effective in treating cardiac arrest. There is a risk that bolus injections of calcium could, by increasing intra-cellular calcium concentrations, result in myocardial necrosis or uncontrolled muscle contractions (Colquhoun 1999:75).

Currently, calcium is recommended when the patient is known to be:

- hypocalcaemic
- hyperkalaemic
- haemodynamically compromised as a result of an overdose of a calcium antagonist such as verapamil (Millar 1991:933)

Calcium is usually administered as an intravenous bolus of 10 ml of 10% calcium chloride or calcium gluconate solution. This dose can be repeated if necessary.

2.17.6 *Sodium bicarbonate* is used to correct acidosis due to hypoxia. Severe metabolic acidosis usually develops about twenty minutes after cardiac arrest. Acidosis normally resolves spontaneously and thus doesn't require specific medical intervention (Scott Millar 1991:936). Acidosis, however, has a negative effect on myocardial contractility and also reduces the effectiveness of catecholamines.

Sodium Bicarbonate can cause paradoxical acidosis and should thus only be used as a last resort and then only after cardiac arrest has persisted for at

least ten minutes. The initial dose of sodium bicarbonate is 50 mmol (50ml of an 8.4% solution). Further doses depend on subsequent acid-base blood analysis.

## 2.18 TERMINATION OF CARDIOPULMONARY RESUSCITATION EFFORTS

Resuscitation should generally be continued for at least twenty to thirty minutes from the time of cardiac arrest (Nolan 1998: 8). CPR should be continued as long as ventricular fibrillation is present (Millar 1991:932).

The registered nurse can stop CPR when:

- CPR is successful
- she is exhausted
- the attending medical doctor decides that further efforts are futile
- a more qualified person has arrived to take over the situation
- personal safety is threatened
- the cardiac arrest lasts longer than thirty minutes with or without CPR (except in cases of severe hypothermia or cold water drowning) (Paturas 1998:8)

Other possible indications include:

- a time delay of greater than five minutes before commencing CPR

- evidence of cerebral damage such as persistent fixed and dilated pupils unrelated to previous drug therapy

- asystole that persists for more than 20 minutes (Colqhuoun 1999:68).

## 2.19 POST-RESUSCITATION SYNDROME

*Post-resuscitation syndrome* - The post-resuscitation syndrome is a group of multiple organ system malfunctions that sometimes occurs following successful CPR (Peter Safar 1985:932). Post-resuscitation syndrome was first identified by Negovsky in the sixties and appears to due to cellular injury as a result of hypoxia and toxic substances released from damaged organs.

Other complications, apart from post-resuscitation syndrome, that can occur include:

- Hypotension
- Acidemia
- Hypoxemia
- Hyperthermia
- Uremia
- sepsis

## 2.20 NURSING MANAGEMENT OF SUCCESSFULLY RESUSCITATED PATIENTS

A patient who has been successfully resuscitated requires careful nursing care which includes the following:

2.20.1 *Neurological observation* - The registered nurse should carefully observe the patient's neurological status (Quinn 1996:7). The Glasgow coma scale can be used to monitor the level of consciousness.

2.20.2 *Respiratory support* – Support in the form of oxygen therapy or mechanical ventilation might be necessary. Continuous assessment of the patient's respiratory status is possible with pulse oximetry. A post-arrest chest radiograph should be taken to exclude trauma resulting from CPR efforts as well as to check the position of newly inserted central lines and endotracheal tubes.

2.20.3 *Cardio-vascular support* - A baseline twelve lead ECG should be taken. The patient should be attached to a cardiac monitor because of the risk of further dysrhythmias. Acid-base balances and electrolyte levels, which could be abnormal as a result of the cardiac arrest, need to be checked and corrected. Continuous monitoring of the patient's vital signs as well as other haemodynamic parameters, such as central venous pressures, should be recorded. Where ordered, supportive measures such as volume replacement or the use of inotropic drugs needs to be administered.

2.20.4 *Renal support* - An indwelling urethral catheter allows hourly evaluation of renal function.

2.20.5 *Gastro-intestinal support* - Nutritional supplements need to be considered if the patient is to remain intubated for a long period of time.

2.20.6 *Emotional support* - of both the patient and the family is essential. If the patient is distressed, sedation should be considered.

Accurate documentation of all interventions during and after CPR is important. The data that is documented can be used to evaluate the registered nurses' actions during CPR and, indirectly, the CPR training programme (Kaye 1985:918).

## 2.21 TRAINING REGISTERED NURSES IN CARDIOPULMONARY RESUSCITATION

It is possible that a registered nurse may have attended a workshop on basic CPR and yet still not be competent. Training involves dissemination of knowledge while learning is a complicated process whereby knowledge is internalized (International Labour Office 1976:96).

Various methods have been used to train healthcare workers, such as registered nurses, in CPR and these include:

- traditional lectures and demonstrations
- practice on a manikin
- television and film viewing
- review of written material including wall charts

Various combinations of the above methods are also used. Subsequent updates or refresher courses should focus on relevant training needs (Kaye 1985:918).

2.21.1 *Knowledge* - Learning is a process that involves organising and structuring data related to a specific subject. Learning involves repetition and reinforcement (Stross 1983:3341). Newly acquired knowledge aids understanding of tasks and situations and also enables the person to be more effective in planning activities and solving problems (Messick 1982:13).

2.21.2 *Problems with retention* - Forgetting is a natural phenomenon.

"Not all material that is learned will be remembered. Forgetting seems most likely to occur immediately after learning, then there is a gradual reduction in the amount of material remembered over a period of time when cognitive material is involved" (Dickinson 1973:14).

Poor performance of CPR has been attributed to poor retention of newly acquired knowledge and skills. This deterioration in competence was found to occur as early as two weeks after training (Moser 1992:372-380). No strong positive correlation was found between CPR competence and factors such as frequent involvement in cardiac arrests or level of qualification (Quinn 1996:10).

2.21.3 *Recommendations to improve retention* - Various training methods have been evaluated with regards to retention of CPR competence. Many researchers agree on the importance of repetition and recommend that refresher courses in CPR be done on an annual basis (Quinn 1996:10). Other studies suggest that refresher courses that are done at six monthly intervals might be more effective (Berden 1993:21). Other training techniques, such as

debriefing after each CPR effort, also appear to improve retention (Page 1996:318). Feedback given immediately after each CPR training session was also found to be beneficial (Kaye 1986:622).

It is important to identify possible barriers to learning. Studies reveal that learning is hindered when adult learners are influenced by factors such as underlying emotions; perceived threats to competency; boredom or "I've heard it all before" attitude (Crunden 1991:603).

## 2.22 INEFFECTIVE PERFORMANCE OF CARDIOPULMONARY RESUSCITATION

Studies found that, besides the phenomena of deterioration in CPR knowledge and skills, many registered nurses were too embarrassed or too proud to admit that they needed training. In fact, these registered nurses often portrayed themselves as being more competent than they actually were (Crunden 1991:603). Registered nurses that fell into this category reported that they felt extremely agitated when faced with cardiac arrests. This extreme agitation appeared to worsen their already poor performance of CPR (Page 1996:320).

2.22.1 *Assessing level of cardiopulmonary resuscitation knowledge and skills* - There are various ways to assess the cognitive knowledge and motor skills necessary for competent CPR. Motor skills, such as external chest compressions or rescue breathing, are best evaluated using a mannikin (Wynne 1987: 1198).) Simulation of a cardiac arrest situation has been used to assess both cognitive and motor skills (Kaye 1986: 99). Multiple-choice questionnaires are common cognitive evaluation tools (Morris 1991:626). The American Heart Association uses five different multiple-choice questionnaires (Braunholer 2000:118-123).

2.22.2 *Problem areas* – Registered nurses who are not competent in CPR negatively influence their patients' chances of survival. One study noted that when efficient CPR was given within four minutes of cardiac arrest, spontaneous circulation returned in 80 % of patients. When inefficient CPR was observed to be given, spontaneous circulation returned in only 38% of patients (Pantridge cited in Kaye 1985:916).

Registered nurses, and other healthcare workers, appear to have difficulty with the following areas:

- effective artificial rescue breaths
- closed chest compressions at rates and depths recommended by the American Heart Association
- correct hand positioning on the patient's sternum
- following the sequence of CPR as recommended by the American Heart Association (Kaye 1986:621)

Another study included the following problem areas:

- assessment of circulation and respiration
- troubleshooting or investigating why the patient was not responding to interventions
- drug therapy (Kaye 1986:103)

Incompetent CPR is attributed to poor retention. Studies suggest that poor retention might be related to inadequacies in:

- the CPR course content
- the CPR training program
- the CPR instructor
- the student who, for example, may have difficulty in changing old habits or
- the influence of senior staff who are not up-to-date with current CPR algorithms (Kaye 1986:103)

## 2.23 SUMMARY

CPR has both cognitive and practical components. The basic aim of CPR is to provide respiratory and cardiac support in order to ensure perfusion of vital organs. A deficit in the ability to perform CPR can lead to the death of the patient or long-term complications such as severe brain damage. The emotional, physical, social and financial consequences of these complications on both the patient and his family can be considerable. Despite various training methods, poor retention of CPR knowledge and skills remains a problem. The researcher believes that there is a need to specify what knowledge is not being retained. The steps taken to determine this are outlined in chapter 3.

# CHAPTER 3
# RESEARCH METHODOLOGY

## 3.1 INTRODUCTION

In this chapter, the purpose of the research is stated and the steps taken in: design selection; sample selection; instrument development; data collection and data analysis are discussed.

## 3.2 PURPOSE OF THE STUDY

The purpose of this study is to describe the knowledge of CPR of registered nurses working in medical or surgical wards of selected private hospitals in the Western Cape Peninsula.

## 3.3 RESEARCH DESIGN

In order to describe the registered nurse's knowledge of CPR; a non-experimental, quantitative, descriptive and contextual research design was chosen.

3.3.1 *Non-experimental* - This study is non-experimental in nature. Experimental designs require strict control of variance and this would not have been possible in this study.

3.3.2 *Quantitative* - A quantitative approach was chosen in order to ensure that the registered nurses' knowledge was fairly measured. This was made possible by the use of a standardised multiple-choice questionnaire. It was then also possible to collect the data under controlled conditions.

Objective analysis, through use of descriptive statistics, was done to determine a specific aspect namely the registered nurse's amount of knowledge of CPR (Polit and Hungler 1995:15).

3.3.3 *Descriptive* - A descriptive approach was chosen as it was considered necessary to identify not only what the registered nurse knew about CPR but, more importantly, what they didn't know (Polit and Hungler 1995: 11).

3.3.4 *Contextual* - The study is considered contextual because it occurs in a certain setting.

## 3.4 POPULATION

The population of interest was defined as: registered nurses working in either medical or surgical wards of selected private hospitals in the Western Cape Peninsula. The private hospitals were selected from an area geographically close to the researcher.

## 3.5 SAMPLE AND SAMPLING

It is not feasible to do research on an entire population. Usually a group of people is chosen from a population. This group or sample is typically representative of the population of interest. The process by which the sample is chosen is called sampling (Burns 1987:205).

The sample for this study was chosen using convenience sampling, which is a non-probability sampling method. The disadvantage of non-probability sampling is that it is less likely than probability or random sampling to be truly representative of the population. Thus it is not possible to generalise the results from the sample to the

population. The advantage of non-probability sampling is that it saves time and money (Polit and Hungler 1995:232).

In this study, the population consisted of eight private hospitals that were geographically close to the researcher. Four hospitals were approached, but only three agreed to participate in the study. From this population of three hospitals, a sample of thirty registered nurses was obtained using a convenience sampling technique.

A small sample of thirty participants was felt to be adequate for a study of limited scope.

The inclusion criteria were as follows:

*The participant should be a registered nurse* working either night shift or day shift. Registered nurses working on a full-time or sessional basis were also included. Nurses who fell into other categories, such as enrolled or assistant nurses, were excluded on the basis that some of the items in the questionnaire did not fall within their scope of practice (Searle 1992: 137).

*The participant should be currently working in one of the selected private hospitals.* This criteria relates to the research purpose of the study which is to describe the knowledge of registered nurses who work in private hospitals.

*The participant should be currently working in either a medical or a surgical ward.* Registered nurses who worked in maternity wards were excluded on the basis that the patients they cared for were generally healthy and thus at low risk of cardiac arrest. Registered nurses working in paediatric wards were excluded on the basis that paediatric CPR algorithms and medication dosages differed from that of the adults. Registered nurses working in specialised areas such as intensive care or high

care units were excluded on the basis that their work requirements differed and thus they formed a different population from the registered nurses who worked in the wards. Most intensive care unit registered nurses, for example, possess additional qualifications in the areas of critical care nursing and advanced CPR.

## 3.6 ETHICAL CONSIDERATIONS

The following steps were taken in order to fulfill professional, legal and social obligations to the participants:

In line with the principle of self-determination, the participant had the right to decide whether or not to participate in the study. A covering letter was used to ensure that participants were fully informed. This letter described the aims of the study and a copy was attached to each questionnaire. Participants were encouraged to try and answer every question. However, those who didn't want to guess were allowed to leave questions that they were unsure of unanswered.

In line with the principle of the right to privacy, attempts were made to ensure anonymity. The researcher did not record the participants' names; and the participants were advised not to write their names anywhere on the questionnaire. Anonymity ensured that the information obtained would be kept confidential.

Lastly, written permission was obtained from each participating hospital's nursing service manager.

## 3.7 THE RESEARCH INSTRUMENT

Because of the descriptive nature of this study, a self-administered multiple-choice questionnaire was chosen.

