

**THE KNOWLEDGE AND PRACTICE OF STANDARD PRECAUTIONS AMONG
HEALTH CARE WORKERS IN PUBLIC SECONDARY HEALTH FACILITIES IN ABUJA,
NIGERIA**

By

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DECLARATION

I declare that **THE KNOWLEDGE AND PRACTICE OF STANDARD PRECAUTIONS AMONG HEALTH CARE WORKERS IN PUBLIC SECONDARY HEALTH FACILITIES IN ABUJA, NIGERIA**, is my own work and that all the sources I have used or quoted have been indicated and acknowledged by means of complete references, and that this work has not been submitted before for any other degree at any other institution.

Dr. Emeka Franklin OKECHUKWU

20 November 2009

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- the ethical committee of Health and Human Secretariat of Federal Capital Territory Administration (FCTA), for giving me approval and permission to conduct the study.

THE KNOWLEDGE AND PRACTICE OF STANDARD PRECAUTIONS AMONG HEALTH CARE WORKERS IN PUBLIC SECONDARY HEALTH FACILITIES IN ABUJA, NIGERIA

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ABSTRACT

Standard precautions are a set of guidelines that aim to protect health care workers from infections from blood, body fluids, secretions, excretions except sweat, non-intact skin, and mucous membranes while providing care to patients. However, compliance to the standard precautions is often low in low-income countries in spite of the greater risk of infection. This study examined the knowledge and practice of standard precautions among health care workers in public secondary health facilities in Abuja, the Federal Capital Territory of Nigeria. A quantitative descriptive survey was conducted with 83 doctors and 194 nurses using a structured questionnaire. Findings show suboptimal knowledge and practice of the standard precautions among the health care workers. Knowledge of post-exposure prophylaxis for HIV was low as well as hepatitis B immunization among the respondents. A lack or irregular supply of essential materials, such as personal protective equipment, was the main reason the respondents did not comply to the precautions. This report recommends the development and implementation of a comprehensive infection prevention and control program in health facilities in order to ensure compliance to the standard precautions by health care workers.

KEY CONCEPTS

Standard precautions, health care workers, occupational exposure, blood-borne infection, secondary health facilities, knowledge, practice.

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Acronyms

AIIR	Air-borne infection isolation room
BSI	Body substance isolation
CDC	Centers for Disease Control and Prevention
FCT	Federal Capital Territory
FCTA	Federal Capital Territory Administration
FMOH	Federal Ministry of Health
HCWs	Health care workers
HBV	Hepatitis B virus
HBeAg	Hepatitis Be antigen
HBIG	Hepatitis B immune globulin
HCV	Hepatitis C virus
HHSS	Health and Human Services Secretariat
HIV	Human immunodeficiency virus
ICUs	Intensive care units
IEC	Information, education and communication
IPAC	Infection prevention and control
OSHA	Occupational Safety and Health Administration
PPE	Personal protective equipment
SARS	Severe acute respiratory syndrome
SSA	Sub-Saharan Africa
WHO	World Health Organization

CHAPTER 1

ORIENTATION TO THE STUDY

1.1 INTRODUCTION

Universal precautions are a set of guidelines that aim to protect health care workers (HCWs) from blood-borne infections (Bennett & Mansell 2004: 1017–9). In 1987, the Centers for Disease Control and Prevention (CDC) proposed the concept of “universal precautions” originally designed to protect health care workers from exposure to blood-borne pathogens. In 1996, CDC recommended that universal precautions be renamed standard precautions, which combine the major features of the universal precautions and body substance isolation (BSI). The precautions apply to all body fluids including blood, secretions, and excretions (except sweat) regardless of whether or not they contain visible blood, skin that is not intact, mucous membranes, any unfixed tissue or organ (other than intact skin) from human (living or dead), human immunodeficiency virus (HIV) or hepatitis B virus (HBV) containing culture medium or other solutions (Standard/Universal Precautions 2007).

Under the standard precautions, blood and body fluid of all patients are considered potentially infectious for HIV, HBV and other blood-borne pathogens. Standard precautions is regarded as an effective means of protecting HCWs, patients, and the public, thus reducing hospital acquired infections (Wang, Fennie, Burgess & Williams 2003:187–194). Standard precautions are designed to prevent health care workers from being exposed to potentially infected blood and body fluid by applying the fundamental principles of infection control, through hand washing, utilization of appropriate protective barriers such as gloves, mask, gown, and eye wear (Motamed, BabMahmoodi, Khalilian, Peykanheirati & Nozari 2006:1205). In addition, the standard precautions stipulate that HCWs take precautions to prevent injuries caused by needles, scalpels, and other sharp instruments or devices during procedures and disposal (CDC 1996).

1.2 BACKGROUND INFORMATION ABOUT THE RESEARCH PROBLEM

1.2.1 The source of the research problem

Standard precautions are practiced in high-income countries to protect HCWs from occupational exposure to blood and the consequent risk of infection with blood-borne pathogens. The situation is different in low-income countries, where standard precautions are partially practiced (Kermode, Jolley, Langkham, Thomas, Holmes & Gifford 2005: 27–33).

1.2.2 Background to the research problem

The practice of standard precautions is being widely promoted to protect HCWs from occupational exposure to body fluids and consequent risk of infection with blood-borne pathogens. HCWs are potentially exposed to blood-borne and other infections through contact with body fluids while performing their duties. HCWs frequently provide care to patients whose HBV, HIV and hepatitis C virus (HCV) status is unknown, and individuals may be asymptomatic for months to years while being infectious. The occupational health of the health care workforce of about 35 million people globally, representing about 12% of the working population, has been neglected (Wilburn & Eijkemans 2004: 451). About three million HCWs worldwide receive percutaneous exposure to blood-borne pathogens each year. These injuries may result in 15,000 HCV, 70,000 HBV and 500 HIV infections, and more than 90% of these infections occur in developing countries. Worldwide, about 40% of HBV and HCV infections and 2.5% of HIV infections in HCWs are attributable to occupational sharps exposures, which are mainly preventable (WHO 2002: 74). The health consequences of these infections are enormous. For instance, about 60–85% of HCV infections result in chronic liver disease and a risk for liver cirrhosis and liver cancer (CDC 1998: 1–39).

The Occupational Safety and Health Administration (2002) estimates that 5.6 million HCWs worldwide, who handle sharp devices, are at risk of occupational exposure to blood-borne pathogens. Needle stick injuries were shown to be the commonest (75.6%) mechanism for occupational exposure in a Nigerian teaching hospital (Orji, Fasubaa & Onwudiegwu 2002:75–78). These injuries are usually under-reported for so many reasons, which include stigma that could be associated with an eventual infection with HIV in the

affected HCW. There is no immunization for HIV and HCV, thus the most effective prevention is through regular practice of the standard precautions.

1.3 RESEARCH PROBLEM

Compliance to standard precautions is low in public secondary health facilities, especially in resource-limited settings, thus exposing HCWs to the risk of infection. Occupational safety of HCWs is often neglected in low-income countries in spite of the greater risk of infection due to higher disease prevalence, low level awareness of the risks associated with occupational exposure to blood, inadequate supply of personal protective equipment (PPE), and limited organizational support for safe practices (Sagoe-Moses, Pearson, Perry & Jagger 2001: 538–41). Blood and other body fluids from patients are becoming increasingly hazardous to those who provide care for them. There is therefore a need for adequate measures to ensure compliance to standard precautions and reduce the risk of infection among HCWs (Bamigboye & Adesanya 2006: 112–116).

1.4 AIM OF THE STUDY

1.4.1 Research purpose

The purpose of this research is to determine the knowledge, practice and factors affecting the utilization of standard precautions among health care workers in public secondary health facilities in Abuja, Federal Capital Territory (FCT) of Nigeria.

1.4.2 Research objectives

The research objectives are to:

- assess the knowledge of standard precautions among health care workers in public secondary health facilities in Abuja;
- determine the practice of standard precautions among health care workers in public secondary health facilities in Abuja;
- identify factors affecting the practice of standard precautions among health care workers in public secondary health facilities in Abuja.

1.5 SIGNIFICANCE OF THE STUDY

This study examines the knowledge and practice of standard precautions among two categories of health care workers (doctors and nurses) in secondary health facilities in FCT. It also examines the factors promoting or inhibiting the practice. Findings from the study will be used by the Health and human Services Secretariat (HHSS) of the Federal Capital Territory Administration (FCTA), the hospital management, and other stakeholders in planning and targeting appropriate measures/interventions to improve compliance to standard precautions among health care workers. The health care workers will be the ultimate beneficiary of interventions that will be based on findings from the study.

1.6 DEFINITION OF TERMS

- **Knowledge:** The Oxford Advanced Learners Dictionary (2001: 658) defines knowledge as the information, understanding and skills that one gains through education or experience. It also defines knowledge as the state of knowing about a particular fact or situation. In this study, knowledge refers to the awareness of basic principles of standard precautions.
- **Practice:** Practice is the usual or expected way of doing something in a particular organization or situation (Oxford 2001: 912). In this study, practice refers to the extent that health care workers implement recommended strategies of standard precautions.
- **Standard precautions:** The Centers for Disease Control and Prevention defines standard precautions as a group of infection prevention practices that apply to all patients, regardless of suspected or confirmed infection status, in any setting in which healthcare is delivered. It is based on the assumption that every person is infected or colonized with an organism that could be transmitted in the healthcare setting and thus health care workers need to apply infection control practices during the delivery of health care. The same definition/assumption applies in this study.
- **Nurses:** Nurses are persons whose jobs are to take care of the sick or injured people, usually in a hospital (Oxford Learners Dictionary 2001:801). In this study, nurses refer

to registered nurses and nurse/midwives working in public secondary health facilities in FCT.

- **Doctors:** A doctor is a person who has been trained in medical science and whose job is to treat ill or injured people (Oxford 2001: 343). In this study, doctors refer to graduates of medical schools working as medical practitioners in public secondary health facilities in FCT.
- **Occupational exposure:** Occupational exposure is defined by the Occupational Safety and Health Administration (OSHA) of US Department of Labour as reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties. The same definition applies in this study.
- **Blood-borne infections:** OSHA defines blood-borne infections as infections from pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, HBV and HIV. In this study, blood-borne infections are infections from pathogenic microorganisms that are present in human blood, are capable of causing disease in human, and are predominantly transmitted via blood and blood contact.