Questionnaires are frequently used in descriptive studies where the researcher is trying to obtain a broad spectrum of information about a situation. In this study, the researcher wanted to describe registered nurse's knowledge not only in terms of the basic CPR algorithm but also in the broader spectrum of knowledge that she would generally need to know in a cardiac arrest situation. This knowledge includes essential medication dosages, standard defibrillation energy requirements and proper use of specialised equipment such as the ambubag (Burns 1999:272).

A multiple-choice questionnaire format was chosen. Multiple-choice questionnaires were found in the literature review to be one of the most common means of determining whether cognitive learning had occurred following CPR training (Morris et al 1991:626).

3.7.1 *Advantages of using a questionnaire* - There are three general advantages of using a questionnaire. The first is that it is time and cost effective. Secondly, it is easier to maintain the anonymity of the participants thus reducing the participant's fear of exposure. Thirdly, the questionnaire poses less of a threat to validity than other descriptive methods, such as observational studies, where the researcher is utilised as the research instrument. This threat to validity occurs because the participant's response is influenced by the researcher's presence (Polit and Hungler 1994:222).

Of the various types of questionnaires, multiple-choice questionnaires are fairly quick to complete because the participant is not required to spend time formulating written answers.

3.7.2 *Disadvantages of using a questionnaire* - Questionnaires have a number of disadvantages. In the case of the multiple-choice questionnaire, for example, the participant's response is restricted to four pre-determined answers. Furthermore, the participant is not able to query questions that she is not

sure of. Also, it is not possible to examine the reasons or beliefs underlying each participant's answer (Polit and Hungler 1995:289).

## 3.8 THE QUESTIONNAIRE

The questionnaire was written in English. It included: a covering letter; a brief set of instructions to the participant; a demographic section and a multiple-choice questionnaire. The pilot study revealed that it took each participant approximately 30 minutes, on average, to complete the questionnaire.

## 3.9 THE COVERING LETTER

The covering letter served as a letter of introduction as well as an informal means of obtaining informed consent. In the covering letter, the participant was provided with:

- the researcher's name and contact details
- the background of the researcher
- the purpose of the study
- the background of the study
- information on how long the questionnaire would take to complete
- an assurance of anonymity
- a commitment by the researcher to provide participants with the answers at the conclusion of the study (Polit and Hungler 1995:641).

## 3.10 WRITTEN INSTRUCTIONS TO THE PARTICIPANTS

The participants were advised not to write their name anywhere on the questionnaire (this was verbally reiterated). They were instructed to read each question and then to circle the answer that they thought was correct. They were verbally encouraged to try to answer each question.

## 3.11 THE DEMOGRAPHIC SECTION

The demographic section consisted of fourteen items. It included standard questions such as:

- age
- gender
- nursing qualifications
- nursing experience

Other items included in the demographic section were questions related to the participants' daily nursing practices such as: when last they had checked the resuscitation trolley; when last they had received instruction in CPR as well as the type of instruction. This information formed part of the study's contextual background.

## 3.12 THE MULTIPLE-CHOICE QUESTIONNAIRE SECTION

The multiple-choice questionnaire section consisted of 47 questions. The questions were structured to follow a logical sequence of action. Participants had to select an answer from four fixed options. One of the participants jokingly said that they

would have preferred a fifth, easier option such as "I am not sure or I don't know". She went on to explain that she felt that most of the registered nurses would have selected this option.

Following the pilot study, the questions were refined in order to be as short, simple and unambiguous as possible. Questions that were double-barreled, complex, used unfamiliar terms or included a double-negative were discarded (Seaman 1987: 279).

The questionnaire attempted to cover knowledge that the registered nurse would need to know regarding a cardiac arrest situation. As such it was not restricted to just questions based on the basic CPR algorithm. Questions that were drawn from the basic CPR algorithm were regarded as essential knowledge and are analysed separately in the section on critical questions.

The questions were introduced in a logical sequence. The first few questions dealt with initial actions or decisions that the registered nurse would need to make when faced with a cardiac arrest. The questionnaire ended with questions on when to terminate CPR. Questions regarding the rationale behind each action as well the correct method of each action, were included.

3.12.1 *Source of the questions* - Most of the questions were derived from a review of the literature on CPR. A few of the questions were included following conversations with an instructor in basic and advanced CPR.

3.12.2 *Physical characteristics of the questionnaire* – potential participant's often base their decision on whether to be part of a study on the appearance of the research instrument; thus an attempt was made to improve the appearance of the questionnaire by:

- Use of colour. The covering letter was printed on a pale blue cloudy paper. The rest of the questionnaire was left white. The questions were highlighted in grey so that they could be easily identified.

- Use of a clear font. A clear, simple font was selected.

- Use of numbers to order the questions

## 3.13 STRUCTURE OF THE MULTIPLE-CHOICE QUESTIONNAIRE

### QUESTIONS 1 – 47

There were nineteen questions on basic CPR, ten on advanced CPR, eight on defibrillation, eight on medications and two questions that didn't fit into the preceding categories and thus were assigned to a category listed as "other".

### QUESTIONS 1 – 19: BASIC CARDIOPULMONARY RESUSCITATION

Questions on basic CPR were derived from the basic CPR algorithm. Basic CPR provides an artificial circulation and thus preserves life until more definitive treatment is available. Thus the registered nurse needs to be familiar with each step of the algorithm. Where the correct sequence or correct method is not followed, the consequences can be serious. For example, hyperextension of the neck of a patient with cervical injury can result in paralysis.

### QUESTIONS 20 –29: ADVANCED CARDIOPULMONARY RESUSCITATION

In a resuscitation situation in the ward, the registered nurse often assists either the intensive care registered nurse or the medical doctor. She is sometimes expected to

perform actions that she is not specifically trained in. For example, the registered nurse is sometimes asked to ambubag the patient. Ambubagging requires a specific technique and is not, to the researcher's knowledge, included in basic CPR training programmes. The registered nurse needs to keep in mind that, as an independent practitioner, she is accountable for all acts and omission. Thus if she agrees to ambubag the patient; it is essential that she does it correctly.

QUESTIONS 30 -37 DEFIBRILLATION

As soon as an intensive care registered nurse or a medical doctor arrives on the scene, the registered nurse's role changes from that of CPR provider to that of an assistant. If the registered nurse is asked to defibrillate the patient, then she needs to know the correct paddle position as well as the correct joule dosage. Again, she is accountable for each action. An incorrectly placed paddle can result in ineffective defibrillation.

QUESTIONS 38 –45: MEDICATIONS

When assisting the medical doctor or the intensive care nurse, the registered nurse is often asked to draw up emergency medications such as adrenaline, atropine or lignocaine. Mistakes can occur if she doesn't hear the doctor correctly. Thus it is important for her to know the action of the drug as well as the normal dosage.

QUESTIONS 46 – 47: OTHER

The registered nurse must know when to discontinue CPR. It is also important that the registered nurse knows that the patient who survives needs to be nursed in an intensive care unit where skilled staff will be able to identify and manage any complications.

## 3.14 PILOT STUDY

The pilot study has been defined as "a small-scale version, or trial run, of the major study" (Polit and Hungler 1995:34). The pilot study serves various functions. It is used to evaluate the reliability of newly designed research instruments. It is also useful in that it helps to illuminate potential problems regarding the instrument such as ambiguous questions or obstacles in data collection. Furthermore, it gives the researcher an idea of how much time and money the actual study is likely to cost; thus enabling the researcher to refine the questionnaire and the data collection procedure (Polit and Hungler 1995:34).

The pilot study was conducted under conditions similar to that of the actual study. Six registered nurses were approached at the start of a nursing shift. Of the six, two were starting night shift and the other four were starting day shift. They were approached over a very quiet weekend and were asked to complete the questionnaire; critique it for appearance and length; and note any ambiguity of the questions. The pilot study revealed that registered nurses felt embarrassed to admit that they didn't know the answer to certain questions. This posed a potential area of bias as is described under the section on validity and reliability.

Based on the feedback obtained the following areas were identified and then subsequently modified:

- unclear paging sequence

- participants on day-shift had fewer quiet moments in which to complete the questionnaire that participants on night-shift

- some of the participants appeared embarrassed when admitting that they "didn't know the correct answers"

- the questionnaire was not visually appealing

- some of the questions were unclear or poorly worded and needed to be rephrased

Positive feedback was also received:

- all of the participants in the pilot study stated that the questionnaire was not too long (the questionnaire took approximately thirty minutes to complete)

- some of the participants expressed an interest in knowing the answers

## 3.15 VALIDITY AND RELIABILITY

Participants in the pilot study expressed embarrassment at not knowing all the answers. This fear of exposure posed a possible source of bias where the registered nurse, if she didn't know the answers to the questionnaire, might be tempted to consult a second source such as a textbook or a colleague.

Certain steps were thus implemented during data collection to ensure that the questionnaire was administered under consistent and controlled conditions. Firstly, the questionnaires were handed out at the participant's place of work where it was unlikely that they would have access to textbooks. Secondly, the researcher aimed either to be present while the participant completed the questionnaire or to return within 30 minutes to collect the questionnaire (the average time that it took to complete it).

Reliability means that a replication of this study, by another researcher, would yield similar results. In other words that similar results would be obtained (Grove 1987:291).

Control of bias refers to taking steps to prevent extraneous variables from contaminating the data that is being collected. One of the risks in this study, for example, was that a participant might seek the assistance of a more knowledgeable colleague in order to complete the questionnaire (Polit and Hunlger 1995: 209).

In order to ensure reliability:

- a clear explanation of the purpose of the study was given, in writing, in order to gain the participant's co-operation.

- the questionnaires were handed out at a time when it was convenient to the ward. Thus enabling the participant to complete the questionnaire during a quiet moment.

- a pilot study was conducted to identify any ambiguity, inaccuracies or errors in the questionnaire

- in order to ensure that the conditions under which the participants completed the questionnaire were constant and controlled; the researcher either sat in the same room while the participant completed the questionnaire or returned within exactly thirty minutes.

The researcher used the Split half technique to assess reliability. Five questionnaires were randomly selected. The scores for the odd-numbered questions were separated from the scores for the even-numbered questions. A reliability coefficient of 0.43 percent was obtained using the Pearsons Product correlation coefficient as described

by Brink (1987:80). See appendix 4 for details. As the Split half technique shortens the length of the questionnaire and thus could bias the reliability, the resulting amount was adjusted using the Spearman Brown Prophecy formula (Polit and Hungler 1995:351). A final correlation coefficient of 0.60 % was obtained. The standard correlation coefficient for a new instrument should be in the region of 0.70 %. The moderate 0.60 % was however accepted as it was felt to be due to the heterogenous nature of the items included in the questionnaire (Talbot 1995:278).

Validity, in this study, means that the data that has been collected reflects the participants' actual knowledge of the subject.

In order to establish content validity, it was necessary to review the literature and to ask qualified experts to evaluate the instrument (Van Dalan 1979:136). Two experts in CPR were asked to examine the questionnaire. The first was a medical doctor who was actively involved in training healthcare professionals and paramedics in advanced CPR. The second expert was a registered nurse who held a qualification in critical care nursing science and had been involved in the past in training registered nurses in basic CPR. Based on their suggestions; the questionnaire was modified.

Firstly, the questionnaire was re-structured so that questions were grouped according to the following categories: basic CPR, advanced CPR, defibrillation and medication. Secondly, only three emergency drugs were included namely: atropine, adrenaline and lignocaine. Lastly, many of the questions were re-phrased in order to fulfill the following aim:

"The aim is not to trick the participant.... the participant either knows the answer or he (or she) doesn't" (conversation with an advanced CPR instructor 2000).

Further changes such as deleting non-essential questions were made following review by the research supervisor (an expert in critical care nursing science and a qualified nursing educator). This had the advantage of shortening the questionnaire considerably.

## 3.16 DATA COLLECTION

In order to ensure a good response rate two steps were taken. Firstly, the questionnaires were personally handed out to the participants by the researcher. Secondly, the researcher then waited 30 minutes for the participants to complete the questionnaire. In total, 43 registered nurses were approached, of which 30 agreed to participate in the study. It appeared that the most common reason for declining was that the ward was too busy.

3.16.1 *The physical environments* in the hospitals where data collection occurred were more or less comparable. In hospital A, the participant sat alone in a room in the ward. This room was either the visitor's lounge or the nurse's rest room. On one occasion, the participant completed the questionnaire in the nurse's general tea room. In hospital B, most of the participants completed the questionnaire at the nurse's station. A few sat in the nurse's general tea room and one participant sat in the senior registered nurse's office. In hospital C, the participant sat alone either in the senior registered nurses' office or in the visitor's lounge.

3.16.2 *Data collection times* - Data collection occurred over a two-week period. Data collection occurred during weekdays as well as over weekends. The hospitals that were involved were relatively quiet because of a holiday period. Many of the permanent registered nurses had signed leave and in some instances both the surgical and medical wards were later combined.

Thus the population from which the sample was drawn was greatly reduced. On average, the surgical wards were busier than the medical wards.

Before distributing the questionnaires, the registered nurse in charge of the ward was consulted and verbal permission to do the study was obtained. The questionnaires were distributed in the evenings after 22h00 when the patients were settled; at 06h00 in the morning before the dayshift came on duty and during the registered nurses lunch hour.

The same data collection procedure was followed at each of the three hospitals. In hospital A and C the researcher was able to wait for the participant to complete the questionnaire. In hospital B, the researcher had to be more flexible in order to obtain a sample of 30 participants.

After the questionnaire was retrieved, the participant was thanked and a commitment was made by the researcher to provide the participant with answers. The answers would be given at the conclusion of the study.

## 3.17 DATA ANALYSIS

As soon as possible, the questionnaire was marked and scored using a score sheet that the researcher developed. A "numeric code" was assigned to each answer. If the correct answer was circled, then a score of 1 was given. If the incorrect answer was given or if the participant did not select an answer, then a score of 0 was given. The numeric codes were then entered directly onto a score sheet and totaled. The scoring sheet also enabled the scores to be grouped into categories such as basic CPR, advanced CPR, medications, defibrillation and other.

The scores were then entered onto a computer. The computer package Word 6.0 for Microsoft 1995 was used as it enabled the researcher to develop frequency tables which were later converted into graphs (Sweeney M 1981: 215).

Tables and graphs were utilized to organise and analyse the data. Data analysis was done by the researcher. Descriptive statistics were used to analyse and interpret the data. Data analysis and interpretation occurred simultaneously and is discussed in depth in chapter 4, which follows. The results were compared with other studies' findings and interpreted against the background of the literature review. In chapter 5, conclusions and recommendations are discussed.

## 3.18 SUMMARY

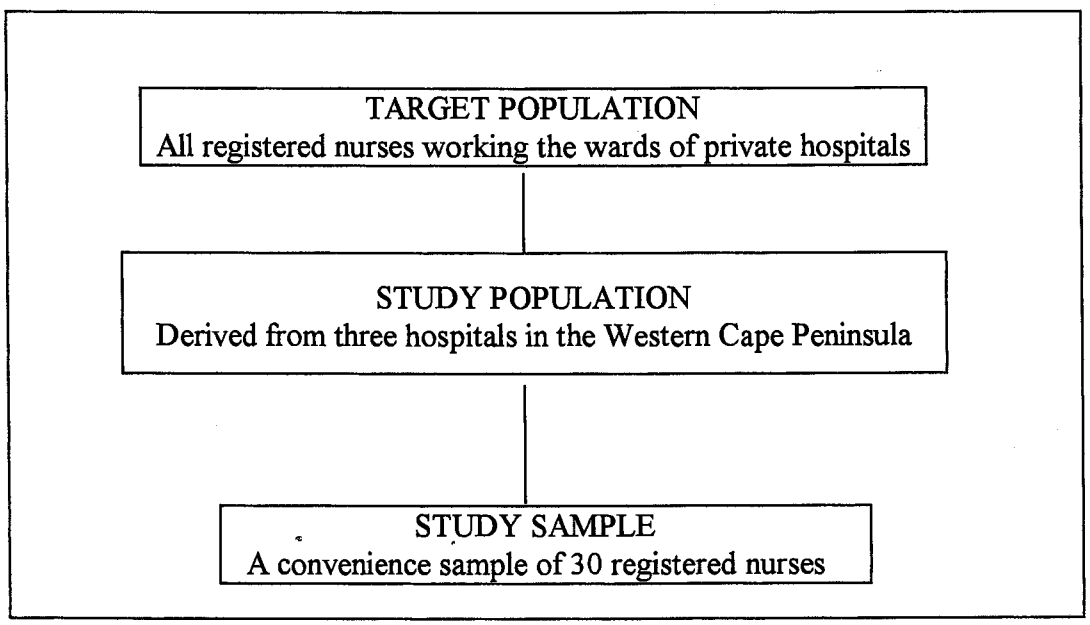
A descriptive methodology was used in this study to attempt to describe registered nurses knowledge of CPR. After specifying the population, registered nurses were invited to participate in the research project. A convenience sample of thirty registered nurses was obtained. The research instrument consisted of a multiple-choice questionnaire that was developed from the literature review. Steps were taken to ensure reliability and validity. A pilot study was then done. Data collection took place over a two-week period. Attempts were made by the researcher to control for bias. In chapter 4, which follows, data analysis is discussed.

# CHAPTER 4

# ANALYSIS AND DISCUSSION OF THE DATA

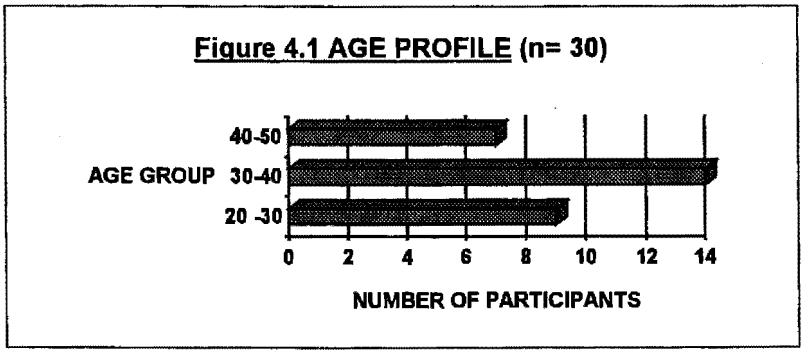
## 4.1 INTRODUCTION

In this chapter, the results will be presented. The data was entered by hand onto a computer. The software package Word 6.0 for Windows 95 was used to organise the data into tables and then to display the results in the form of graphs. The results were then analysed. These results are discussed below with reference to relevant literature and research.



## 4.2 DEMOGRAPHIC DATA

### 4.2.1 AGE PROFILE (n=30)



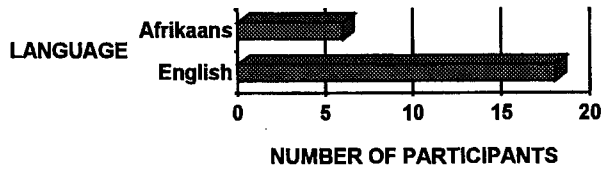

Fourteen (47%) of the participants were aged between 30 and 40 years. Nine (30%) participants were in the age group 20 to 30. Seven (23%) participants fell in the age group 40 to 50 years of age. This result could be explained by a shift of registered nurses out of the clinical field into non-clinical areas of nursing. This shift occurs, in the researcher's experience, because most promotions in nursing are in the area of either management or education. Another reason for this shift is related to the physical demands of clinical nursing. The physical work of lifting heavy patients often results in registered nurses sustaining back injuries and thus not being able to continue with clinical nursing.

### 4.2.2 GENDER

Two (7%) male and twenty-eight (93%) female registered nurses participated in this study. This is attributed to the well-known fact that more females enter the nursing profession than males.

### 4.2.3 LANGUAGE

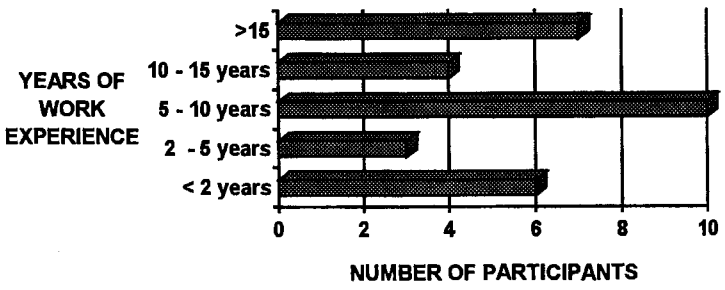
**Figure 4.2 LANGUAGE PROFILE (n= 24)**




Six (20%) of the participants never indicated their language preference. Eighteen (60 %) participants indicated that they were English. The remaining six (20 %) participants stated that they were Afrikaans. None of the participants utilized the option "other" to indicate another language such as Xhosa or Zulu. The results could be biased as only an English version of the questionnaire was distributed.

### 4.2.4 WORK EXPERIENCE/YEARS QUALIFIED

**Figure 4.3 WORK EXPERIENCE (n= 30)**

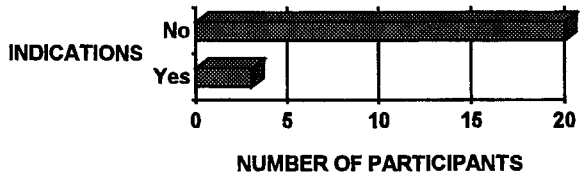



The sample included registered nurses with a diverse number of years of nursing experience, ranging from a few months to more than 15 years. One registered nurse indicated that she had been qualified since 1969 and another since 1973. Seven (23.3%) of the participants had more than fifteen years of

nursing experience; four (13.3%) had 10 to 15 years of experience; ten (33,3 %) had five to ten years of experience; three (10%) had 2 to 5 years of experience and six (20%) had less than two years of nursing experience. The latter included a registered nurse that had qualified in 1999.

### 4.2.5 ADDITIONAL NURSING QUALIFICATIONS

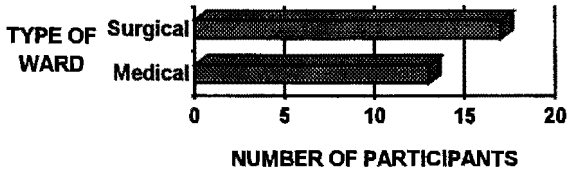
**Figure 4.4 INDICATION OF ADDITIONAL NURSING QUALIFICATIONS (n= 23)**




Seven (23%) of the participants did not complete this section. Of the remaining twenty-three participants, twenty (67%) participants indicated that they did not have any additional nursing qualifications while three (10%) participants indicated that they did. The current four year course that leads to the qualification as a registered nurse includes training in medical-surgical, community, psychiatry and midwifery nursing. Some of the older participants had completed a three year course in medical-surgical nursing and then later a year in either midwifery, psychiatry and/or community nursing. Since these qualifications are now regarded as part of the basic general nursing qualification, they are not regarded as additional qualifications. In this sample, participants had additional qualifications in either education, theatre or opthalmics. The participant who had obtained a nursing qualification in theatre had worked mostly in theatres and had little ward experience.

## 4.2.6 PRESENT WARD POSITION

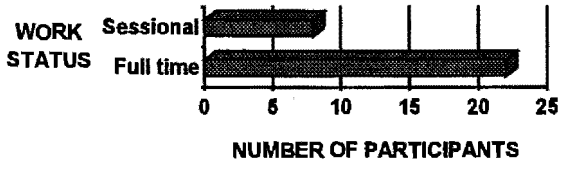
**Figure 4.5 PRESENT WARD POSITION (n=30)**




In the one hospital, some of the participants indicated that they were currently working in either an orthopaedic or gastro-intestinal specialised surgical ward. For the purposes of this study, participants who worked in specialised surgical wards are combined with those who worked in the general surgical wards. Seventeen (57%) of the participants worked in a surgical ward and thirteen (43%) participants worked in a medical ward.

## 4.2.7 WORK (EMPLOYMENT) STATUS

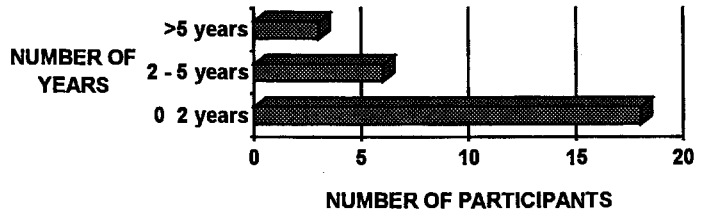
**Figure 4.6 WORK STATUS (n= 30)**




None of the participants worked part-time. Twenty-two (73%) of the participants worked full-time. The remaining eight (27%) participants were sessional workers (i.e. agency staff). It appears as if there may be a trend in private hospitals to employ a skeleton permanent staff and then utilise sessional staff when the hospital is either busier than normal or short of staff.

## 4.2.8 LENGTH OF TIME IN CURRENT POSITION

**Figure 4.7 NUMBER OF YEARS IN CURRENT POSITION (n= 27)**




Three (10%) of the participants had less than six months nursing experience. Six (33%) participants had been working in their current position for less than a year. Eighteen (57%) participants had been working in their current position for more than one year. Of this latter group, one registered nurse had been in her current position for fourteen years.

## 4.2.9 WORK EXPERIENCE FOR THE PAST SIX YEARS

Seven (23%) of the participants did not answer this question. The work experience of the remaining twenty-three participants is presented in the following table:

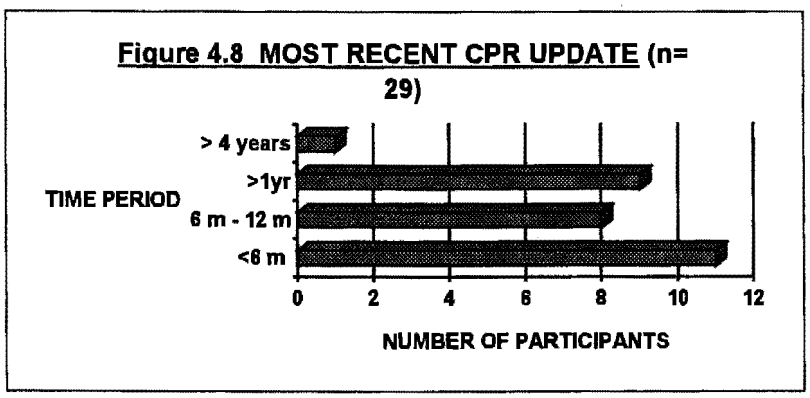
Table 4.1: Participants work experience for the past six years

| | |
|---|---|
| MEDICAL WARD ONLY (TWO PARTICIPANTS – 7%) | Two participants indicated that they had only worked on medical wards. One participant had three years experience and the other fourteen years of experience working in a medical ward. |
| COMBINED MEDICAL AND SURGICAL WARD (NINE PARTICIPANTS – 30%) | Seven of these participants indicated that they had worked in a combined medical and surgical ward. Their ward experience ranged from one to six years with a median of four years, two modes of four and six years and an average of 3.7 years experience.<br><br>Two participants had worked in medical as well as surgical wards. The one participant had worked for one year in a medical ward and one year in a surgical ward. The other |

| | |
|---|---|
| | participant had worked three months in a medical ward and seven years in a surgical ward. |
| SURGICAL WARDS ONLY (SIX PARTICIPANTS – 20%) | Six participants indicated that they had only worked in surgical wards. Their experience ranged from one to fifteen years with two modes of one and two years; a median of 2 years and an average of 4.3 years of experience. |
| OTHER AREAS (SIX PARTICIPANTS – 20%) | Six participants indicated that they had neither medical nor surgical work experience. One had worked in a variety of areas such as primary health care, oncology and haematology. Another had spent six months working in a rehabilition centre. Two had worked only in psychiatry. One had worked only in midwifery. And one participant's work experience consisted of psychiatry and midwifery.<br><br>Besides these six participants, nine of the above participants had worked in other nursing areas such as midwifery, psychiatry and oncology. |

## 4.3 CONTEXTUAL BACKGROUND

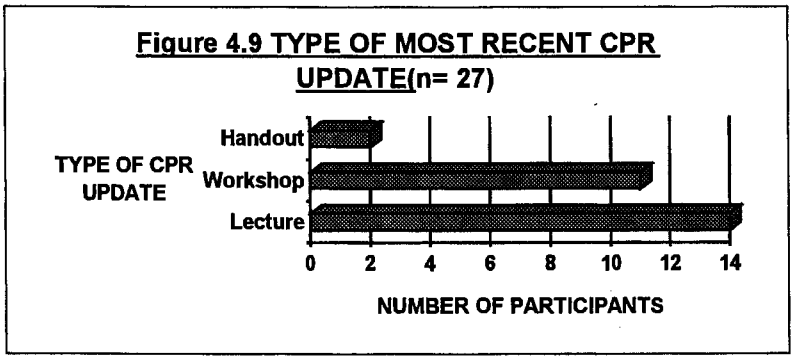
### 4.3.1 MOST RECENT UPDATE/TRAINING IN CARDIOPULMONARY RESUSCITATION




One (3%) participant did not answer this question. Eleven (37%) participants had had CPR training within the past six months. Eight (27%) participants had had CPR training between six months and one year ago. Nine (30%) participants had last had CPR training over a year ago. And one (3%)

participant had last had CPR training more than four years ago when she had been working in theatre. She has been in her current position for approximately six months.