1.7 RESEARCH DESIGN AND METHOD

This is a descriptive quantitative cross-sectional study that describes and examines factors associated with the practice of standard precautions. The study population consists of health care workers (doctors, nurses) in public secondary health facilities in FCT, who were sampled using the multistage stratified sampling technique. A structured, pre-coded questionnaire was used to collect data from the respondents.

1.8 LIMITATIONS OF THE STUDY

One limitation of this study was the self-report method of assessment of practice of standard precautions; the level of adherence to standard precautions may have been better assessed by observation, although observation will likely influence normal routines.

Also, some of the information requested in the data collecting tool may be under-reported due to recall bias, but to minimize this limitation, a short period of recall (three months) was requested in the questionnaire.

1.9 STRUCTURE OF THE DISSERTATION

This research report is presented in five chapters: (1) Orientation to the Study, (2) Literature Review, (3) Research Design and Method, (4) Analysis, Presentation and Description of Research Findings, and (5) Conclusions and Recommendations.

Chapter 1: Orientation to the study provides background information (which includes the risk of occupational exposure by HCWs) as well as the aim and significance of the study.

Chapter 2: Literature Review explores the literature, documents and other studies on knowledge and practice of standard precautions by HCWs.

Chapter 3: Research Design and Method explains the methods of data collection, sampling technique, study population, and ethical considerations.

Chapter 4: Analysis, Presentation and Description of Research Findings presents and analyzes the key findings from the study in relation to the background characteristics of the respondents.

Chapter 5: Conclusions and Recommendations summarizes the research findings and makes recommendations, based on the study findings.

1.10 CONCLUSION

Observance of standard precautions is very important in reducing occupational exposure to infectious diseases and the spread of nosocomial infections among patients. The need to improve the practice of standard precautions in low-income countries is more important now than ever, because of the high prevalence of common infectious diseases in these countries. This study examines health care providers' level of knowledge and compliance with standard precautions, with the aim of recommending appropriate interventions to improve compliance. The next chapter presents a review of the literature on standard precautions among HCWs.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Literature review is an insightful analysis and evaluation of each research source as it relates to the objectives of the current study (Baumgartner, Strong & Hensley 2002: 56). A review of related literature helps identify what other researchers have done and reported on the research problem. It also helps identify areas of controversy or disagreement and discover gaps in existing knowledge in the problem area. This chapter presents a review of literature on the knowledge and practice of standard precautions among health care workers from the global, regional and national perspectives.

2.2 PURPOSE OF THE REVIEW

This review was conducted to enable the researcher to gain insight into the research question, verify the significance of the research problem and determine the most appropriate methodology, including the research instrument, for the study (Burns & Grove 2001:111). The review explored reports on the knowledge and practice of standard precautions among health care workers in order to identify information, ideas and methods that are relevant to the present study. It identified findings and views from previous studies in order to provide intellectual context for positioning the study in relation to those other studies. It helped in widening the researcher's knowledge base, increase his depth of knowledge regarding standard precautions, and justify the significance of the study.

2.3 SCOPE OF THE LITERATURE REVIEW

The literature review was guided by the research problem and the research questions. The researcher looked at various reports and studies conducted in different countries as well as in Nigeria, the country of study. The focus of the review was on the knowledge and practice of standard precautions among health care workers in secondary health facilities in the FCT.

2.4 REVIEW OF LITERATURE

The following keywords were used as the topic thrust for the review:

- Standard precautions
- Knowledge of standard precautions
- Practice of standard precautions

2.4.1 Standard Precautions

2.4.1.1 *Historical Background*

The CDC first published a document in 1983 entitled 'Guidelines for Isolation Precautions in Hospital', which contained a section on precautions for blood and body fluids. The section recommended preventive measures to be taken when a patient is known or suspected to be infected with blood-borne pathogens (Garner, Simmons & Williams 1983: A8-8). In 1987, CDC published 'Recommendations for Prevention of HIV Transmission in Healthcare Settings'. In contrast to the 1983 guidelines, the Recommendations suggested that precautions be consistently used for all patients regardless of their blood-borne infection status. This extension became known as the Universal Precautions and it was defined by CDC (1996) as a set of precautions designed to prevent the transmission of HIV, HBV and other blood-borne pathogens when providing first aid or health care. Under the universal precautions, blood and certain body fluids of all patients were considered potentially infectious for HIV, HBV and other blood-borne pathogens. Thus, universal precautions replaced and eliminated the need for the isolation category "blood and body fluid precautions" in the 1983 CDC Guidelines for Isolation Precautions in Hospitals.

Universal precautions was applicable to blood, other body fluids containing visible blood, semen, vaginal secretions, tissues, and the cerebrospinal, synovial, pleural, peritoneal, pericardial, and amniotic fluids. However, the universal precautions did not apply to feces, nasal secretions, sputum, sweat, tears, urine, and vomitus unless they contained visible blood. It did not also apply to saliva except when visibly contaminated with blood or in the dental setting where blood contamination of saliva is predictable (CDC 1996). Universal precautions recommended the use of protective barriers such as gloves, gowns, aprons, masks, or protective eyewear, which can reduce the risk of exposure of the health care worker's skin or mucous membranes to potentially infective materials. It recommended that

all health care workers take precautions to prevent injuries caused by needles, scalpels, and other sharp instruments or devices.

However, additional precautions were needed for diseases transmitted by air and droplet contacts in order to protect health care workers from occupationally acquired pulmonary tuberculosis, severe acute respiratory syndrome (SARS), and, recently, human influenza. These additional precautions included airborne, droplets and contact precautions.

Airborne precautions would reduce the transmission of diseases spread by air. Airborne transmission occurs when droplet nuclei less than 5 micron in size are disseminated in the air for long periods. Diseases spread by this mode include active pulmonary tuberculosis, measles, chickenpox and hemorrhagic fever.

Droplet precautions control the transmission of pneumonias, pertussis, diphtheria, influenza type B, mumps, and meningitis. Droplets transmission occurs when there is adequate contact between the mucous membrane of the nose and mouth or conjunctivae of a susceptible person and large droplets greater than 5 microns (Weinstern, Hierhoizer & Garner 1998: 198).

Percutaneous exposures are the most common routes of exposure to blood-borne pathogens in health care settings. Globally, injections are one of the most common health care procedures and they are often abused. Injection safety practices could significantly reduce occupational risks due to blood-borne pathogens in health care settings. For example, wearing gloves as a protective barrier can reduce the incidence of contamination of the hands but it cannot prevent penetrating injuries caused by needles or other sharp instruments. The CDC (1999) reported that out of 191 health care workers reported to national surveillance in the United States, 55 had reported occupational exposure to HIV, with a baseline negative and subsequent documented seroconversion. Of the 55 health care workers, 47 sustained percutaneous injuries, five had mucocutaneous exposure, and two had both percutaneous and mucocutaneous exposures. In a study conducted by CDC (1997), injections with safety devices reduced injuries by 23%, while the re-use of injection equipment accounted for an estimated 5% of new HIV infections (WHO 2003).

In 1996, CDC published new guidelines, called Standard Precautions, for isolation precautions in hospitals. The standard precautions synthesize the major features of body substance isolation and universal precautions to prevent transmission of a variety of organisms. Standard precautions were developed for use in hospitals and may not necessarily be indicated in other settings where universal precautions are used, such as childcare settings and schools (CDC 1996). Standard precautions is based on the principle that all blood, body fluids, secretions, excretions except sweat, non-intact skin, and mucous membranes may contain transmissible infectious agents. Standard precautions includes a group of infection prevention practices that apply to all patients regardless of whether they have suspected or confirmed infection status in any setting in which healthcare is delivered. These practices include hand hygiene, use of gloves, gown, mask, eye protection or face shield (depending on the anticipated exposure), and safe injection practices. In addition, equipment or items in the patient's environment likely to have been contaminated with infectious body fluids must be handled in a manner to prevent the transmission of infectious agents.

The application of standard precautions during patient care is determined by the nature of the health care worker-patient interaction and the extent of anticipated blood, body fluid, or pathogen exposure. For some interactions, e.g. performing venipuncture, only gloves may be needed, but for others, e.g. intubations, use of gloves, gown, and face shield or mask and goggles is necessary. Standard precautions are also intended to protect the patient by ensuring that healthcare personnel do not transmit infectious agents to patients through their hands or equipment during patient care (Siegel, Rhinehart, Jackson, Chiarelo and the Health Infection Control Practices Advisory Committee 2007: 13).

Identification of patients infected with blood-borne pathogens cannot be reliably made through medical history and physical examination, and it is not feasible or cost-effective to test all patients for all pathogens prior to giving care. Standard precautions are therefore recommended for use on all patients regardless of diagnosis and treatment setting. Decision regarding the level of precautions to use will depend on the nature of the procedure and not on the actual or assumed serological status of the patient. It is not safe to take precautions only with people from so-called "high-risk groups" because many

people belonging to such groups may not necessarily be infected while many infected people may not even be from the high-risk groups.

2.4.1.2 *Components of the Standard Precautions*

The infection control problems that emerge during outbreak investigations often indicate the need for new recommendations or reinforcement of existing infection control recommendations to protect patients. Because such recommendations are considered a standard of care and may not be included in other guidelines, they are usually added to the standard precautions. Three such areas of practice that have been added are respiratory hygiene/cough etiquette, safe injection practices and use of masks for the insertion of catheters or injection of material into spinal or epidural spaces via lumbar puncture (e.g. myelogram, spinal or epidural anesthesia) (Siegel et al 2007: 67).