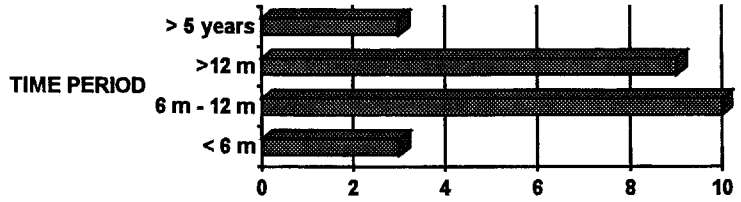
### 4.3.2 TYPE OF MOST RECENT CARDIOPULMONARY RESUSCITATION UPDATE/TRAINING




Three (10%) of the participants did not complete this section. Two were sessional registered nurses. Of the remaining twenty-seven participants; eleven (36%) had been exposed to a workshop; fourteen (47%) had attended a lecture; and two (7%) had received a handout on CPR. It is possible that the participants did not understand that a workshop referred to a practical demonstration as well as a lecture.

### 4.3.3 MOST RECENT EXPERIENCE OF CARDIOPULMONARY RESUSCITATION

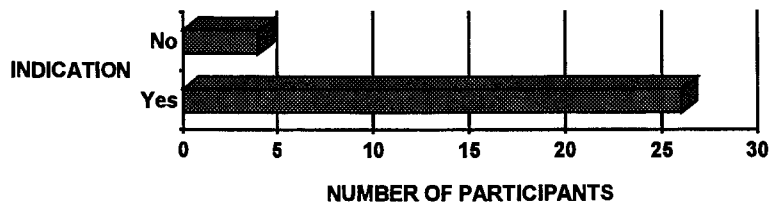
**Figure 4.10 MOST RECENT EXPERIENCE OF A RESUSCITATION SITUATION (n= 25)**




Five (17%) of the participants did not answer this question. Two of these participants indicated that they were recently qualified and had not yet been in a resuscitation situation. Three (10%) participants had last been in a resuscitation five years ago; nine (30%) more than a year ago; ten (33%) between six months and a year ago; and three (10%) less than six months ago.

### 4.3.4 INDICATION OF WHETHER THE PARTICIPANT CHECKS THE RESUSCITATION TROLLEY

**Figure 4.11 INDICATION OF WHETHER PARTICIPANT CHECKS THE RESUSCITATION TROLLEY (n= 30)**



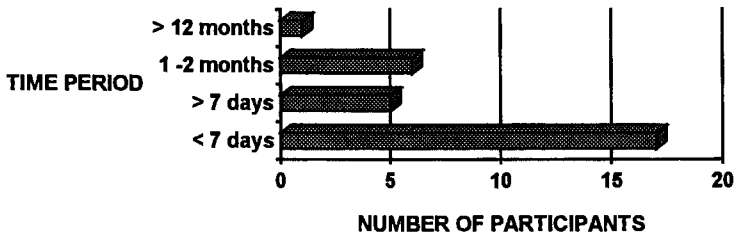

Most wards have their own resuscitation trolley. This is a special trolley that is stocked with items commonly used during resuscitation. It is usually

reserved for use in a resuscitation situation - thus the term "resus trolley". The trolley is usually located in the ward next to the nurse's station or in the middle of the ward in an alcove (researcher's observation of participating wards). The ward normally ensures that the trolley is checked twice a day, once by the day and once by the night shift personnel. The items are checked to ensure that they are in good working order. Missing items are restocked. In a resuscitation situation, it is important to be able to quickly locate an item on the resuscitation trolley. The researcher noticed that, in hospital A and C, the contents of the various wards' resuscitation trolleys differed. In hospital B the trolleys were standardised in terms of their content.

Twenty-six (86%) of the participants indicated that they checked the resuscitation trolley. The remaining four (14%) participants indicated that they didn't check the resuscitation trolley. The reasons varied. In one hospital, one of the surgical wards did not have it's own resuscitation trolley. Instead they shared the adjacent medical ward's trolley, which was stored on the medical ward. Thus participants who worked on this surgical ward did not have a resuscitation trolley to check. It appears that the wards where the resuscitation trolley was located were responsible for checking the trolley. The remaining participants who indicated that they did not check the resuscitation trolley were either sessional staff or registered nurses who were in charge of the ward and it is possible that they were not allocated this responsibility.

### 4.3.5 MOST RECENT EXPOSURE TO THE RESUSCITATION TROLLEY

**Figure 4.12 MOST RECENT EXPOSURE TO RESUSCITATION TROLLEY (n= 29)**




One (3%) participant did not answer this question. Seventeen (57%) of the participants had checked the resuscitation trolley within the same week of completing the questionnaire. Five (17%) participants had last checked the trolley more than a week ago. Six (20%) participants had last checked between one and two months ago. And one (3%) participant had not checked the resuscitation trolley for more than a year. This participant was a sessional worker.

## 4.4 THE MULTIPLE-CHOICE QUESTIONNAIRE AS A UNIT

Appendix I contains an example of the questionnaire as well as the raw scores.

Median is defined as "that point on a numerical scale above which and below which 50% of the cases fall" (Brink 1978:53).

Mode is defined as "that value which occurs most frequently" (Brink 1987:52).

Mean is defined as an average score.

Scores for the questionnaire as a whole are as follows:

**Table 4.2: Scores for the questionnaire as a whole**

| MEAN | MODE | MEDIAN |
|---|---|---|
| 26 (55%) | 24 (51%) and 26 (55%) | 25 (53%) |

There were 47 questions on the questionnaire. Any score of 37/47 (80%) was considered to indicate adequate knowledge (Ragavan 2000:505). The overall scores obtained ranged from 16 to 34, with a mean of 26 (55%), a median of 25 (53%) and two modes of 24 (51%) and 26 (55%). The highest score of 34 (72%) was obtained by two participants. Twenty-three participants scored 50% and above. Two modes were identified namely 24(51%) and 26(55%). The bimodal effect could be related to the research design as more than one quality was being measured. In this case, not only is the participant's factual knowledge of CPR being measured but also their understanding of the rationale for each action. The median score was 25 (53%).

The questionnaire consists of five sections namely: basic CPR, advanced CPR, defibrillation, medication and "other". Included in the latter category were questions regarding termination of CPR efforts and nursing management of patients who survived CPR. Each section was scored individually. It is assumed that participants who left questions unanswered didn't know the answer.

The mean scores obtained in the various sections of the questionnaire are as follows:

**Table 4.3: Mean scores obtained in the various sections of the questionnaire**

| BASIC CPR | ADVANCED CPR | DEFIBRIL-LATTION | MEDICA-TION | OTHER |
|---|---|---|---|---|
| 62% | 56% | 44% | 40% | 80% |

## 4.5 CRITICAL CARDIOPULMONARY RESUSCITATION INFORMATION SCORES

**Table 4.4: Critical information scores**

| MEAN (average) | MODE (Mo) | MEDIAN (Md/Mdn) |
|---|---|---|
| 7.4 (61%) | 5 (42%) | 7 (58%) |

Previous studies, such as Ragavan et al (2000:504), have based their questions on the advanced CPR algorithm. The questions that were used in this study were compiled from the literature review as well as the basis and advanced CPR algorithms. They thus vary in significance. Some questions, for example those relating to the rationale of an action, are not as essential or "critical" for effective CPR as others. Most of the questions that were derived from the basic and advanced CPR algorithms were considered "critical". It was possible that the participant could score badly on the questionnaire as a whole and yet score well on the core "critical" questions. Thus the researcher decided to separate the "critical" questions and analyse the resulting score separately. Questions relating to defibrillation were not considered critical knowledge for registered nurses working on the wards, because defibrillation is not as yet included in basic CPR training programmes. In this study, twelve out of the 47 questions were denoted "critical" and are as follows:

- Questions: 1,3,4,7,9,16,17,18 relating to basic CPR
- Questions: 21,23 relating to advanced CPR
- Question 38 relating to medications
- Question 46 from the section marked "Other"

The mean score for these twelve critical questions was 7.4 (61%). The modal score was 5 (42%). The median was 8.5 (71%). The scores indicated that the participants had an inadequate understanding of the twelve core critical questions (mean score of 61%). One participant scored 12 (100%). The mean critical score of 61% (7.4) is similar to the mean score for the questionnaire as a whole 55% (26). A separate discussion of each question follows.

### 4.5.1 Question 1

Twenty-two (73%) of the participants knew that the initial assessment of a collapsed patient should be to check the level of consciousness. Eight (27%) participants either didn't answer or answered incorrectly.

### 4.5.2 Question 3

Twelve (40%) of the participants knew that the correct (and safest) way of assessing level of consciousness was to shout and tap the patient's shoulder. The remaining eighteen (60%) participants either didn't answer or answered incorrectly. Of the participants who answered incorrectly, twelve (40%) chose the method of gently slapping the patient's face. This option could result in the registered nurse and the hospital being sued for physical abuse.

### 4.5.3 Question 4

Twenty-three (77%) of the participants correctly chose the look, listen and feel method for assessing the patient's respiratory status. Wrong or no answers were selected by the remaining seven (23%) participants. This contrasts with Kaye's finding that CPR was often commenced without a proper assessment (1986:103).

### 4.5.4 Question 7

Sixteen (53%) of the participants knew that the correct method of relieving airway obstruction was the head-tilt and chin-lift manoeuvre. The remaining fourteen (47%) participants either didn't answer or answered incorrectly. Twelve (40%) participants indicated that the patient should be placed onto his side, a position known as the left recovery position. Registered nurses often place postoperative patients in this position in order to protect the patient's airway until the effects of the general anaesthetic have worn off. It is possible that the participants' answers are influenced more by their daily nursing practice than by the CPR training that they have received.

### 4.5.5 Question 9

Twenty-four (80%) of the participants were aware that brain damage occurs within 4 to 6 minutes of cardiac arrest. The remaining six (20%) participants either didn't answer or incorrectly chose either a longer or a shorter time interval. It is important for registered nurses to be aware that one has only a few minutes in which to prevent irreversible brain damage, and thus CPR efforts should be guided by the basic CPR algorithm in order to utilise time in an organized and efficient manner.

### 4.5.6 Question 16

With regards to depth of closed chest compressions, fifteen (50%) of the participants knew that it should be 4 to 5 cm. The remaining fifteen (50%) participants either didn't answer or answered incorrectly. Nine (30%) of the participants underestimated the depth at 1 to 2 cm, which is ineffective (Desforges 1996:1076).

### 4.5.7 Question 17

Sixteen (53%) of the participants knew that the correct single rescuer ratio of rescue breaths to closed chest compressions was 15:2. The remaining fourteen (47%) participants either didn't know or answered incorrectly. Of the participants who answered incorrectly, nine (30%) selected the ratio 1:15. This ratio is close to, and thus possibly easily confused with, the correct answer.

### 4.5.8 Question 18

With regards to the correct closed chest compression to rescue breathing ratio in a two-man rescuer situation; twenty-two (73%) of the participants correctly selected 1:5. The remaining eight (27%) participants either didn't answer or answered incorrectly. Kaye (1986:103) and Stross (1983:3340) also found that healthcare workers did not remember or did not know the correct closed chest compressions to rescue breathing ratio. In the researcher's experience, mouth-to-mouth rescue breathing is rarely instituted in resuscitations in the wards; instead an airway is inserted and the patient is ambubagged.

### 4.5.9 Question 21

Eight (27%) of the participants knew that when connecting the ambubag to an oxygen source; the oxygen flow rate should be turned up to 10 -15 L/min or greater. The remaining twenty-two (73%) participants either didn't answer or answered incorrectly. Sixteen (53%) of the participants selected 8-10 L/min. Their answer could possibly be linked to the practice of using a flow rate of 8-10 L/min for a 40% venturi-mask. This finding indicates the possibility that during resuscitation, registered nurses will tend to use knowledge derived from their daily nursing experiences.

### 4.5.10 Question 23

Sixteen (53%) of the participants knew that the correct rate of ambubagging a patient is at the same rate as the patient's normal respiratory rate. The remaining fourteen (47%) participants either didn't know or answered incorrectly.