The transmission of SARS-CoV in emergency departments by patients and their family members during the widespread of SARS outbreaks in 2003 highlighted the need for vigilance and prompt implementation of infection control measures at the first point of encounter within a healthcare setting (e.g. reception and triage areas in emergency departments, outpatient clinics, and physician offices). The strategy proposed has been termed respiratory hygiene/cough etiquette and it is intended to be incorporated into infection control practices as a new component of standard precautions. The strategy is targeted at patients and accompanying family members and friends with undiagnosed transmissible respiratory infections, and applies to any person with signs of illness including cough, congestion, rhinorrhea, or increased production of respiratory secretions when entering a healthcare facility. The elements of respiratory hygiene/cough etiquette include:

- education of healthcare facility staff, patients and visitors;
- posted signs in language(s) appropriate to the population served, with instructions to patients and accompanying family members or friends;
- source control measures (e.g. covering the mouth/nose with a tissue when coughing and prompt disposal of used tissues, using surgical masks on the coughing person when tolerated and appropriate);
- hand hygiene after contact with respiratory secretions; and

- spatial separation, ideally more than three feet, of persons with respiratory infections in common waiting areas when possible. Covering sneezes and coughs and placing masks on coughing patients are proven means of source containment that prevent infected persons from dispersing respiratory secretions into the air (Siegel et al 2007: 68).

Masking may be difficult in some settings, e.g. pediatrics, in which case emphasis by necessity may be on cough etiquette. Physical proximity of less than 3 feet has been associated with an increased risk for transmission of infections via the droplet route, e.g. *N. meningitidis* and group A *Streptococcus*, and therefore supports the practice of distancing infected persons from others who are not infected. The measures stated above should be effective in decreasing the risk of transmission of pathogens contained in large respiratory droplets, e.g. influenza virus, adenovirus, *Bordetella pertussis* and *Mycoplasma pneumoniae*. Healthcare personnel are advised to observe droplet precautions, i.e. wear a mask, and hand hygiene when examining and caring for patients with signs and symptoms of a respiratory infection. Healthcare personnel who have a respiratory infection are advised to avoid direct contact with patients, especially with high-risk patients. If this is not possible, then a mask should be worn while providing patient care (CDC 2007).

2.4.1.3 *Elements of the Standard Precautions*

Health care workers should assume that every person is potentially infected or colonized with an organism that could be transmitted in the healthcare setting and, therefore, should apply the following infection control practices while delivering health care (CDC 2007).

2.4.1.3.1. *Hand Hygiene*

This has been cited frequently as the most important practice in reducing the transmission of infectious agents in health care settings and it is an essential element of the standard precautions. Hand hygiene includes hand washing with both plain or antiseptic-containing soap and water and the use of alcohol based products (gels, foams or rinses), which do not require the use of water (Siegel et al 2007: 49). Hand hygiene involves:

- avoiding unnecessary touching of surfaces that are close to the patient to prevent contamination of clean hands by environmental surfaces and transmission of pathogens from contaminated hands to surfaces;
- hand washing with either a non-antimicrobial soap and water or an antimicrobial soap and water when hands are visibly dirty, contaminated with proteinaceous material, or visibly soiled with blood or body fluids;
- decontaminating hands in the clinical situations described above if hands are not visibly soiled, or after removing visible material with non-antimicrobial soap and water. The preferred method of hand decontamination is the use of an alcohol-based hand rub, but, alternatively, hands may be washed with an antimicrobial soap and water. However, frequent use of alcohol-based hand rub immediately following hand washing with non-antimicrobial soap may increase the frequency of dermatitis.

Hand hygiene should be performed:

- before having direct contact with patients;
- after having contact with blood, body fluids, excretions, mucous membranes, non-intact skin, or wound dressings;
- after contact with a patient's intact skin, e.g., when taking pulse or blood pressure or lifting a patient;
- if hands will be moving from a contaminated-body site to a clean-body site during patient care;
- after contact with inanimate objects (including medical equipment) in the immediate vicinity of the patient; and
- after removing gloves.

Hand washing with non-antimicrobial soap and water or with antimicrobial soap and water is recommended if contact with spores, e.g. *Clostridium difficile* or *Bacillus anthracis*, is likely to have occurred. The physical action of washing and rinsing hands under such circumstances is recommended because alcohols, chlorhexidine, iodophors, and other antiseptic agents have poor activity against spores. Artificial fingernails or extenders should not be worn if duties include direct contact with patients at high risk for infection and

associated adverse outcomes, e.g. those in intensive care units (ICUs) or operating rooms (Siegel et al 2007: 49). Organizational policy should be developed on the wearing of non-natural nails by healthcare personnel who have direct contact with patients outside of the groups specified above.

2.4.1.3.2. *Personal Protective Equipment*

Personal Protective Equipment refers to a variety of barriers used alone or in combination to protect mucous membrane airways, skin and clothings from contact with infectious agents. The selection of PPE depends on the nature of patient interaction and/or the likely mode(s) of transmission (Siegel et al 2007: 49). The following principles of use should be observed:

- PPE should be worn when the nature of the anticipated patient interaction indicates that contact with blood or body fluids may occur.
- Prevent contamination of clothing and skin during the process of removing PPE.
- PPE should be removed and discarded before leaving the patient's room or cubicle.

The following PPE are recommended for implementing standard precautions:

- *Gloves*

Under standard precautions, gloves should be worn when it can be reasonably anticipated that contact with blood or other potentially infectious materials, mucous membranes, non-intact skin, or potentially contaminated intact skin, e.g. of a patient incontinent of stool or urine, could occur. Gloves with fit and durability appropriate to the task should be used. Disposable medical examination gloves should be worn for providing direct patient care such as wound dressing, phlebotomy, setting intravenous infusion, etc.

For cleaning the environment or medical equipment, disposable medical examination gloves or re-usable utility gloves should be worn. Gloves should be removed after contact with a patient and/or the surrounding environment (including medical equipment) using proper techniques to prevent hand contamination. The same pair of gloves should not be

worn for the care of more than one patient and gloves should not be re-used, because this practice has been associated with the transmission of pathogens.

Gloves should be changed during patient care if the hands will move from a contaminated body site, e.g. perineal area, to a clean body site, e.g. face (Siegel et al 2007: 50).

- *Gowns*

Gowns should be appropriate for protecting the skin and preventing soiling or contamination of clothing during procedures and patient care when contact with blood, body fluids, secretions, or excretions is anticipated. A gown should be worn for direct patient contact if the patient has uncontained secretions or excretions and it should be removed and hand hygiene performed before leaving the patient's environment. Gowns should not be re-used even for repeated contacts with the same patient. Routine donning of gowns upon entrance into a high-risk unit, e.g. intensive care unit, is not indicated (Siegel et al 2007: 51).

- *Mouth, Nose, and Eye Protection*

PPE should be used to protect the mucous membranes of the eyes, nose and mouth during procedures and patient care activities that are likely to generate splashes or sprays of blood, body fluids, secretions and excretions. Select masks, goggles, face shields, and combinations of each according to the need anticipated by the task to be performed.

A face shield that fully covers the front and sides of the face or a mask and goggles (in addition to gloves and gown) should be worn during aerosol-generating procedures, e.g. bronchoscopy, suctioning of the respiratory tract (if not using in-line suction catheters), and endotracheal intubation in patients who are not suspected of being infected with an agent for which respiratory protection is otherwise recommended, e.g. *M. tuberculosis*, SARS or hemorrhagic fever viruses.

2.4.1.3.3 *Respiratory Hygiene/Cough Etiquette*

Healthcare personnel should be educated on the importance of source control measures in containing respiratory secretions to prevent droplet and fomite transmission of respiratory

pathogens, especially during seasonal outbreaks of viral respiratory tract infections in communities, e.g. influenza, adenovirus, parainfluenza virus.

The following measures should be implemented to contain respiratory secretions in patients and accompanying individuals who have signs and symptoms of a respiratory infection, beginning at the point of initial encounter in a healthcare setting, e.g. triage, reception, and waiting areas in emergency departments, outpatient clinics, and physician offices:

- Post signs at entrances and in strategic places, e.g. elevators and cafeterias, within ambulatory and in-patient settings with instructions to patients and other persons with symptoms of a respiratory infection to cover their mouth/nose when coughing or sneezing, use and dispose of tissues, and perform hand hygiene after hands have been in contact with respiratory secretions.
- Provide tissues and no-touch receptacles, e.g. foot pedal operated lid or open and plastic-lined waste basket, for disposal of tissues.
- Provide resources and instructions for performing hand hygiene in or near waiting areas in ambulatory and in-patient settings; provide conveniently located dispensers of alcohol-based hand rubs and, where sinks are available, supplies for hand washing.
- During periods of increased prevalence of respiratory infections in the community, e.g. as indicated by increased school absenteeism, increased number of patients seeking care for a respiratory infection, offer masks to coughing patients and other symptomatic persons, e.g. persons who accompany ill patients, upon entry into the facility or medical office and encourage them to maintain special separation, ideally a distance of at least 3 feet from others in common waiting areas. Some facilities may find it logistically easier to institute this recommendation year round as a standard of practice (Siegel et al 2007: 80).

2.4.1.3.4 Patient Placement

The potential for transmitting infectious agents should be included in patient placement decisions. Patients who pose a risk for transmission to others, e.g. uncontained secretions,

excretions or wound drainage and infants with suspected viral respiratory or gastrointestinal infections, should be placed in a single-patient room when available.

Patient placement should be based on the following principles:

- Route(s) of transmission of the known or suspected infectious agent
- Risk factors for transmission in the infected patient
- Risk factors for adverse outcomes resulting from a hospital acquired infection (HAI) in other patients in the area or room being considered for patient placement
- Availability of single-patient rooms
- Patient options for room sharing, e.g., cohort patients with the same infection (Siegel et al 2007: 81).

2.4.1.3.5 Patient Care Equipment and Instruments/Devices

Policies and procedures should be established for containing, transporting, and handling patient care equipment and instruments/devices that may be contaminated with blood or body fluids. Organic materials should be removed from critical and semi-critical instruments/devices using recommended cleaning agents before high-level disinfection and sterilization to enable effective disinfection and sterilization processes (Siegel et al 2007: 81).