### 4.5.11 Question 38

Seventeen (57%) of the participants knew the correct dosage of adrenaline (1:1000), which is one of the most common emergency medications. The remaining thirteen (43%) participants either didn't answer or answered incorrectly. Eight (27%) of the participants, who answered incorrectly, believed that only 1mg of adrenaline could be given and that this dose could only be repeated three times. It is possible that registered nurses believe that it is the doctor's responsibility to know the correct dosage and administration method of emergency medications. However, studies show that many medical doctors in fact do not know the correct emergency drug protocols (Kaye 1986:103).

When the questionnaires were retrieved, many of the participants said that they found the section on medications very difficult. Those who did not know the answers said that they would rather leave the questions unanswered than guess.

### 4.5.12 Question 46

Twenty-seven (90%) of the participants knew that, after successful CPR, the patient should be nursed in the intensive care unit. The remaining three

(10%) participants either didn't know or answered incorrectly. This result possibly reflects current nursing practice where registered nurses, who are trained in intensive care nursing, are called to help with resuscitations in the ward. If CPR is successful, then the intensive care nurse escorts the patient up to the intensive care unit. It is not known whether the participants were aware that cardiac arrest survivors are at risk for complications, such as post resuscitation syndrome, and thus need to be nursed in an intensive care unit.

## 4.6 BASIC CARDIOPULMONARY RESUSCITATION

There were nineteen questions on basic CPR. Eight were covered in the section on critical questions, the remaining eleven questions are as follows:

- 2, 5, 6, 8, 10, 11, 12, 13, 14, 15 and 19

**Table 4.5: Basic cardiopulmonary resuscitation**

| MEAN | MODE | MEDIAN |
|---|---|---|
| 11.8 (62%) | 13 (68%) | 12 (63%) |

### 4.6.1 Question 2

Fifteen (50%) of the participants knew that loss of consciousness occurs within 15 to 20 seconds after cardiac arrest. The remaining fifteen (50%) participants either didn't know or answered incorrectly. Nine (30%) of the participants who answered incorrectly, overestimated the length of time and chose 1 to 2 minutes.

### 4.6.2 Question 5

Twenty-six (87%) participants knew that an obstructed airway is the most common cause of loss of consciousness. The remaining four (13%) participants answered incorrectly.

### 4.6.3 Question 6

Twenty-three (77%) of the participants knew that the tongue was the most common cause of airway obstruction. The remaining seven (23%) participants answered incorrectly.

This question is linked to critical question number seven regarding the best method to relieve airway obstruction. With regards to question 7, sixteen (53%) of the participants knew that the correct method of relieving airway obstruction was the head-tilt and chin-lift manoeuvre. The remaining fourteen (47%) participants either didn't answer or answered incorrectly. The rationale for the head-tilt and chin-lift method is that it serves to open the airway by lifting the tongue out of the way (Paturas 1998:20). The difference in the answers to question 7 and question 6 could indicate a deficit in the participants' understanding of the rationale underlying certain steps of the CPR algorithms.

### 4.6.4 Question 8

Twenty-nine (97%) of the participants knew that the carotid pulse should be palpated in order to assess circulation. The remaining participant (3%) selected the radial pulse. During shock, blood is shunted away from the peripheral areas to the vital organs; thus peripheral pulses such as the radial or pedal pulses are not usually palpable.

### 4.6.5 Question 10

Sixteen (53%) of the participants knew that the aim of the precordial thump was to convert ventricular fibrillation (or aystole) to a sinus (or normal) rhythm. The remaining eleven (37%) participants either didn't know or answered incorrectly. Three (10%) participants believed that the aim of a precordial thump was to rouse the patient from unconsciousness. During the data collection procedure, many of the participants commented that the precordial thump was no longer used.

### 4.6.6 Question 11

Eight (27%) participants knew that the main danger of a precordial thump was that it could convert a normal sinus rhythm to ventricular fibrillation. The remaining twenty-two (73%) participants either didn't know or answered incorrectly. Twenty (67%) participants believed it was no longer used because it could cause a sternal fracture. The results indicate that though participants are aware that it is no longer used, they appear unaware of the possible dangers of using a precordial thump.

### 4.6.7 Question 12

Nine (30%) participants knew that closed chest compressions could increase the cardiac output by 20 to 40%. The remaining twenty-one (70%) participants either didn't know or answered incorrectly. Seventeen (57%) participants who answered incorrectly overestimated the effectiveness of closed chest compressions in increasing cardiac output as being either 50 % or 60%. When closed chest compressions are not done at the prescribed rate and depth, the resulting cardiac output is further reduced (Gazmari 1997:714).

### 4.6.8 Question 13

Five (17%) of the participants were aware that closed chest compressions should not be interrupted because of the difficulty of re-establishing a circulation. The remaining twenty-five (83%) participants answered incorrectly. Twenty-four (80%) of the participants who answered incorrectly believed that the reason for not interrupting closed chest compressions is that closed chest compressions mimic the normal cardiac activity. The results indicate that there is a possible deficit in the participants' knowledge of the mechanical and electrical functioning of the arrested heart.

### 4.6.9 Question 14

Twenty-two (73%) participants knew that the correct hand position for closed chest compressions was two centimetres from the xiphisternum. The remaining eight (27%) participants answered incorrectly. No diagrams were included in this questionnaire. It is possible that registered nurses' knowledge of basic anatomical terms needs to be reinforced.

### 4.6.10 Question 15

Twenty-four (80%) participants knew that only the heel of the hand should rest on the sternum. The remaining six (20%) participants answered incorrectly. In CPR, in order to avoid complications such as rib fractures, only the heel of the hand should rest on the sternum (Paturas 1998:29).

### 4.6.11 Question 19

Twenty-three (77%) participants knew that in order to achieve an artificial pulse rate of 80 to 100, one should perform closed chest compressions at the verbal counting speed of 1-and 2- and 3- and 4 and –5. The remaining seven

(23%) participants answered incorrectly, three (10%) of whom believed that it was necessary to depress the chest as fast as possible.

## 4.7 ADVANCED CARDIOPULMONARY RESUSCITATION

There are ten questions (Questions 20 to 29) regarding advanced CPR in this questionnaire. Questions 21 and 23 were discussed in the section on critical questions.

**Table 4.6: Advanced cardiopulmonary resuscitation scores**

| MEAN | MODE | MEDIAN |
|---|---|---|
| 5.6 (56%) | 5 (50%) | 7 (58%) |

### 4.7.1 Question 20

Sixteen (53%) participants were aware that an ambubag, which is not attached to an oxygen source, only provides an oxygen concentration of 21% (i.e. similar to the concentration of oxygen at sea level). The remaining fourteen (47%) participants either didn't know or answered incorrectly. Of those participants who answered incorrectly, nine (30%) overestimated the amount of oxygen provided as being either 50% or 100%. This result indicates that participants might be unaware of the importance, during resuscitation, of attaching the ambubag to an oxygen source in order to supply more oxygen to the patient (Paturas 1998:51).

### 4.7.2 Question 22

Eleven (37%) participants knew that, in order to minimise the risk of gastric insufflation or baro-trauma, the most effective manner of squeezing the

ambubag was "slowly and smoothly". The remaining nineteen (63%) participants either didn't know or answered incorrectly. Eighteen (60%) of the participants who answered incorrectly indicated that they would use as "much pressure as possible".

### 4.7.3 Question 24

Seventeen (57%) participants were aware that by connecting the ambubag to an oxygen source a percentage of oxygen as high as 60% to 90% could be delivered. The remaining thirteen (43%) participants either didn't answer or answered incorrectly. Ten (33%) of the participants who answered incorrectly underestimated the percentage of oxygen thus achieved as being either 40 to 60%, 50% or 20 to 50%.

### 4.7.4 Question 25

Four (13%) participants were aware that high oxygen flow rates could " jam the patient valve (of the ambubag) in the inspiratory position and prevent expiration through the valve". The remaining twenty-six (87%) participants either didn't know or answered incorrectly.

### 4.7.5 Question 26

With regards to assisting the medical doctor during intubation, three (10%) participants were aware that the volume of air required for adequate inflation of the endotracheal cuff depended on the size of the patient's trachea as well as the size of the endotracheal tube. The remaining twenty-seven (90%) participants either didn't know or answered incorrectly.

### 4.7.6 Question 27

Twenty-nine (97%) participants were aware that one of the signs of cardiac arrest was "no blood pressure or pulse". The remaining participant answered incorrectly. This result suggests that registered nurses would be able to differentiate cardiac arrest from other causes of unconsciousness.

### 4.7.7 Question 28

Thirteen (43%) participants knew that cardiac arrest was commonly caused by a dysrhythmia. The remaining seventeen (57%) participants either didn't know or answered incorrectly.

### 4.7.8 Question 29

Twenty-nine participants (97%) knew that the term bradycardia referred to a pulse rate "below 60 beats per min". The remaining participant (3%) answered incorrectly.

## 4.8 DEFIBRILLATION

Questions 30 to 37, relating to defibrillation, will be discussed in this section.

Defibrillation Scores

**Table 4.7: Defibrillation scores**

| MEAN | MODE | MEDIAN |
|---|---|---|
| 4,4 (44%) | 4 (50%) | 4 (50%) |

### 4.8.1 Question 30

Sixteen (53%) participants knew that defibrillation was indicated for ventricular fibrillation. The remaining fourteen (47%) participants either didn't know or answered incorrectly.

### 4.8.2 Question 31

Eight (27%) participants were aware that defibrillation was most successful within the first 1 to 2 minutes of ventricular fibrillation. The remaining twenty-two (73%) participants either didn't know or answered incorrectly. Of the participants who answered incorrectly, fifteen (50%) overestimated the time interval as being either 5 to 20 minutes, the first hour or any time interval.

### 4.8.3 Question 32

Twenty-seven (90%) participants appeared to be aware of the importance of obtaining an ECG tracing prior to defibrillating. The remaining three (10%) participants answered incorrectly. In the researcher's experience of private hospitals, registered nurses often do 12 lead ECGs on patients. It is not known whether registered nurses, who work on the wards, are competent in ECG interpretation. General training of registered nurses does not, to the researcher's knowledge, include training on ECG interpretation.

### 4.8.4 Question 33

Seventeen (57%) participants indicated that they knew that defibrillator pads were safer than electrode gel. The remaining thirteen (43%) participants answered incorrectly. During data collection, the researcher checked each participating ward's resuscitation trolley to ensure that only items that were

on the trolley were mentioned in the questionnaire. None of the wards had defibrillator pads on their emergency trolleys. It is not known whether the participants used past experiences or logical deduction to arrive at their answer.

4.8.5 Question 34

Twenty-two (73%) participants knew the correct position of the apex defibrillator paddle. The remaining three participants either didn't know or answered incorrectly.

4.8.6 Question 35

Fourteen (47%) participants knew the correct position of the sternal defibrillator paddle. The remaining sixteen (53%) participants either didn't know or answered incorrectly. Seven (23%) of the participants who answered incorrectly stated that they would place the sternal paddle directly on the sternum. Defibrillator paddles should not be placed directly on the sternum because bones absorb electrical energy; thus the resulting energy is not sufficient for effective defibrillation (Quinn 1996:3). It is possible that the questionnaire used anatomical landmarks that were unfamiliar to the participants.

4.8.7 Question 36

Twelve (40%) participants knew that the correct joule sequence for defibrillation is: 200J, 200J, 360 J given one after another. The remaining eighteen (60%) participants either didn't know or answered incorrectly. This result indicates the possibility that registered nurses are not familiar with the advanced CPR algorithm.

### 4.8.8 Question 37

Fourteen (47%) participants knew that defibrillation should be stopped as soon as a pulse is obtained. The remaining sixteen (53%) participants either didn't know or answered incorrectly. Fourteen (47%) of the participants who answered incorrectly selected options that had limits of either the amount of joules or the number of shocks.

## 4.9 MEDICATION

There were eight questions on medication, namely questions 38 to 45. As question 46 is discussed in the section on critical questions, it is not discussed again here.

The scores in the section of medication were generally low. Kaye (1986:103) obtained a similar finding.

**Table 4.8: Medication scores**

| MEAN | MODE | MEDIAN |
|---|---|---|
| 3.2 (40%) | 4 (50%) | 3 (37%) |

### 4.9.1 Question 39

Thirteen (43%) participants knew that the recommended dose of lignocaine in a cardiac arrest situation was 1mg per kg. The remaining seventeen (57%) participants either didn't know or answered incorrectly.

### 4.9.2 Question 40

Fourteen (47%) participants knew that adrenaline would increase the patient's blood pressure, heart rate and also improve the heart's ability to contract. The remaining sixteen (53%) participants either didn't know or

answered incorrectly. This result indicates that registered nurses might not be familiar with the indications or actions of emergency medications.

### 4.9.3 Question 41

Five (17%) participants were aware that lignocaine is used to treat ventricular fibrillation. The remaining twenty-five (83%) participants either didn't know or answered incorrectly.

### 4.9.4 Question 42

Twenty-two (73%) participants knew that atropine is used to increase a patient's slow pulse rate. The remaining eight (27%) participants either didn't know or answered incorrectly.

### 4.9.5 Question 43

Thirteen (43%) participants knew that adrenaline could be given if the patient was in asystole. The remaining seventeen (57%) participants either didn't know or answered incorrectly.

### 4.9.6 Question 44

Thirteen (43%) participants knew that only atropine, adrenaline or lignocaine could be given via the endotracheal route. The remaining seventeen (57%) participants either didn't know or answered incorrectly. In the researcher's experience, the endotracheal route is seldom used in resuscitation situations in the ward.

### 4.9.7 Question 45

Three (10%) participants knew that when administering drugs via the endotracheal route, the dose should be doubled and the drug flushed down the trachea with 10mls of normal saline. The remaining twenty-seven (90%) participants either didn't know or answered incorrectly.