PPE should be used according to the level of anticipated contamination when handling patient care equipment and instruments/devices that are visibly soiled or may have been in contact with blood or body fluids (Siegel et al 2007: 81).

2.4.1.3.6 Care of the Environment

Policies and procedures should be established for routine and targeted cleaning of environmental surfaces as indicated by the level of patient contact and degree of soiling. Surfaces that are likely to be contaminated with pathogens should be cleaned and disinfected more frequently, including those surfaces that are close to the patient (e.g. bed rails, over bed tables) and frequently touched in the patient care environment (e.g. door

knobs, surfaces in and surrounding toilets in patient rooms), compared to other surfaces (e.g. horizontal surfaces in waiting rooms).

The efficacy of in-use disinfectants should be reviewed when evidence of continuing transmission of an infectious agent (e.g. rotavirus, *C. difficile*, norovirus) may indicate resistance to the in-use product and change to a more effective disinfectant as indicated.

In facilities that provide health care to pediatric patients or have waiting areas with child play toys, e.g. obstetric/gynecology offices and clinics, policies and procedures should be established for cleaning and disinfecting toys at regular intervals. Use the following principles in developing such policy and procedures:

- Select play toys that can be easily cleaned and disinfected.
- Do not permit use of stuffed furry toys if they will be shared.
- Clean and disinfect large stationary toys (e.g. climbing equipment) at least once a week and whenever visibly soiled.
- If toys are likely to be mouthed, rinse with water after disinfection or wash in a dishwasher.
- When a toy requires cleaning and disinfection, do so immediately or store in a designated labeled container separate from toys that are clean and ready for use.

Multi-use electronic equipment should be included in policies and procedures for preventing contamination and for cleaning and disinfection, especially those items that are used by patients, those used during delivery of patient care, and mobile devices that are moved in and out of patient rooms frequently (Siegel et al 2007: 82).

2.4.1.3.7 *Textiles and Laundry*

Used textiles and fabrics should be handled with minimum agitation to avoid contamination of air, surfaces and persons. If laundry chutes are used, ensure that they are properly designed, maintained, and used in a manner to minimize dispersion of aerosols from contaminated laundry (Siegel et al 2007: 82).

2.4.1.3.8 *Safe Injection Practices*

The following recommendations apply to the use of needles, cannulas that replace needles, and, where applicable, intravenous delivery systems.

- Use aseptic technique to avoid contamination of sterile injection equipment.
- Do not administer medications from a syringe to multiple patients, even if the needle or cannula on the syringe is changed. Needles, cannulae, and syringes are sterile, single-use items; they should neither be re-used for another patient nor allowed to contact a medication or solution that might be used for another patient.
- Fluid infusion and administration sets, i.e. intravenous bags, tubing and connectors, should be used for one patient only and disposed appropriately after use. Consider a syringe or needle/cannula contaminated once it has been used to enter or connect to a patient's intravenous infusion bag or administration set.
- Use single-dose vials for parenteral medications whenever possible.
- Do not administer medications from single-dose vials or ampoules to multiple patients and do not combine leftover contents for later use.
- If you must use multidose vials, both the needle or cannula and syringe used to access the multidose vial must be sterile.
- Do not keep multidose vials in the immediate patient treatment area; store in accordance with the manufacturer's recommendations and discard if sterility is compromised or questionable.
- Do not use bags or bottles of intravenous solution as a common source of supply for multiple patients (Siegel et al 2007: 83).

2.4.1.3.9 *Infection Control Practices for Special Lumbar Puncture Procedures*

Always wear a surgical mask when placing a catheter or injecting material into the spinal canal or subdural space, i.e. during myelograms, lumbar puncture and spinal or epidural anesthesia (Siegel et al 2007: 83).

2.4.1.4 *Transmission-based Precautions*

Transmission-based precautions are for patients documented or suspected to be infected with highly transmissible or epidemiologically important pathogens, for which additional precautions beyond the standard precautions are needed to interrupt transmission in hospitals. There are three types of transmission-based precautions: air-borne precautions, droplet precautions, and contact precautions. They may be combined for diseases that have multiple routes of transmission and when used either singularly or in combination, they should be used in addition to the standard precautions. Transmission-based precautions remain in effect for a limited period, i.e. while the risk of transmission persists or for the duration of the illness, then they are discontinued. The duration for most infectious diseases reflects known patterns of persistence and shedding of infectious agents associated with the natural history of the infectious process and treatment (Siegel et al 2007: 72).

Air-borne precautions are to reduce the risk of air transmission of infectious agents. Air transmission occurs through the dissemination of either air-borne droplet nuclei (small-particle residues {5 µm or smaller} of evaporated droplets that may remain suspended in the air for long periods) or dust particles containing the infectious agent. Microorganisms carried in this manner can be dispersed widely by air currents and may become inhaled by or deposited on a susceptible host within the same room or over a longer distance from the source patient, depending on environmental factors. Therefore, special air handling and ventilation are required to prevent air transmission.

Air-borne precautions apply to patients known or suspected to be infected with epidemiologically important pathogens that can be transmitted by air, such as *M. tuberculosis*, measles, chickenpox, and disseminated herpes zoster. In acute care hospital and long-term setting, it involves placement of the patient in an air-borne infection isolation room (AIIR). AIIR is a single-patient room that is equipped with special air handling and ventilation capacity that meet the required standards, i.e. monitored negative pressure relative to the surrounding area, 12 air exchanges per hour for new construction and renovation and 6 air exchanges per hour for existing facilities, and air exhausted directly to the outside. In the event of an outbreak or exposure involving large number of patients who require air-borne precautions, it also involves placing together (cohorting) patients

who are presumed to have the same infection (based on clinical presentation and diagnosis when known) in areas of the facility that are away from other patients, especially patients who are at increased risk for infection (e.g. immunocompromised patients). Again, air-borne precautions can be applied in this setting using temporary portable solutions, e.g. exhaust fan, to create a negative pressure environment in the converted area of the facility and discharging air directly to the outside, away from people and air intakes (Siegel et al 2007: 71).

In ambulatory setting, air-borne precautions include developing systems, e.g. triage, and signage, to identify patients with known or suspected infections that require air-borne precautions upon entry into ambulatory settings. Place the patient in an AIIR as soon as possible. If an AIIR is not available, place a surgical mask on the patient and place him/her in an examination room. Once the patient leaves, the room should remain vacant for the appropriate time, generally one hour, to allow full exchange of air. Instruct patients with a known or suspected air-borne infection to wear a surgical mask and observe respiratory hygiene/cough etiquette. Once in an AIIR, the mask may be removed but should remain on if the patient is not in an AIIR (Siegel et al 2007: 88).

Droplet precautions are to reduce the risk of droplet transmission of infectious agents. Droplet transmission involves contact of the conjunctivae or the mucous membranes of the nose or mouth of a susceptible person with large-particle droplets (larger than 5 μm) containing microorganisms generated from a person who has a clinical disease or who is a carrier of the microorganism. Droplets are generated from the source person primarily during coughing, sneezing, or talking and while performing certain procedures such as suctioning and bronchoscopy. Transmission via large-particle droplets requires close contact between the source and recipient persons, because droplets do not remain suspended in the air and generally travel only short distances, usually 3 ft or less, through the air. Because droplets do not remain suspended in the air, special air handling and ventilation are not required to prevent droplet transmission.

Droplet precautions apply to any patient known or suspected to be infected with epidemiologically important pathogens that can be transmitted by infectious droplets, e.g. *B. pertussis*, influenza virus, adenovirus, rhinovirus, *N. meningitides*, etc. A single patient

room is preferred for patients who require droplet precautions. When a single-patient room is not available, consultation with infection control personnel is recommended to assess the risks associated with other patient placement options, e.g. cohorting or keeping the patient with an existing roommate. Spatial separation of patients by > 3 feet and drawing the curtain between patient beds is especially important for patients in multi-bed rooms with infections transmitted through droplets. Healthcare personnel should wear a mask for close contact with infectious patients upon entry into the room. Patients on droplet precautions who must be transported outside of the room should wear a mask if tolerated and they should observe respiratory hygiene/cough etiquette.

Contact precautions are to reduce the risk of transmitting epidemiologically important microorganisms through direct or indirect contact. Direct contact transmission involves skin-to-skin contact and physical transfer of microorganisms to a susceptible host from an infected or colonized person. This occurs when personnel turn patients, bathe patients, or perform other patient care activities that require physical contact. Direct contact transmission can also occur between two patients, e.g. through hand contact, with one serving as the source of infectious microorganisms and the other as a susceptible host (Siegel et al 2007: 70).

Indirect contact transmission involves contact of a susceptible host with a contaminated intermediate object, usually inanimate, in the patient's environment. Contact precautions apply to specified patients known or suspected to be infected or colonized (presence of microorganism in or on patient but without clinical signs and symptoms of infection) with epidemiologically important microorganisms that can be transmitted through direct or indirect contact. Contact precautions also apply where the presence of excessive wound drainage, fecal incontinence, or other discharges from the body suggest an increased potential for extensive environmental contamination and risk of transmission. A single patient room is preferred for patients who require contact precautions. In multi-patient rooms, place together in the same room (cohort) patients who are infected or colonized with the same pathogen and are suitable roommates. Ensure more than 3 feet spatial separation between beds and draw the privacy curtain between beds to minimize opportunities for direct contact and reduce opportunities for inadvertent sharing of items between the infected/colonized patient and other patients. Healthcare personnel caring for

patients on contact precautions should wear a gown and gloves for all interactions that may involve contact with the patient or potentially contaminated areas in the patient's environment. Don PPE before entering and discard before exiting the patient room to contain pathogens, especially those that have been implicated in transmission through environmental contamination (Siegel et al 2007: 72).

2.4.1.5 Common Infections Transmissible through Occupational Exposure

Three common infectious pathogens known to be transmissible through occupational exposure are HBV, HCV and HIV. The risk of transmission of these pathogens to health care workers depends on the prevalence of the disease in the patient population as well as the nature and frequency of exposures. Transmission of HBV, HCV and HIV can occur through occupational exposure due to percutaneous injury (needle stick or other sharps injury), mucocutaneous exposure (splash of blood or other body fluids into the eye, mouth or nose), or blood contact with non-intact skin. However, percutaneous injury, precisely needle stick injury, is the most common form of occupational exposure and the most likely to result in infection. Among 35 million health care workers worldwide, about 3 million experience percutaneous exposure to blood-borne pathogens each year; 2 million to HBV, 0.9 million to HCV and 750,000 to HIV. These injuries may result in 15,000 HCV, 70,000 HBV and 1000 HIV infections and more than 90% of these infections occur in developing countries (WHO 2003).

2.4.1.5.1 Hepatitis B Virus (HBV) Infection

HBV infection is a major infectious hazard for health care workers, and 5-10% of HBV-infected workers become chronically infected. Persons with chronic HBV infection are at risk for chronic liver disease (i.e. chronic active hepatitis, cirrhosis and primary hepatocellular carcinoma) and are potentially infectious throughout their lifetime (CDC 1997: 3). The risk of HBV infection is primarily related to the degree of contact with blood in the workplace and to the hepatitis Be antigen (HBeAg) status of the source person (CDC 2001: 3-4). The risk of acquiring HBV infection from occupational exposure depends on the frequency of percutaneous and permucosal exposures to blood or body fluids containing blood (Thomas, Factor, & Gabon, 1993: 1705). Although percutaneous injuries are among the most efficient modes of HBV transmission, percutaneous exposures probably account for only a minority of HBV infections among HCWs.

In several investigations of nosocomial hepatitis B outbreaks, most infected HCWs could not recall an overt percutaneous injury (Garibaldi, Hatch Bisno, Hatch, & Greg, 1972: 963-6). However, in some studies, up to one-third of infected HCWs recalled caring for a patient who was HBsAg-positive (Callender, White, Williams, 1982: 324). In addition, HBV has been demonstrated to survive in dried blood at room temperature on environmental surface for at least one week. Thus, HBV infections that occur in HCWs with no history of non-occupational exposure or occupational percutaneous injury might have resulted from direct or indirect blood or body fluid exposures that inoculated HBV into cutaneous scratches, abrasions, burns, other lesions, or mucosal surfaces (Francis, Favero, & Maynard, 1981: 27- 32; Lauer, VanDrunen, Washburn, & Balfour, 1979: 513).

Blood contains the highest HBV titers of all body fluids and it is the most important medium of transmission in the healthcare setting. HBsAg is also found in several other body fluids, including breast milk, bile, cerebrospinal fluid, feces, nasopharyngeal washings, saliva, semen, sweat and synovial fluids (Bond, Peterson, & Favero, 1977: 235- 52). However, the concentration of HBsAg in the body fluid can be 100-1000 folds higher than the concentration of infectious HBV particles. Therefore, most body fluids are not efficient vehicles of transmission because they contain low quantities of infectious HBV, despite the presence of HBsAg. Because of the high risk of HBV infection among HCWs, routine pre-exposure vaccination of HCWs against hepatitis B and the use of standard precautions to prevent exposure to blood and other potentially infectious body fluids have been recommended since 1980s (CDC 1982: 317).

2.4.1.5.2 Hepatitis C Virus (HCV) Infection

Hepatitis C virus is one of the hepatitis agents known to be transmitted through blood and blood products. HCV has been implicated as a major cause of chronic liver disease and hepatocellular carcinoma worldwide, but the risk of occupational transmission of HCV is low. The average incidence of anti-HCV seroconversion after accidental percutaneous exposure from an HCV positive source is 1.8% (range 0–7%) (Lamphear, Linnemann, Cannon, DeRonde, Pandy, & Kerley, 1994: 745). One study showed that transmission occurred only from hollow-bore needles (Puro, Petrosillo & Ippollito, 1995: 273). Transmission in HCWs rarely occurs from mucous membrane exposures to blood; no transmission in HCWs has been documented from intact or non-intact skin exposures to

blood (CDC 2001:6). A prevalence of 6% HCV infection has been reported among healthy blood donors in a Nigerian population in Jos (Egah, Madong, Iya, Gomwalk, Audu, Banwat, & Orile, 2004: 35). The highest prevalence of 12.3% of hepatitis C antibody so far reported among volunteer blood donors in Nigeria was in a study conducted at the University of Benin Teaching Hospital (Halim, & Ajayi, 2000: 410). The disease prevalence in a population is one of the determinants of the risk of infection transmission among HCWs. There is therefore a need to pay attention to HCV infection among HCWs in Nigeria.

2.4.1.5.3 Human Immunodeficiency Virus

The seroprevalence of HIV varies widely from country to country and from one region to another within the same country. Sub-Saharan Africa (SSA) has the highest HIV seroprevalence in the world. The 2005 sero-sentinel survey conducted in Nigeria reported an overall HIV seroprevalence of 4.4% (Federal Ministry of Health 2006:13). This high prevalence in the country poses an occupational risk to HCWs. The average risk of HIV transmission after percutaneous exposure to HIV infected blood has been estimated to be approximately 0.3% (Bell, 1997: 9) and after a mucous membrane exposure approximately 0.09% (Ippolito, Puro, & DeCarli, 1993: 1451-8). Cases of HIV transmission after non-intact skin exposure have been documented (CDC 1997: 285).

Various studies suggest that several factors may influence the risk of HIV transmission after occupational exposure. In a retrospective study of HCWs who had percutaneous exposure to HIV, the risk for HIV infection was found to be increased with exposure to a larger quantity of blood from the source person. A needle that was visibly contaminated with the patient's blood was placed directly in a vein or artery (Cardo, Culver, & Ciesielski, 1997: 1485-90).

2.4.1.6 Post-exposure Management

Exposure prevention by adhering to standard precautions remains the primary strategy for the prevention of infections due to occupational exposure. Nevertheless, occupational exposure sometimes occurs; therefore, appropriate post-exposure management is important for workplace safety. Health care facilities should make available a system that includes written protocols for prompt reporting, evaluation, counseling, and treatment as

well as follow-up of occupational exposures that might place HCWs at risk for acquiring infections. Again, HCWs should be educated on the risk for and prevention of infections, including the need to be vaccinated against hepatitis B (CDC 1989; CDC 1991; Garner, 1996: 54).

2.4.1.6.1 Post-exposure Prophylaxis for HIV

Post-exposure prophylaxis is an important part of post-exposure management. PEP for HIV involves initiation of antiretroviral regimen as soon as possible preferably within hours rather than days of exposure. The recommended PEP regimen involves the use of two or three antiretroviral agents, depending on the level of risk for HIV transmission represented by the exposure. If PEP is offered and taken and the source is later determined to be HIV negative, PEP should be discontinued. However, concerns have been expressed regarding HIV negative sources being in window period for conversion (CDC 2005: 2-11).

2.4.1.6.2 Post-exposure Prophylaxis for HBV Infection

Post-exposure prophylaxis for HBV infection involves the combination of hepatitis B immune globulin (HBIG) and hepatitis B vaccine. For perinatal exposure to an HBsAg, HBeAg positive mother, a regimen combining HBIG and initiation of the hepatitis B vaccine series at birth is 85–95% effective in preventing HBV infection. In the occupational setting, multiple doses of HBIG initiated within one week following percutaneous exposure to HBsAg positive blood will provide an estimated 75% protection from HBV infection (CDC 2001:4).

Ensure access to clinicians who can provide post-exposure care during all working hours including nights and weekends. HBIG, hepatitis vaccine, and antiretroviral drugs for HIV post-exposure prophylaxis should be made available for timely administration (either by providing access on-site or by creating linkages with other facilities or providers). Persons responsible for providing post-exposure management should be familiar with the evaluation, treatment protocols, and facility plan for accessing HBIG, hepatitis B vaccine and antiretroviral drugs for HIV PEP. All HCWs should be educated to report occupational exposures immediately after they occur, particularly because HBIG, hepatitis B vaccine and HIV PEP are most likely to be effective if administered as soon as possible after exposure. HCWs that are at risk of occupational exposure to infective organisms should be

familiar with the principles of post-exposure management as part of their job orientation and ongoing job training (CDC 2001: 16).

2.4.1.7 Immunization

Because of their contact with patients or infective materials from patients, many HCWs are at risk of exposure and possible transmission of some vaccine-preventable diseases. Maintenance of immunity is therefore an essential part of prevention and infection control programs for HCWs. Optimal use of immunizing agents safeguards the health of workers and protects patients from becoming infected through exposure to infected workers. Consistent immunization program could substantially reduce both the number of susceptible HCWs in hospitals and attendant risk of transmitting vaccine-preventable diseases to other workers and patients. Any medical facility that provides direct patient care is encouraged to formulate a comprehensive immunization policy for all health care workers (CDC 1997: 1). On the basis of documented nosocomial transmission, HCWs are considered to be at significant risk of acquiring or transmitting hepatitis B, influenza, measles, mumps, rubella, and varicella, all of which are vaccine-preventable and for which immunization is strongly recommended (CDC 1997: 3).

2.4.2 Knowledge of Standard Precautions

Knowledge refers to a recall of information and it is a pre-requisite to appropriate behavioral change. It is the most important tool for effecting behaviour change (Gbefwi 2004: 36). The linkage between knowledge and behaviour has been stated in the cognitive behaviour theory, which states that behaviour is mediated through cognition and that knowledge is necessary but not sufficient to produce behaviour change (Glanz & Rimer 2001:16; National Cancer Institute 2005: 12). This section reviews available literature on the knowledge of health care workers of standard precautions.