## 4.10 OTHER

There were two questions in this section, namely question 46 and question 47. Question 46 has already been discussed in the section on critical questions. Thus only question 47 remains to be discussed here.

In question 47, twenty (67%) participants knew that resuscitation should be discontinued when ordered to do so by the attending doctor. The remaining ten (33%) participants answered incorrectly.

## 4.11 SUMMARY

The sample consisted of 28 (93%) female registered nurses and two (7%) male registered nurses. Fourteen (47%) participants were between 30 and 40 years of age and the remaining sixteen (53%) fell into other age categories. The sample comprised 18 (60%) English speaking participants; the language of the remaining 12 (40%) participants was either Afrikaans or unknown. Twenty-one (70%) participants had been qualified for more than 5 years and nine (30%) for less than five years. Twenty (67%) participants did not have additional qualifications; three (10%) did and the remaining seven (33%) did not answer. The three who did have qualifications had specialised in either theatre, education or opthalmics. Seventeen (57%) participants worked in surgical wards and thirteen (43%) in medical wards. Twenty-two (73%) participants were in full-time positions and eight (27%) were sessional workers.

Nineteen (63%) participants had had some form of CPR update or training in the past year. The type of CPR training varied: fourteen (46%) participants had received a lecture, eleven (7%) a workshop and two (36%) a handout. The remaining three (10%) participants did not answer. The results indicate that between six months and five years had passed since the participants had been involved in a resuscitation.

**Table 4.9: Overall results of the multiple-choice questionnaire**

| SECTION | CRITICAL QUESTIONS | BASIC CPR | ADVANCED CPR | DEFIB | MEDS | OTHER |
|---|---|---|---|---|---|---|
| MEAN SCORES | 62% | 61% | 56% | 44% | 40% | 80% |

This study found that the highest scores regarding knowledge of CPR were in the area of basic CPR.

The lowest scores were in the area of medication. A similar result was obtained by Kaye (1986:103), who found that drug therapy was a problem area for both registered nurses and medical doctors. With regards to the indications and actions of certain medications: twenty-two (73%) participants knew the purpose of atropine; fourteen (47%) participants knew the purpose of adrenaline and five (17%) participants knew the purpose of lignocaine. With regards to dosages of the three most common emergency medications: seventeen (57%) participants knew the correct dosage of adrenaline; and thirteen (47%) participants knew the correct dosage of lignocaine. The dosage of atropine was not asked.

In the section on defibrillation: sixteen (53%) participants knew the correct indication for defibrillation; twenty-two (90%) participants knew the correct position for the apex paddle and twenty-seven (90%) participants knew that a ECG tracing should be obtained prior to defibrillating.

The type of incorrect answers chosen indicate a possible deficit in the following areas:

- emergency medications in terms of: dosage, administration, indication and mechanism of action
- rationale underlying steps in the basic and advanced CPR algorithms
- basic anatomical landmarks

It is possible that participants based their answers on daily nursing practices, past nursing experiences and/or logical deduction.

## 4.12 CONCLUSION

The results in this study indicate that registered nurses working in medical and surgical wards of selected private hospitals in the Western Cape Peninsula have adequate knowledge with regards to basic CPR actions such performance of respiratory assessments. However, their knowledge of the underlying rationale appeared to be inadequate. The results indicate deficits in their knowledge regarding emergency medications as well as defibrillation. Based on these results, recommendations will be put forward in Chapter 5.

# CHAPTER 5
# CONCLUSIONS AND RECOMMENDATIONS

## 5.1 INTRODUCTION

The registered nurses' ability to provide competent CPR is of vital importance. The registered nurse who finds a patient in cardiac arrest is expected to commence basic CPR and seek the assistance of a more skilled person, such as an intensive care nurse or a medical doctor.

Quantitative research, as was used in this study, provides an objective means of describing levels of knowledge. In order to describe the registered nurses' knowledge of CPR, a questionnaire was developed and then administered to a convenience sample of 30 registered nurses who worked in the wards of selected private hospitals in the Western Cape Peninsula.

Experts in advanced CPR have chosen a score of 80% as an objective indication of adequate levels of knowledge of CPR (Ragavan 2000:505). In this study, an average score of 61% was obtained. This was felt to be inadequate. Based on the results obtained in this study, recommendations regarding nursing practice, training, research and professional nursing organisations are made.

## 5.2 RECOMMENDATIONS FOR REGULATING BODIES AND PROFESSIONAL ORGANISATIONS

Some researchers suggest that CPR competency or accreditation should become a formal requirement for registration and license renewal (Ragavan 2000:507). The researcher suggests that the South African Nursing Council should consider CPR competency as a prerequisite for renewal of the registered nurses' license. This should be done on an annual basis. Nursing agencies should also consider ensuring that sessional registered nurses also provide proof of annual CPR competency.

Professional nursing organisations, like DENOSA, should consider the possibility of developing CPR competency courses and tests.

Other aspects of CPR, such as the legal and ethical issues relating to do-not-resuscitate orders, need further exploration.

## 5.3 RECOMMENDATIONS FOR THOSE INVOLVED IN FORMAL AND CONTINUING NURSING EDUCATION PROGRAMMES

It has been suggested, in the literature, that CPR competency should be a formal prerequisite for qualification in basic nursing and medical training programmes (Prior-Willeard 1995:2). Based on the results of this study, this suggestion is strongly supported.

The skill of CPR should be included in the student nurse's practical examinations. Nursing educators could also make it an academic requirement that nursing students be certified annually in CPR from their first year of training onwards.

## 5.4 RECOMMENDATIONS FOR HOSPITALS

5.4.1 *Nursing policies* - Nursing service managers should consider including the skill of defibrillation in the basic CPR training programmes for registered nurses. They should also consider gradually phasing out manual defibrillators, which require specific skills such as ECG interpretation, and replacing them with automated external defibrillators. Consideration should also be given to emulating the Department of Health of Kwazulu Natal and developing, in association with professional nursing organisations and nursing educational institutions, formal CPR accreditation programmes.

5.4.2 *Nursing practice* - The deficit in the knowledge of basic and advanced CPR, which was indicated by the results of this study, might be remedied by

frequent refresher courses (Quinn 1993:21). Studies indicate that other measures, such as posters of CPR algorithms placed in prominent places in the hospital, help to increase registered nurses' knowledge of CPR (Wynne 1995:31). A copy of the basic CPR algorithm could be placed on a notice board above the resuscitation trolley so that the person checking the resuscitation trolley is continually exposed to it. Likewise, a chart of the correct dosages and administration methods of the most commonly used emergency medications could be placed on the resuscitation trolley.

Consideration should also be given to the following:

- the use of quality circles and debriefing sessions following a resuscitation

- ensuring that sessional registered nurses are also allocated the responsibility of checking the resuscitation trolley

- standardising the contents of the resuscitation trolleys within a hospital or group of hospitals; because different equipment could result in confusion during a resuscitation.

5.4.3 *Nursing training* -Each hospital should consider establishing a resuscitation committee. This committee would have the following functions:

- establish and continually update the CPR training programme

- identify training needs and develop training programmes to remedy these areas (Kaye 1985:98)

- evaluate real resuscitation situations in order to identify problem areas that need to be addressed during CPR training

- ensure that CPR training is appropriate for the needs of the registered nurse working in medical or surgical wards

- include anatomy, physiology and rationale in CPR training programmes

- devise CPR programmes that train individuals to operate as a team (Kaye 1986:99)

- ensure that hospital staff are trained or given refresher courses on a six-monthly or annual basis

- regularly inspect resuscitation equipment to ensure that it is in good condition

- provide registered nurses with CPR training facilities and equipment such as mannikins

- establish standards for documentation of CPR attempts and train registered nurses in these standards

- keep statistics of cardiac arrest events

- liaise with the Resuscitation Council of South Africa with regards to new resuscitation algorithms

- incorporate the principles of adult learning, such as reinforcement and feedback, in CPR training programmes

5.4.4 *Nursing research* - Further research could focus on the following areas:

- using interviews to describe in more detail the registered nurses' understanding of the rationale underlying CPR efforts

- exploring the effectiveness of utilising adult learning principles, as a means of improving knowledge and skill retention, during CPR training (American Heart Association 1992:2179)

- describing knowledge levels of CPR of registered nurses working in other areas such as maternity or paediatrics

- exploring the characteristics of the registered nurses who obtained high scores with those who obtained low scores on CPR tests

- exploring the registered nurses' perception of her CPR training needs

## 5.5 LIMITATIONS OF THE STUDY

The researcher identified the following limitations:

- the sample was small and not randomly chosen; thus generalisation of the data to the population could not be made

- it was not always possible, in some cases, to exert the control of waiting thirty minutes for the participant to complete the questionnaire

- the reliability coefficient, determined by using the Split Half technique and the Spearman Brown Prophecy formula, was only 0.60%

- it is possible that, because a multiple-choice questionnaire was used, the participants used logical deduction in selecting many of their answers

## 5.6 CONCLUDING REMARKS

The purpose of this descriptive study was to describe the level of knowledge of CPR of registered nurses working in the wards of selected private hospitals in the Western Cape Peninsula. Data was obtained using a structured multiple-choice questionnaire. The results were analysed and indicate that the level of knowledge of CPR in general was inadequate. Future training in CPR needs to focus on specific problem areas, such as knowledge of emergency medications. Based on the findings, recommendations were made in the area of nursing practice, nursing education and nursing research.

Although generalisations cannot be made from this study, it is clear that serious attention should be given to CPR training programmes for registered nurses.

# APPENDIX I

# THE QUESTIONNAIRE

Tel (021) 553 4923 P Hutchings
Fax (021)553 1289 P O Box 286
Melkbosstrand
7437

Dear Respondent

RESEARCH: THE KNOWLEDGE OF WARD NURSES REGARDING CARDIOPULMONARY RESUSCITATION

I am in the process of completing a Clinical Degree at UNISA. This research project is one of the requirements of the course.

The purpose of this questionnaire is to explore the knowledge of the ward nurse regarding Cardio-pulmonary Resuscitation.

It would be greatly appreciated it you would complete the attached questionnaire. The questionnaire will take approximately 20 minutes of your time. The answers will be posted to the ward at the end of the Study.

<u>All information will be kept strictly confidential.</u>

Thankyou.
Pauline Hutchings

## " CARDIO-PULMONARY RESUSCITATION (CPR)"

Nurses and doctors who receive training in CPR often start to lose their skills and knowledge within 2 weeks to six months of training.

Many authors question whether skill retention can be improved by tailoring training in CPR to meet the needs of the practicing nurse.

In order to identify these needs; his/her current knowledge of CPR needs to be established.

This questionnaire was developed with this aim in mind.

PART ONE - BIOGRAPHICAL DATA

INSTRUCTIONS: In order to maintain confidentiality, do not write your name anywhere on this questionnaire. Please indicate your answer by ticking ( √ )your choice in the box. If "other" please write your answer in the space provided After you have completed this questionnaire, please return it to the collection point.

J1 Your age group is
20 -30 ☐ 30 - 40 ☐ 40 - 50 ☐ 50 -60

J2 Gender
☐ Male ☐ Female

J3 Language
☐ English ☐ Afrikaans ☐ Other.....

J4 What year did you qualify? 19

J5 Other Nursing qualifications
☐ Administrative ☐ Educational ☐ Other .....

J6 Present ward where you are working
☐ Medical ☐ Surgical ☐ Other.....

J7 Work status
☐ full-time ☐ part-time ☐ sessional/agency

J8 length of time in current position
☐ .....months ☐ .....years

J 9 Please list briefly previous areas worked e.g. Day ward for six years.

_____

_____

_____

_____

_____

J10 When last have you had instruction in CPR?
Months Years

J11 What type of instruction
☐Handout ☐Workshop ☐Lecture

J12 When last were you involved in a Resuscitation Situation?
.....

J13 Are you responsible for checking the Resuscitation Trolley?
☐Yes ☐No

J14 When last did you check the Resuscitation trolley?
.....