A study to assess the knowledge and compliance with universal precautions and their perceived risk of infection at the workplace in Ibadan, showed poor knowledge of and compliance with standard precautions. Some 77.5% of the respondents were aware but only 24% had the correct knowledge of the universal precautions. Knowledge was highest (36.9%) among surgical and medical residents; it was 10.8% among laboratory medicine residents and 15.4% among interns. Significantly, senior registrars had better knowledge

than junior doctors (Kolude, Omokhodion & Owoaje 2004). A similar study was conducted in Ile-Ife, Nigeria, on the knowledge and practice of universal precautions among qualifying medical and nursing students. Out of 129 students consisting of 103 medical students and 26 nursing students, 83 (64.3%) were familiar with the concept of universal precautions. There was a higher level of knowledge among nursing students (77%) than among medical students (61%). Knowledge of what constitutes the universal precautions was low among the students. Only 38.8% had good knowledge of the precautionary measures. Prevalence of needle stick injury was high (41.8% of total population) among the study population; 39.8% among medical students and 50% among nursing students (Bamigboye & Adesanya 2006: 112-116). This high prevalence of needle stick injury is an evidence of poor adherence to standard precautions.

In another study on knowledge, attitude and practices among health care workers (nurses and paramedical staff) in Sharourah, Kingdom of Saudi Arabia, 21% of nurses and 30% of paramedics were unaware that HIV and hepatitis C can be transmitted through needle stick injury. Some 74% of the respondents had a history of needle stick injury, of which only 7% reported the injuries to a doctor for post-exposure prophylaxis. Some 27% used gloves for phlebotomy procedure always and 29% felt that needles could be recapped after use. Only 61% of the respondents were aware of the universal precautions (Alam 2002: 395).

Another study carried out on health care workers from a tertiary hospital and two state government-owned secondary health care hospitals in Ibadan, Nigeria, showed that only the tertiary hospital had a safety policy. Identified barriers to infection control included lack of equipment, inadequate reporting system, and inadequate funding for the workers. The same study showed that 89.1% of the HCWs were routinely in contact with body fluids and blood at work and 82.5% reported ever having an accidental splash with body fluids, with blood being the reported fluid in 69.3% and urine in 50.0% of cases. Laboratory personnel were at greatest risk for contact, followed by surgeons. Needle pricks occurred in 59.8% of cases while medication vials were responsible for 22.2%. Sharp injuries were commonest among surgeons. Up to 90.8% of the workers had ever heard about standard precautions but inadequate fund and equipment hindered them from practicing it (Lawoyin, Stringer, Taines & Oluwatosin 2005).

2.4.3 Practice of Standard Precautions

Health care workers may have similar training but their behavior may vary according to their perception of risk. Some of the reasons health care workers gave for not complying with universal precautions are habit, lack of time, interference with procedures, discomfort with protective equipment, lack of supplies, carelessness, concern for costs, unexpected body fluid contact, and the possibility inciting fear in patients. The universal precautions have been in place since 1987, but there has been extensive documentation of sub-optimal adherence especially in the developing countries. However, non-compliance among health care workers may vary according to workplace setting, whether rural or urban.

A study conducted among health care workers in rural north India, showed low compliance with eye protective wears. A high proportion of health care workers were not complying with needle recapping precautions. The study also showed that compliance with standard precautions was associated with being on the job for a longer period, knowledge of blood-borne pathogen transmission and strong commitment to workplace safety. The study suggested that interventions to improve compliance to standard precautions among health care workers in rural north India should address knowledge and understanding as well as safety measures by the employee's organizations (Kermode, Jolley, Langkham, Thomas, Holmes & Gifford 2005: 27-33).

A related study conducted among health care workers in public and private health care facilities in Abeokuta metropolis in Nigeria showed that about one-third of all respondents always recapped used needles. Use of re-capped needles was highest among doctors but less among trained nurses. Less than two-thirds (63%) of the respondents always used personal protective equipment, but more than half (56.5%) had never worn goggles during deliveries and surgeries. Almost all (94.5%) of the health care workers observed hand washing after handling patients (Sadoh, Fawole, Sadoh, Oladimeji & Sotiloye 2006:722-6).

Odusanya in 2003 conducted a study on awareness and compliance with universal precautions amongst health workers at an emergency medical service in Lagos, Nigeria, and found that the group of health workers had good knowledge about exposure risks at

work but did not translate their knowledge into safe work practices. Only 42% of the respondents complied with the universal precautions.

2.5 CONCLUSION

Literature on the knowledge and practice of standard precautions among health care workers were reviewed to provide insight to this study. The review has revealed that occupational exposure with its attendant consequences is real and that adherence to standard precautions is low among health care workers. Commitment to workplace safety and provision of the required materials such PPE, in addition to the knowledge of standard precautions, is necessary for HCWs to practice the standard precautions. Guided by findings from this review, research on the knowledge and practice of standard precautions among health care workers in secondary health facilities in FCT Abuja was designed with appropriate methodology. The next chapter presents the research methodology, including the processes used for sampling, data collection, analysis, and ethical approval.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

This chapter presents the design and methodology used for the research project. A research design is a plan of how a researcher intends to conduct the research; it refers to the overall approach or strategy taken (Katzenellenbogen, Joubert & Abdool Karim 1997:64). Research methodology on the other hand provides a description of research participants, research instruments, procedures for administration, data collection and data analysis (Baumgartner, Strong & Hensley 2002: 144).

3.2 RESEARCH DESIGN

Research design is a plan or blueprint of how a researcher intends to conduct the research (Mouton 2001:55). It is about drawing a plan that will be followed during the study in order to answer the research question (Babbie & Mouton 2002: 72). Babbie & Mouton (2001:72) mentioned two major aspects of research design, which will provide a guide to this section. These are:

- a clear specification of what the research intends to find out; and
- determination of the best way to do the research.

Chapter one of this report presents the purpose and objectives of this study and thus addresses the first major aspect of the design. This study is intended to describe the knowledge and practice of standard precautions among health care workers in the Federal Capital Territory of Nigeria. It is non-experimental and quantitative.

Brink (1999:108) states that the purpose of non-experimental research is to describe phenomena and explore the relationship between variables. Data can be collected without making any changes or introducing any treatment. The use of non-experimental research ensures that social processes occurring in natural social settings are observed, which may not be the case with experimental research (Babbie 2001:235). Non-experimental research

was considered suitable for this study because the researcher will collect data without introducing any treatment or changes to the subjects, i.e. the health workers.

Quantitative research is a systematic process of obtaining formal objective data to describe the variables and their relationships. It uses structured tools to generate numerical data and uses statistics to interpret, organize, and represent the collected data (Burns and Grove 2001:30). This research used a structured questionnaire to collect data from the respondents, thus allowing the researcher to ask all respondents the same questions and allowing objective data to be collected throughout the study.

Both descriptive and explorative survey design was used for the study. Descriptive design helps describe a situation, for example, the distribution of an event in a population in relation to specified characteristics. Measurements are done as a single observation (Araoye 2004: 58). In descriptive study the amount (frequency) and distribution (person, place and time) of an event or situation in a population is described. Descriptive study is known for providing information for planning and program implementation as well as for making comparison between groups (Araoye 2004:55). The main use of descriptive studies is in giving service providers and planners information that will help them design services and allocate resources efficiently (Katzenellenbogen, Joubert & Abdool Karim 1997:66). This study describes the knowledge and practice of standard precautions among health care workers in FCT. It makes recommendations based on findings from the survey in order to improve the knowledge and practice of standard precautions among health care workers in Nigeria.

The study design has some advantages. A lot of information can be obtained if the sample is representative of the population and a relatively small number of respondents can give an accurate picture of the population involved. The disadvantage is the difficulty in ascertaining relationships between characteristics and the event under study. However, the timing of major events can be ascertained.

Like descriptive studies, explorative research aims to investigate the nature of the phenomenon in a new area (Polit & Hungler 1999:17–18). This design was applied in this study to describe the knowledge and practice of standard precautions among HCWs. The

study will assist in exploring and identifying factors that promote or inhibit compliance to standard precautions by health workers.

Surveys are the most common type of descriptive research performed in health and human performance. In survey research, opinions or practices are obtained from a sample of people representing a population using interviews or questionnaires. The information thus obtained provides a basis for making comparisons and determining trends. It reveals current weaknesses and/or strengths in a given situation and provides information for decision-making (Baumgartner, Strong & Hensley 2002: 191). One of the strengths of surveys lies in its potential to generalize findings in a sub-group to the general population if appropriate sampling technique was used in combination with a standardized questionnaire (Babbie & Mouton 2001:263; Mouton 2001:153). Babbie and Mouton (2001: 232) maintain that surveys are the best method available to social scientists interested in collecting original data for describing a population too large to be observed directly. In this case, the population of health care workers in Nigeria is too large to be studied directly, thus a representative sample of the population is studied.

A cross-sectional study was adopted for this research among the different types of descriptive studies. Cross-sectional studies involve a single examination like a snapshot of a cross-section of a population at a given time. This study design is appropriate because the purpose of the study was to understand the knowledge and practice of standard precautions among health care workers in order to generate information on how to improve compliance. This descriptive cross-sectional study describes and examines factors associated with the practice of standard precautions.

3.3. RESEARCH METHODS

3.3.1 Population

A population refers to an entire group or aggregate of people having one or more common characteristics. It is the broader group to which findings from the study are generalized (reference population) (Araoye 2004: 115). In this study, the reference population is doctors and nurses in public secondary health facilities in Nigeria.

The study (target) population is a clearly defined group from which the researcher wants to gather information and make conclusions about. This group should be clearly defined in terms of place and time as well as other factors relevant to the study (Katzenellenbogen et al 1997:74). In this study, the target population includes all doctors and nurses working in all the public secondary health facilities in FCT at the time of the study.

Accessible population is the portion of the population that is available to the researcher. This population actually represents the sampling frame, which is the group from which the sample is actually taken (Baumgartner, Strong & Hensley 2002: 126). In this study, the accessible population includes doctors and nurses working in the eight randomly selected public secondary health facilities in FCT at the time of the study.

3.3.2. Sample and Sampling Techniques

Creswell (2002:163) defines a sample as a subgroup of the target population that the researcher plans to study for the purpose of making generalizations about the target population. The sample in this study comprises doctors and nurses working in the eight randomly selected public secondary health facilities in FCT at the time of the study.

Inclusion criteria are the characteristics that the respondents must have in order to be included in the study (Burns and Grove 2001:367). Respondents must meet the following criteria:

- Male or female
- Doctors and nurses
- Must be working in any of the eight randomly selected public secondary health facilities in FCT at the time of the study

Probability sampling approach was used for the study. Sampling refers to the systematic methods of selecting subjects to be studied (Baker 1998:148). In probability sampling, each unit in the population has a chance of being selected. The sample can be said to be representative of the population from which it has been selected and as such, generalizations of findings can be made to the population (Araoye 2004: 123–128; Baumgartner et al 2002: 132).

Multistage stratified sampling technique, a form of probability sampling approach was used for the study. The selection was done in stages until the final sampling units were arrived at. In probability sampling, each unit in the population has a chance of being selected. The sample can be said to be representative of the population from which it was selected and as such, generalizations of findings can be made to the population (Araoye 2004: 123–128; Baumgartner et al 2002: 132). Multistage sampling technique is appropriate for selecting a representative sample from a large population.

The selection of health facilities required for the study was done during the first stage. A list of public secondary health facilities in FCT was obtained from the Health and Human Services Secretariat of the Federal Capital Territory Authority and stratified according to location into urban and semi-urban. Four health facilities from each of the strata were randomly selected. A total of eight secondary health facilities were selected randomly out of the 10 public secondary health facilities in FCT.

Selection of study participants was done in the second stage. In each of the selected hospital, a list of names of the two categories of HCWs, namely doctors and nurses (sampling frame), was obtained from the hospital administrative authority. Simple random sampling technique was applied to obtain eligible respondents. Where a selected individual was unavailable or declined to participate in the study, the next personnel on the list was chosen.

A study conducted on the knowledge and practice of universal precautions in a tertiary health facility in Enugu, Nigeria, shows 50.4% knowledge of the universal precautions among health care workers. The sample size for the Enugu study was calculated using the following formula:

$$n = \frac{z^2 p q}{d^2}$$

Where:

z = standard normal deviation, set at 1.96, to correspond to the 95% confidence interval

p = 50.4% (i.e. 0.504) proportion in the target population estimated to have the knowledge of standard precautions (Ibeziako & Ibekwe 2006: 250–4)

$$q = 1.0 - p$$

$d = 0.5$ (degree of accuracy desired)

$$n = \frac{(1.96)^2 \times 0.504 \times 0.496}{(0.05)^2} = 384$$

For population < 10,000

$$nf = \frac{n}{1 + \frac{n}{N}} \quad (\text{Araoye 2004: 118–119})$$

Where:

nf = the desired sample size when the population is less than 10,000

$n = 384$, i.e. the desired sample size when the population is more than 10,000

$N = 1000$, i.e. the estimate of the population size

$$nf = \frac{384}{1 + \frac{384}{1000}} = \frac{384}{1 + 0.384} = \frac{384}{1.384} = 277$$

The calculated sample size was 277. Using the doctors/nurses distribution in a typical secondary health facility in Nigeria (30:70), the number of doctors would be $0.3 \times 277 = 83$, while the number of nurses would be $0.7 \times 277 = 194$. From the eight health facilities (urban and semi-urban), a total of 194 nurses and 83 doctors participated in the study.

3.3.2.1 *Ethical Issues related to Sampling*

The following is a brief discussion of the main ethical principles relevant to sampling in this study.

3.3.2.1.1 *Autonomy*

Autonomy refers to respect for individuals as autonomous agents capable of self determination. Researchers have an obligation to respect each participant as a person capable of making a decision regarding participation in the study. The researcher must make sure that all participants receive full disclosure of information regarding the nature of the study, its risks, benefits and alternatives. Explanation of the nature of the study was given to all health workers who met the inclusion criteria in the letter that accompanied the questionnaire. The participants could exercise their right to refuse to participate in the study because in this study participation was completely voluntary and without any form of

coercion. Participants were informed of their right to withdraw at any time. This was applied during sampling; a consenting participant replaced any selected participant who refused to participate in the study.

3.3.2.1.2 *Justice*

The second ethical principle invoked in human subjects is justice. Justice requires that the benefits and burdens of the research be fairly distributed, thus impacting upon selection of research subjects. There must be equitable selection and exclusion of participants. All the participants, male and female who met the inclusion criteria, had the freedom to participate in the study. This was in line with the principle of voluntary participation.

3.3.2.2 **The Sample Used in the Study**

The purpose of the study was to describe the knowledge and practice of standard precautions among HCWs in public secondary health facilities in the Federal Capital Territory of Nigeria. Multistage stratified sampling technique, a form of probability sampling approach was used for the study. The technique was used so that findings from the study could be generalized (Araoye 2004:123).

A sample size of 277 health care workers (doctors and nurses) working in randomly selected public secondary health facilities (urban and semi-urban) in FCT at the time of the study was used. Using the doctors/nurses distribution in a typical secondary health facility in Nigeria (30:70), the number of doctors would be 83 while the number of nurses would be 194 from the eight public secondary health facilities.

3.3.3 **Data Collection**

This section discusses the processes and considerations taken during data collection. It describes the data collection approach as well as ethical issues that were addressed during data collection.

3.3.3.1 ***Data Collection Approach and Method***

Data collection was conducted using a structured, pre-coded, self-administered questionnaire. Questionnaires are documents containing questions and other items designed to solicit information appropriate to analysis. Questionnaires are used primarily in

survey research (Babbies & Mouton 2001: 646). There are advantages of using a questionnaire to collect data in this study. Questionnaires require less time and energy to administer and they are less expensive (LoBiondo-Wood & Haber 2002:301). The absence of an interviewer when completing a questionnaire ensures that there is no bias in the responses that reflect the participant's reaction to the interviewer rather than to the questions (Polit et al 2001:269).

Self-administered questionnaires can be distributed in a number of ways such as through the mail or through self-contained groups, e.g. health workers in a particular hospital Polit et al (2001:186). Copies of the questionnaire were administered to doctors and nurses in eight selected secondary health facilities in FCT with the assistance of two trained field personnel at each hospital. This simplified the process and enhanced response by participants. Each of the field personnel was assigned to two health facilities and the data collection was concluded within one week. The researcher coordinated and supervised the data collection exercise.

3.3.3.1.1 Development and Testing of the Data Collection Instruments

In the use of questionnaire, Mouton (2001:100) recommends that researchers should either use an existing instrument or develop a new one. In this study, the researcher developed the questionnaire, guided by the research objectives and the research questions in Chapter 1 (Araoye 2004: 133). Considering the target population (doctors and nurses), the questionnaire was developed in English, using simple basic questions and statements to enhance clarity. The literature relevant to the study, as well as questionnaires used in similar studies provided invaluable insight. The draft questionnaire was submitted to the supervisors of the study at the University of South Africa (UNISA) and the statistical consultant.

3.3.3.1.2 Structure of the Questionnaire

The questionnaire has three main sections, namely, biographical data, knowledge and practice of universal precautions, and factors influencing compliance. The answer categories were mutually exclusive and special instructions were provided where necessary for easy understanding (Araoye 2004: 133–134).

3.3.3.1.3 *Covering Letter*

A covering letter that accompanied the questionnaire introduced the study and its purpose to participants and requested them to participate. It also provided instructions on how to complete the questionnaire. Participants were not requested to write their name or any other form of identity in the questionnaire in order to ensure that their identity could not be linked with their individual responses (Burns & Grove 2001:430). The covering letter requesting participation by the health workers in the study is included as Annexure to this report.

3.3.3.1.4 *Layout of the Questionnaire*

The questionnaire comprised the following sections:

SECTION 1: BIOGRAPHICAL DATA

This section comprised questions on biographical data (age and gender), area of practice and post-qualification experience. The purpose of eliciting such information was to secure a descriptive profile of respondents and to ensure a basis for data analysis in relation to other sections of the questionnaire as per the objectives of the study. Close-ended questions were used to collect the biographical data.

SECTION 2: KNOWLEDGE OF STANDARD PRECAUTIONS

This section contained questions which sought to ascertain the level of knowledge and understanding of the concept of standard precautions including post-exposure prophylaxis. Multiple-choice questions were used to assess the knowledge of standard precautions among health care workers in public secondary health facilities in FCT.

SECTION 3: PRACTICE OF STANDARD PRECAUTIONS AND FACTORS THAT INFLUENCE COMPLIANCE TO STANDARD PRECAUTIONS

Section 3 comprised questions on the level of adherence to standard precautions. Included also in this section were questions on the use and availability of personal protective equipments, vaccination and policy and guidelines for PEP.

3.3.3.1.5 *Pre-testing of the Instrument*

The aim of pre-testing the data collection instrument was to ascertain whether the questions and instructions in the instrument were well understood by the respondents. The pre-testing exercise also helped in determining whether there is need for revision of the format or the presentation of the questionnaire with regards to sequence and wording of questions, and the need for additional instructions (Araoye 2004: 69–70). Pre-testing the questionnaire is the surest way against errors (Babbie and Mouton 2004:244).

Pre-testing of the data collection tool was conducted on seven nurses and three doctors from hospitals not included in the study. None of those involved in the pre-test participated in the actual study. Each participant in the pre-test was requested to critically analyse all aspects of the questionnaire and to comment on the:

- relevance of the questions;
- wording, order and clarity of questions;
- redundant questions;
- length of the questionnaire and the time required to complete the questionnaire; and
- inadequate or confusing response categories.

Findings from the pre-test exercise were used to revise the questionnaire.

3.3.3.2 *Ethical Considerations related to Data Collection*

Researchers are obliged to act ethically in all areas of conducting research by taking into consideration ethical issues related to data collection. The following ethical issues were considered during data collection:

3.3.3.2.1 *Permission to conduct the study*

The research proposal was approved by the ethical committee of the University of South Africa and permission to conduct the study was given by HHSS of FCT.

3.3.3.2.2 *Informed consent*

Respondents were informed in writing about the purpose of the study and that participation was voluntary. Participants who met the inclusion criteria were not expected to give a written consent; completion of the questionnaire signified their informed consent to participate in the study. They were also informed of their right to withdraw at any time without any consequences.