PART TWO - UNDERSTANDING OF CARDIOPULMONARY RESUSCITATION

INSTRUCTIONS Please complete the following section by circling your answer

| | |
|---|---|
| 1 | When coming across a patient in the ward who appears to have collapsed the first thing one should do is: |
| a | administer a precordial thump |
| b | check the patient's level of consciousness |
| c | call for help |
| d | press the emergency button |
| | |
| 2 | The time interval when loss of consciousness after cardiac arrest occurs is within |
| a | 15 - 20 seconds |
| b | 1 -2 minutes |
| c | 4 - 6 minutes |
| d | 5 minutes |
| | |
| 3 | The safest way that a patients level of consciousness can be assessed is by |
| a | shouting and tapping his shoulder |
| b | shaking him |
| c | gently slapping his/her face |
| d | applying peri-orbital pressure |
| | |
| 4 | If the patient remains unconscious the recommended way of checking for breathing is to |
| a | place one's palm lightly over the patients mouth to feel for air movement |
| b | place one's hand on the patients chest to feel for movement of the chest wall |
| c | use the look. listen and feel method |
| d | hold a mirror over the patients mouth and see if the mirror "mists" |



| | |
|---|---|
| 5 | The most common cause of an unconscious Patient not breathing is: |
| a | central nervous system depression |
| b | an obstructed airway |
| c | general anaesthesia |
| d | cardiac disease |
| | |
| 6 | The most common cause of airway obstruction in an unconscious patient is: |
| a | the tongue |
| b | a foreign object |
| c | vomit |
| d | collapsed pharynx |
| | |
| 7 | Airway obstruction can best be relieved by |
| a | turning the patient into the left recovery position |
| b | turning the patient onto his side |
| c | head tilt-chin lift maneuver |
| d | placing the patient in semi-fowlers |
| | |
| 8 | In checking for circulation one should first |
| a | check the blood pressure |
| b | shake the patient to see if he responds |
| c | feel the patients wrist for the radial pulse |
| d | feel the patients neck for the carotid pulse |
| | |
| 9 | After cardiac arrest the time interval when cerebral damage occurs is within |
| a | 60 -90 minutes |
| b | 6 - 20 minutes |
| c | a few seconds |
| d | 4-6 minutes |
| | |

| | |
|---|---|
| 10 | The aim of a precordial thump is to |

| 10 | The aim of a precordial thump is to: |
|---|---|
| a | rouse the patient from unconsciousness |
| b | convert ventricular fibrillation/asystole to a sinus rhythm |
| c | stimulate the heart to beat more strongly |
| d | stimulate the heart to beat more quickly |
| | |
| 11 | The main danger of a precordial thump is that: |
| a | it can convert a normal sinus rhythm to ventricular fibrillation |
| b | it can cause severe bruising |
| c | it can cause internal bleeding |
| d | it can cause a sternal fracture |
| | |
| 12 | External chest compressions can improve the patient's cardiac output by the following percentage: |
| a | 20 - 40 % |
| b | 25% |
| c | 50% |
| d | 60% |
| | |
| 13 | External chest compressions should be continued without interruption for the following main reason: |
| a | if one stops it is difficult to re-establish circulation |
| b | to mimic the normal cardiac activity |
| c | to assist with lung deflation |
| d | to avoid the development of a thrombus |
| | |
| 14 | For external chest compressions the hand's position on the patient's sternum is extremely important. It should be two fingers above the: |
| a | Manubrium |
| b | Xiphisternum |
| c | Sternum |
| d | Diaphragm |
| | |



| 15 | One's hands should be positioned on the sternum as follows: |
|---|---|
| a | place the hands flat on the sternum side by side |
| b | place the heel of one hand on the sternum and then place other hand on top of the first hand |
| c | first make a fist with the one hand and then place the other hand over that hand |
| d | place the palm of one hand on the sternum and then place the other hand on top of the first hand |
| | |
| 16 | The nurse should press the chest downwards by: |
| a | 4 - 5 cm |
| b | 1 -2 cm |
| c | 5 - 8 cm |
| d | 8 cm |
| | |
| 17 | In a one-rescuer situation the ratio of breaths to compressions in an adult is: |
| A | one breath to fifteen compressions |
| b | two breaths to ten compressions |
| c | two breaths to fifteen compressions |
| d | one breath following each compression |
| | |
| 18 | In a one-man rescuer situation the ratio of breaths to compressions in an adult is: |
| a | two breaths to fifteen compressions |
| b | one breaths to five compressions |
| c | two breaths to five compressions |
| d | one breath following each compression |
| | |
| 19 | In a two-man rescue situation the nurse can achieve the recommended rate of 80 - 100 chest compressions by: |
| a | Decompressing the chest as fast as possible |
| b | asking a second person to time her |
| c | counting out loud from 1 - 80 or 1 - 100 |
| d | counting out loud 1-and-2-and-3-and-4-and-five |

| 20 | Bag-valve (Ambubag) masks not attached to an oxygen source supply the following percentage of oxygen: |
|---|---|
| a | 100% |
| b | 10 % |
| c | 21 % |
| d | 50% |
| | |
| 21 | After attaching the Ambubag with a reservoir to an oxygen source one should increase the Oxygen flow rate to: |
| a | 2 -4 L/min |
| b | 10 - 15L /min or greater |
| c | 5 L /min |
| d | 8 - 10L/min |
| | |
| 22 | The manner in which one should squeeze the ambubag is: |
| a | as hard as possible |
| b | as fast and with as much pressure as possible |
| c | slowly and smoothly |
| d | slowly but squeezing with as much pressure as possible |
| | |
| 23 | The rate at which the ambubag should be squeezed during resuscitation on an unconscious patient who is not intubated is: |
| a | as fast as possible |
| b | after every second chest compression |
| c | at the same rate as the patients normal respiratory rate |
| d | after each chest compression |
| | |
| 24 | By adding a reservoir bag connected to Oxygen the oxygen concentration can be improved from room air (21%) to: |
| a | 40 -60% |
| b | 50% |
| c | 20-50% |
| d | 60 - 95% |
| | |



| 25 | The danger of high Oxygen flow rates is that they: |
|---|---|
| a | jam the patient valve in the inspiratory position and prevent expiration through the valve |
| b | dry out the air passages |
| c | can cause oxygen toxicity |
| d | can cause nasal haemorrhage |
| | |
| 26 | The amount of air used to inflate an endo-tracheal: |
| a | Depends on the size of the Endo- Tracheal tube (ETT) |
| b | Dependents of the patient's trachea and the size of the ETT tube. |
| c | is usually a standard 5mls of air |
| d | Dependents on the size of the endo-tracheal tube's cuff |
| | |
| 27 | A patient who has no blood pressure or pulse is described as: |
| a | Suffering from a heart attack |
| b | Being extremely hypotensive |
| c | in cardiac arrest |
| d | suffering from syncope |
| | |
| 28 | The most common cause of cardiac arrest is: |
| a | hypovolaemia |
| b | an arrhythmia |
| c | electrolyte disturbances |
| d | toxic doses of Beta Blockers |
| | |
| 29 | Bradycardia is the term used to describe a pulse rate: |
| a | above 100 beats/min |
| b | below 60 beats/min |
| c | below 80 beats /min |
| d | above 60 beats/min |
| | |
| 30 | Defibrillation is always indicated in: |
| a | Asystole |
| b | sinus bradycardia |
| c | ventricular fibrillation |
| d | sinus tachycardia |

| 31 | The time interval when Defibrillation is most successful is: |
|---|---|
| a | within the first 5 to 20 minutes |
| b | at any time interval |
| c | within the first 1 - 2 minutes |
| d | within the first hour |
| | |
| 32 | One can only decide if one should defibrillate after checking the patient's |
| a | arterial pulse |
| b | ECG tracing |
| c | blood pressure |
| d | level of consciousness |
| | |
| 33 | Defibrillator contact pads should be used in place of Electrode jelly: |
| a | Routinely as they are safer than Electrode gel |
| b | only if the patient is likely to have a prolonged cardiac arrest episode as they are very expensive |
| c | if the patient is over the age of sixty |
| d | if the patient has a very fragile skin |
| | |
| 34 | In positioning the defibrillator pads the apex paddle should be placed |
| a | on the patients left side of the chest below the patients nipple in the anterior axillary line |
| b | Directly over the patient's heart |
| c | on the patient's right side of the chest below the patient's nipple in the mid-clavicular line |
| d | Directly over the patients breast bone/sternum |
| | |
| 35 | The defibrillator sternal paddle should be placed |
| a | on the patients right side of the chest below the clavicle adjacent to the sternum |
| b | on the patients left side of the chest below the patients nipple in the mid-clavicular line adjacent to the sternum |
| c | on the left side of the patients breast bone/sternum just below the clavicle |
| d | directly on the sternum |





| 36 | The correct Energy sequence for defibrillation is: |
|---|---|
| a | a series of three shocks at the energy level of 200J , 200J,360 given one after the other |
| b | a series of three shocks at increasing energy levels of 100 J, 200 J 300 J given one after the other |
| c | a series of two shocks at the energy level of 200, 400 J |
| d | continuous shocks of 200 J until the rhythm is back to normal |
| | |
| 37 | One should stop defibrillating the patient |
| a | when the patient has a pulse |
| b | after giving three shocks |
| c | when one has reached a maximum of 400 J |
| d | after giving ten shocks |
| | |
| 38 | When ordered by the doctor to draw up Adrenaline 1:1000 in a syringe for a bolus intravenous injection the correct dose will be: |
| a | 1mg which can be repeated every 3 - 5 min |
| b | 10mg which can be repeated every 3 - 5 min |
| c | 5 mg which can be repeated every 3 - 5 min |
| d | 1mg which can be repeated only three times |
| | |
| 39 | When ordered by the doctor to draw up Lignocaine in a syringe for a bolus intravenous injection the correct dose will be: |
| a | 10mg per kg |
| b | 5 mg per kg |
| c | 2 mg per kg |
| d | 1mg per kg |
| | |
| 40 | When the doctor wants to increase the patient's blood pressure heart rate and the heart's ability to contract he will order: |
| a | Magnesium |
| b | Adrenaline |
| c | Lignocaine |
| d | Atropine |

| 41 | To treat Ventricular fibrillation the doctor will order (besides Adrenaline) |
|---|---|
| a | Atropine |
| b | Dobutrex |
| c | Lignocaine |
| d | Isoptin |
| | |
| 42 | If the patient has a slow pulse the doctor will order: |
| a | Lignocaine |
| b | Digoxin |
| c | Atropine |
| d | any beta-blocker |
| | |
| 43 | If the ECG tracing shows asystole the doctor will request: |
| a | sodium bicarbonate |
| b | Dobutrex |
| c | Adrenaline |
| d | Lignocaine |
| | |
| 44 | The endotracheal route can only be used for: |
| a | magnesium and adrenaline |
| b | atropine, adrenaline and lignocaine |
| c | sodium bicarbonate and adrenaline |
| d | calcium chloride and adrenaline |
| | |
| 45 | When the doctor orders one to give adrenaline via the endo-tracheal tube one should inject: |
| a | one ampoule of undiluted adrenaline |
| b | one ampoule of adrenaline flushed down with five mls of normal saline |
| c | two ampoules of adrenaline flushed down with 10 mls of normal saline |
| d | two ampoules of adrenaline given undiluted. |
| | |



| 46 | After resuscitation the patient: |
|---|---|
| a | can stay in the ward close to the nurse's station |
| b | can stay in the ward unless he is unconscious |
| c | should be monitored in the ICU even if he is conscious |
| d | can stay in the ward so long as he is connected to a heart monitor |
| | |
| 47 | Resuscitation should be discontinued when: |
| a | when the patients pupils are constricted |
| b | when ordered to do so by the attending doctor |
| c | after 20 minutes when there is still no blood pressure |
| d | when requested by the patient's family |

# APPENDIX II
# LETTERS OF PERMISSION

Tel (021 ) 5534923
Fax (021) 553 1289

Miss P Hutchings
P O Box 286
Melkbosstrand
7437
1st January 2001

Attention:

Nursing Services Manager/Hospital Matron
Hospital

Dear Sir/ Madam

RE: PERMISSION TO CONDUCT RESEARCH

The area that I am researching concerns "the level of knowledge of Cardio-Pulmonary Resuscitation (CPR) of Registered Nurses working in the wards of Private Hospitals".

This research project is one of the requirements for a course in Clinical Nursing that I am doing via UNISA (MaCur). In order to collect this data, I am hoping that you will grant me permission to distribute questionnaires to Registered Nurses working Day and/or Night shift in the wards of your Hospital at a time and date convenient to the Ward. The questionnaire will take approximately 20 -30 minutes to complete. **The questionnaire (and the study) has been designed to ensure anonymity of all who participate (the subjects as well as the hospital).**

Once all the questionnaires have been retrieved, the answers to the questionnaire will be posted to your office/your clinical tutor.

If you decide to grant me permission; then please sign in the space below and I will collect the form from your secretary.

P Hutchings

Thankyou
Pauline Hutchings (R.N.)

12.01.001

Tel (021 ) 5534923
Fax (021)553 1289

Miss P Hutchings
P O Box 286
Melkbosstrand
7437
15 December 2000

Attention: Jill
Nursing Services Manager/Hospital Matron
Hospital
CAPE TOWN

Dear Sir/ Madam

RE: PERMISSION TO CONDUCT RESEARCH

CPR is about saving lives. The Ward nurse is often the first person on the scene of a resuscitation situation. It is assumed that she has kept her psychomotor skills and level of knowledge of CPR up-to-date. The area that I am researching concerns "the level of knowledge of Cardio-Pulmonary Resuscitation (CPR) of Registered Nurses working in the wards of Private Hospitals".

This research project is one of the requirements for a course in Clinical Nursing that I am doing via UNISA (MaCur). In order to collect this data, I am hoping that you will grant me permission to distribute questionnaires to Registered Nurses working Day and/or Night shift in the wards of your Hospital at a time and date convenient to the Ward. The questionnaire will take approximately 20 -30 minutes to complete. **The anonymity of all who participate (the subjects as well as the hospital) will be ensured by means of a coding system.**

Once all the questionnaires have been retrieved and the results analyzed, they will be posted to your office/your clinical tutor together with the answers to the questionnaire.

If you decide to grant permission, then please sign the space below and place your hospital stamp in the adjacent space. I will then collect this form from Jill (Clinical Tutor).

SIGNATURE: J. Ellis p/p. HOSPITAL STAMP:_____

Pauline Hutchings

Thankyou
Pauline Hutchings (R.N.)

# APPENDIX III
# CPR ALGORITHMS

RESUSCITATION COUNCIL OF SOUTHERN AFRICA
RESUSSITASIERAAD VAN SUIDER-AFRIKA

# Adult CPR
# Advanced Life Support Algorithm

10177

RESUSCITATION COUNCIL OF SOUTHERN AFRICA
RESUSSITASIERAAD VAN SUIDER-AFRIKA

## Assessment

**H** Hazards? — Ensure safety of scene and rescuer

**H** Hello? — Determine responsiveness

**H** Help? — Call for assistance

2258

→ Responsive → **Look for and treat injuries, etc**

Unresponsive

## A Airway Opened

(Chin lift)

## B Breathing Assessed

→ Breathing adequate → **Recovery position**

Breathing absent

## C Circulation Assessed

→ Pulse present → **Ventilate** at 12 breaths per minute (with oxygen)

Pulse absent

## D Defibrillator Required

**Precordial Thump** (If arrest witnessed)

↓ CPR (only until defibrillator available and ready)

**Determine rhythm**

↓ (Quick-look paddles/Monitor)

### ELECTROMECHANICAL DISSOCIATION
(Pulseless QRS Electrical Activity)

↓ (No Pulse)

DETERMINE LIKELY CAUSE DURING CPR

| | |
|---|---|
| T –Test other pulses | H – Hypovolaemia |
| T –Tension pneumo | H – Hypoxia |
| T –Tamponade | H – Hypothermia |
| T –Thrombo-emboli | H – Hyperkalaemia |
| T –Toxins | H – $H^+$ ion excess |

↓ CPR

ENDOTRACHEAL INTUBATION / ESTABLISH IV ACCESS

↓ CPR

ADRENALINE
1 mg IV (2 mg ET) every 3 minutes

↓ CPR

ATROPINE
1 mg IV (2 mg ET) X 3 if bradycardia

↓

**Consider:** 1. SODIUM BICARBONATE (8.5%)
50 ml IV every 10 minutes
↓
2. ADRENALINE
5 mg IV bolus
↓
3. CALCIUM CHLORIDE (10%)
10 ml IV bolus

### VENTRICULAR FIBRILLATION
(and Pulseless Ventricular Tachycardia)

↓ (No Pulse)

DEFIBRILLATE IMMEDIATELY

1st shock – 200 J
↓ (No Pulse)
2nd shock – 200 J
↓ (No Pulse)
3rd shock – 360 J
↓ (No Pulse)

↓ CPR

ENDOTRACHEAL INTUBATION / ESTABLISH IV ACCESS

↓ CPR

ADRENALINE
1 mg IV (2 mg ET) every 3 minutes

↓ CPR

DEFIBRILLATE
3 shocks at 360 J after 1 minute of CPR following each dose of Adrenaline

↓

**Consider:** 1. SODIUM BICARBONATE (8.5%)
50 ml IV every 10 minutes
↓
2. LIGNOCAINE
1 mg/kg IV every 5 minutes [X3]
↓
3. BRETYLIUM TOSYLATE
5 mg/kg IV, then 10 mg/kg IV after 5 minutes

### ASYSTOLE

↓ (No Pulse)

DEFIBRILLATE IF RHYTHM UNCLEAR

1st shock – 200 J
↓ (No Pulse)
2nd shock – 200 J
↓ (No Pulse)
3rd shock – 360 J
↓ (No Pulse)

↓ CPR

ENDOTRACHEAL INTUBATION / ESTABLISH IV ACCESS

↓ CPR

ADRENALINE
1 mg IV (2 mg ET) every 3 minutes

↓ CPR

ATROPINE
3 mg IV (6 mg ET) bolus

↓

**Consider:** 1. SODIUM BICARBONATE (8.5%)
50 ml IV every 10 minutes
↓
2. ADRENALINE
5 mg IV bolus
↓
3. PACING
if arrest was witnessed

**NOTE: This algorithm is based on the assumption that the previous step was unsuccessful and cardiac arrest is continuing**

Printed as a service to the community

(Nov 93)

RESUSCITATION COUNCIL OF SOUTHERN AFRICA
RESUSSITASIERAAD VAN SUIDER-AFRIKA

# CPR Saves Lives!

It's as simple as the ABC of CPR (Cardio Pulmonary Resuscitation)

RESUSCITATION COUNCIL OF SOUTHERN AFRICA
RESUSSITASIERAAD VAN SUIDER-AFRIKA

## Assess

### Assess Alertness/Responsiveness

- Hazards?
  - Ensure safety of scene and rescuer
  - Beware of electrocution, noxious gases, oncoming traffic, etc.
- Hello?
  - Try to arouse victim by gently tapping the shoulder
  - Shout: "Are you okay?"
- Help?
  - Call for assistance

If Responsive →

### Check for Injuries

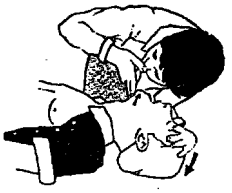
- Look for injuries and treat as necessary
- Get help if needed
- Reassess victim
- Keep victim comfortable until help arrives

↓ Not Responsive

## Breathing

### Assess Breathing

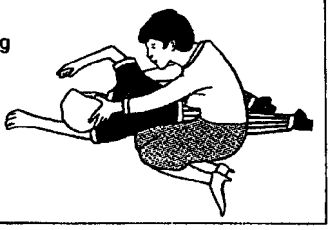
- With the fingers of one hand, lift the bony part of the chin forwards while tilting the head back with the other hand
- Remove obvious obstructions from mouth
- Place ear next to victim's mouth and nose
  - Look for movement of chest
  - Listen for breath sounds
  - Feel for breath on your cheek
- Take five seconds to determine if breathing



Adequate Breathing →

### Place in Recovery Position

- Support head with one hand, and turn victim as a unit onto his side, ensuring that no twisting of the head or neck occurs
- Get help
- Keep checking breathing and pulse
- Stay with victim until help arrives

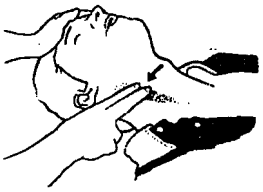


↓ Not Breathing

## Circulation

### Assess Circulation (Pulse)

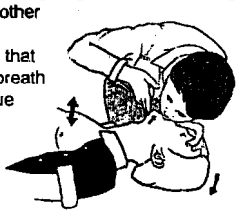
- Keep head tilted back
- Slide two fingers into the groove between the "Adam's Apple" and the muscles of the neck
- Press gently
- Feel for a pulse for five seconds



Pulse Present →

### Start Rescue Breathing

- Pinch nose closed with thumb and index finger of hand on victim's forehead
- Place mouth over victim's mouth, forming a tight seal, while lifting bony part of chin up with fingers of other hand
- Give 10 slow, full breaths, ensuring that the chest rises and falls with each breath
- Get help then reassess and continue rescue breathing if pulse present
- Reassess pulse after every 10 rescue breaths

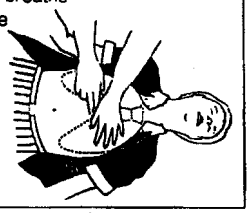


↓ No Pulse

## Don't Delay

### Get Help and Start CPR

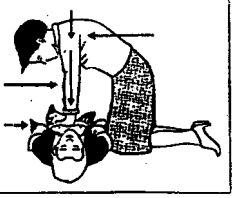
- Call the emergency services immediately
- Commence CPR on a firm, flat surface:
  A – Airway: Lift chin up and tilt head back
  B – Breathing: Give two slow full breaths
  C – Circulation: Place heel of one hand on lower half of breast-bone, two finger-breadths above lower end of ribcage in the midline
- Place measuring hand on top of first hand and start chest compressions



Do CPR →

### Start Chest Compressions

- Compress breastbone to a depth of 4-5 cm, at a rate of 80 compressions per minute
- Count: 1-and, 2-and, 3-and, etc with each compression
- Lift chin, and give 2 full, slow breaths after every 15 compressions
- Continue until professional help arrives, or pulse and breathing returns.



Calling the emergency services:

1. Dial .....
2. Indicate emergency (CPR in progress)
3. Give exact location (street name and number / cross-street / landmark / etc.)
4. Replace receiver last (answer all questions)
5. Return to the victim

*(Nov 93)*

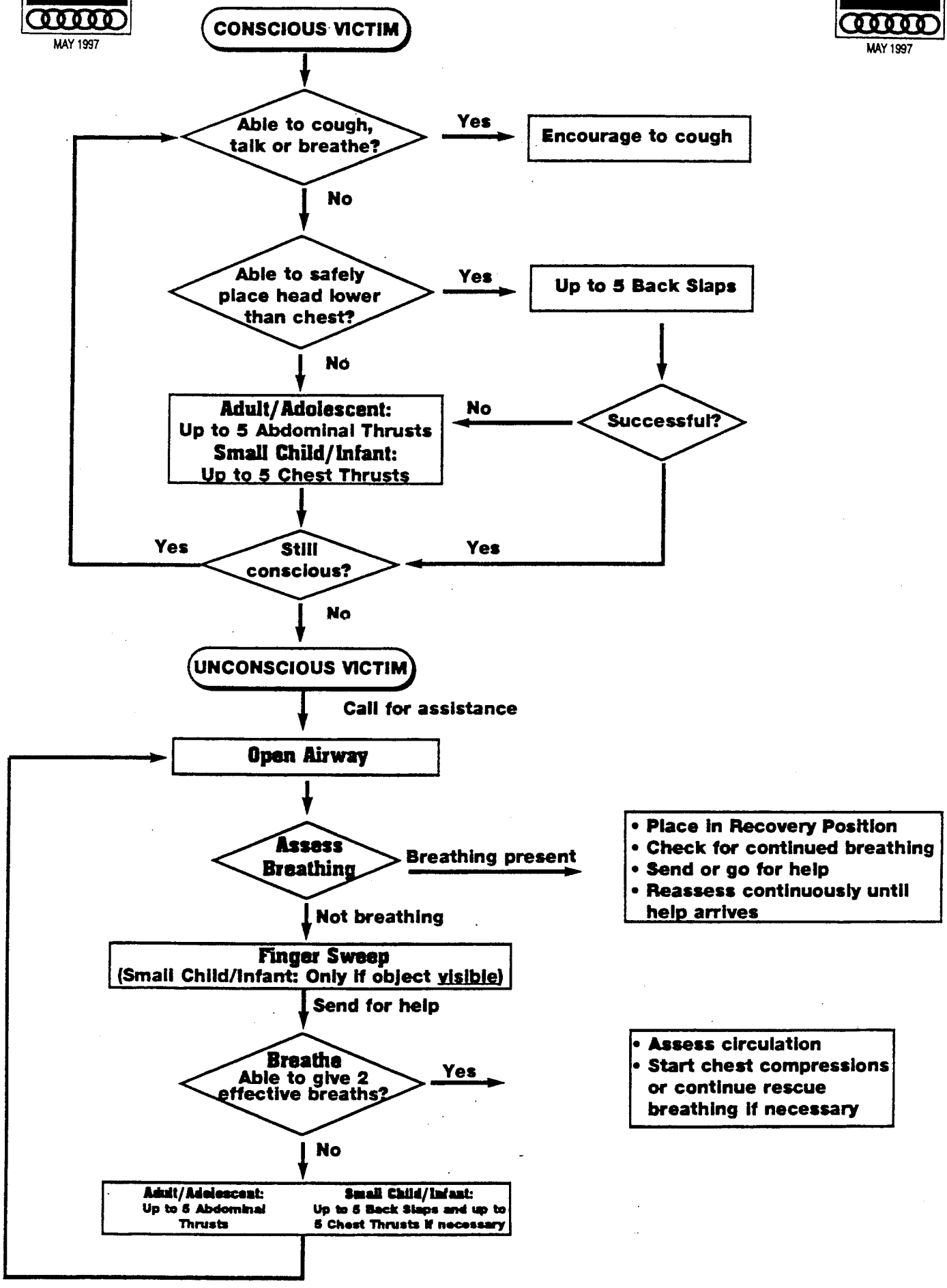
RESUSCITATION COUNCIL OF SOUTHERN AFRICA

MAY 1997

# CHOKING ALGORITHM

RESUSCITATION COUNCIL OF SOUTHERN AFRICA

MAY 1997



# APPENDIX IV
# CALCULATION OF THE CORRELATION COEFFICIENT

## CALCULATION OF THE CORRELATION COEFFICIENT USING THE SPLIT HALF TECHNIQUE

1. STEP ONE

Five questionnaires were randomly selected from a pile of questionnaires. The scores for the odd-numbered questions (x) were separated from the scores for the even-numbered questions (y). Each score was squared.

| ODD NUMBERED SCORES (X) | $X^2$ | EVEN NUMBERED SCORES (Y) | $Y^2$ |
|---|---|---|---|
| 13 | 169 | 9 | 81 |
| 9 | 81 | 8 | 64 |
| 11 | 121 | 14 | 196 |
| 14 | 196 | 14 | 196 |
| 14 | 196 | 10 | 100 |

2. STEP TWO

The mean of each score was calculated; and then subtracted from the original score. These results were then squared (see step three).

| X – (mean of x) | Y – (mean of y) | [x-(mean of x)][y-(mean of y)] |
|---|---|---|
| +0.8 | -2 | - 1.6 |
| -3.2 | -3 | +9.6 |
| -1.2 | +3 | -3.6 |
| +1.8 | +3 | +5.4 |
| +1.8 | -1 | -1.8 |
| TOTAL = | | +8.1 |

3. STEP THREE

| $[x-(\text{mean of } x)]^2$ | $[y-(\text{mean of } y)]^2$ |
|---|---|
| 0.64 | 4 |
| 10.24 | 9 |
| 1.44 | 9 |
| 3.24 | 9 |
| 3.24 | 1 |
| TOTAL =18.8 | TOTAL = 19 |

4. STEP FOUR

The totals obtained in step three were used in the following calculation.

Square root of [18.8]x[19]
=18.89

5. STEP FIVE

Mean scores divided by square root of squared mean scores (8.1 divided by 18.89) resulted in a figure of 0.43%.

6. STEP SIX

The correlation coefficient is related to the length of the questionnaire. The split half technique effectively halves the questionnaire and thus tends to yield a lower correlation coefficient.

The Spearman Brown Prophecy formula is used to adjust for this effect (Brink 1987: 80) and (Polit and Hungler 1995:351).

Spearman Brown Prophecy formula
=(2 x 0.43%) divided by (1 + 0.43%)
=0.60%

A final correlation coefficient of 0.60 percent was thus obtained.

According to Talbot, a correlation of 0.70 percent is acceptable for a new research instrument. The lower correlation coefficient obtained for the questionnaire used in this study was felt to be acceptable as it was considered to be due to the heterogenous nature of the questionnaire.

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