3.3.3.2.3 *Confidentiality*

Information provided by participants during data collection should not be divulged to others without permission. No name or any form of identity was required on the questionnaire to ensure confidentiality and anonymity, thus protecting the privacy of respondents. The respondents were assured that the information they provided would be used for research only and that the result of the research could be made available to them on request (Baumgartner et al 2002: 109).

3.3.3.2.4 *Beneficence*

Researchers are obliged to protect persons from harm, maximize possible benefits and minimize possible harm. The respondents were told that there was no foreseeable risk or discomfort (Araoye 2004: 13) as a result of participating in the study.

3.3.3.2.5 *Benefits*

Respondents were informed that there was no direct immediate benefit, but that the study findings would assist health services managers to improve compliance to standard precautions by health care workers' in the course of carrying out health care services, thus reducing the risk of infection transmission.

3.3.4 Data analysis

Data analysis is a systematic organization and synthesis of research data and a testing of the research hypothesis using the data (Polit and Hungler 1999:643). In this study, data analysis was done in collaboration with a biostatistician using STATA statistical software. Descriptive statistics were used in the analysis and univariate analysis, which includes frequency distribution of key items, was presented. Bivariate analysis (cross tabulation)

was used to describe the study participants and the knowledge and practice of standard precautions among doctors and nurses.

3.3.5 Measures to ensure validity and reliability

Validity is the ability of a study to measure what the investigator intends to measure (Araoye 2004: 150). Content validity is concerned with the adequacy of coverage of the content area being measured (Polit, Beck and Hungler 2001:309). Due attention was paid by the researcher to the development of the questionnaire to ensure that the questions elicited necessary information in accordance with the objectives of the study. Content validity was ensured by given the questionnaire to a statistician to examine and appraise and to ensure that all the component elements of the variables were measured (Araoye 2004: 153). The draft questionnaire for the study was reviewed independently by experts from the infection control unit of the Ministry of Health to ensure relevance, appropriateness and adequacy of the questions. Feedback from these reviews was used to improve the first draft. The final version was pre-tested on health care workers, who were not part of the study population, in a health facility outside FCT to assess its wordings and clarity.

External validity refers to the generalizability of the study findings from a sample to the reference population (Araoye 2004: 151). In this study, external validity was assured by selecting a representative sample of the study population and using a probability sampling technique.

Reliability, also known as reproducibility or repeatability is the stability or consistency of information. In other words, reliability means the extent to which similar information is supplied or obtained when a measurement is performed more than once (Araoye 2004: 154). To test for reliability of the tool, the test-retest method was used. The questionnaire was administered and re-administered to 40 respondents after a 2-week test-retest interval. Reliability was also established during the pre-testing of the instrument as indicated in paragraph 3.4.3.1.5 above.

3.4 OPERATIONALIZATION OF DATA COLLECTION

On September 30, 2009, distribution of 304 copies of the questionnaire to participants at selected hospitals commenced. In each of the hospitals, the trained field personnel distributed the questionnaire to the participants in their various units and explained the purpose of the study. Participants completed the questionnaire and they were collected by the field personnel the following day. Data collection was done over two weeks. The final cut-off date for data collection was October 14, 2009.

3.4.1 Response to the Questionnaire

Responses that were received up to the cut-off date of October 14, 2009 were included in the study. Table 3.1 shows the number of responses to the questionnaire.

Table 3.1 Responses to the questionnaire

	Number of copies of the questionnaire distributed	Percentage	Number of copies of the questionnaire returned	Percentage
GH Wuse	38	100	37	97
DH Maitama	38	100	34	89
GH Kubwa	38	100	38	100
GH Nyanya	38	100	34	89
GH Karishi	38	100	37	97
GH Kuje	38	100	35	92
DH Asokoro	38	100	36	95
GH Bwari	38	100	35	92
Total	304	100	286	94

GH = General Hospital

DH = District Hospital

3.5 CONCLUSION

This chapter presented the research design and methodology for the study of the knowledge and practice of standard precautions among health care workers in FCT. A

descriptive cross sectional survey design was used for the study as well as a multistage stratified sampling technique, a form of probability sampling. The characteristics and content of the data collection tool used for the study and the steps taken to ensure compliance to ethical considerations at various stages of the research were. A description of the data analysis process was also discussed.

CHAPTER 4

ANALYSIS, PRESENTATION AND DESCRIPTION OF THE RESEARCH FINDINGS

4.1 INTRODUCTION

This chapter presents the data analysis, interpretation, and discussion, based on responses in the completed copies of the questionnaire on the knowledge and practice of standard precautions among health care workers. The data analysis was done using STATA statistical software and the result is presented as frequencies and percentages in tables, figures, and charts. Each analysis is presented item by item, followed by relevant discussion in accordance with the main sections and subsections of the study questionnaire.

4.2 DATA MANAGEMENT AND ANALYSIS

As indicated in chapter 1, the purpose of the study was to determine the knowledge, practice and factors affecting compliance to standard precautions among health care workers in public secondary health facilities in the FCT of Nigeria.

The objectives were to:

- assess the knowledge of health care workers of the standard precautions;
- determine the practice of standard precautions among health care workers in public secondary health facilities in FCT, Nigeria;
- identify factors affecting the practice of standard precautions by health care workers in public secondary health facilities in FCT, Nigeria.

4.2.1 Data Processing

The researcher and statistician sorted and checked the questionnaires for completeness in order to determine their usability. Three hundred and four copies of the questionnaire were administered but some respondents did not return their copies while a few others did not respond to majority of the questions. A total of 277 complete and usable copies of the questionnaire were analyzed, giving a response rate of 91%.

4.2.2 Data Entry

The biostatistician designed a data entry template and coded responses in the questionnaire were entered into it. Two data entry clerks who are familiar with the use of the computer software were trained by the biostatistician and engaged to enter the data.

4.2.3 Data Check

After entering the data into the computer, the data was imported from the template to the data analysis statistical software. The biostatistician and researcher then conducted data checks, looking for outliers and cross checking the data collecting tool. They also conducted logical checks such as looking out for logical harmony in responses to some of the question items.

4.2.4 Data Analysis

Data analysis was undertaken with the assistance of the biostatistician, using STATA (SE10). Dummy (draft) tables of analysis to be done were performed by the researcher to guide the biostatistician (Araoye 2004: 164). Descriptive statistics were used in the analysis (Babbie & Mouton 2001: 459). Univariate analysis, which included frequency distribution of key items on the respondents' knowledge and practice of standard precautions, were presented. Bivariate analysis (cross tabulations) was used to describe the respondents and to compare knowledge and practice among the HCWs (Araoye 2004:178).

4.3 RESEARCH RESULTS

4.3.1 Biographical data

A total of 277 health care workers participated in this study. Of these, 83 (29.96%) were doctors and 194 (70.04%) were nurses, giving a doctor-nurse ratio of 1:2.3.

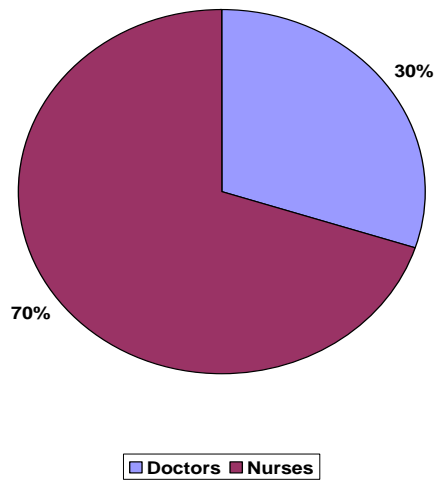


Figure 4.1: Percentage of health care workers by area of work

This distribution pattern of health care workers is consistent with current statistics of doctor/nurse distribution in the hospitals where the study was conducted.

4.3.1.1 Respondents' Age

Figure 4.2 presents the age distribution of respondents. Respondents' aged 30–39 years had the highest frequency (45.85%) and those aged 50–55 years had the lowest frequency (4.69%).

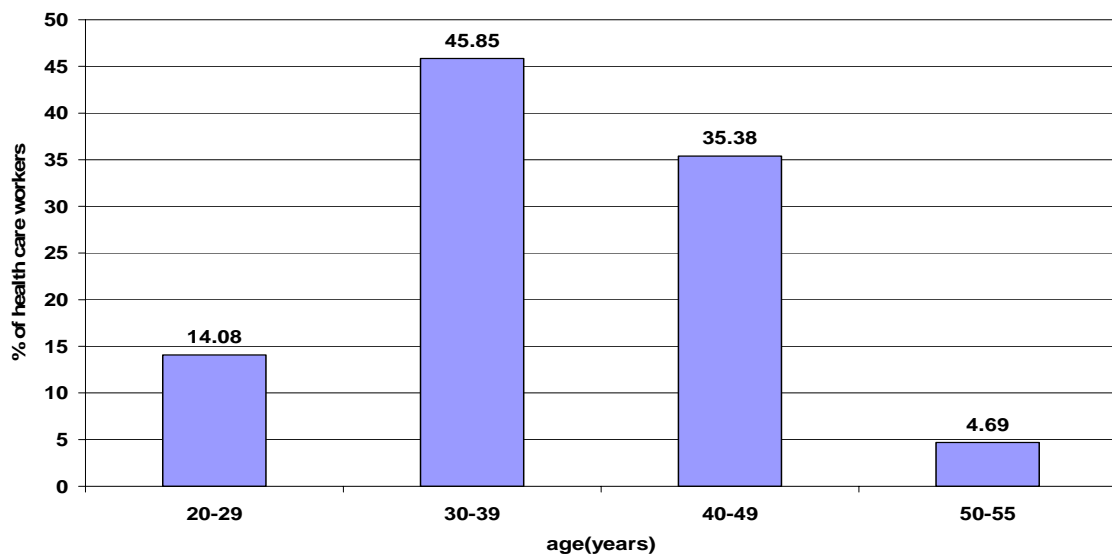


Figure 4.2: Percentage of health care workers by age group

The median age of doctors was 34 (IQR: 30; 39) and for nurses 39 (IQR: 33; 45) years. The oldest doctor among the respondents was 52 years while the oldest nurse was 55 years (Figure 4.3).

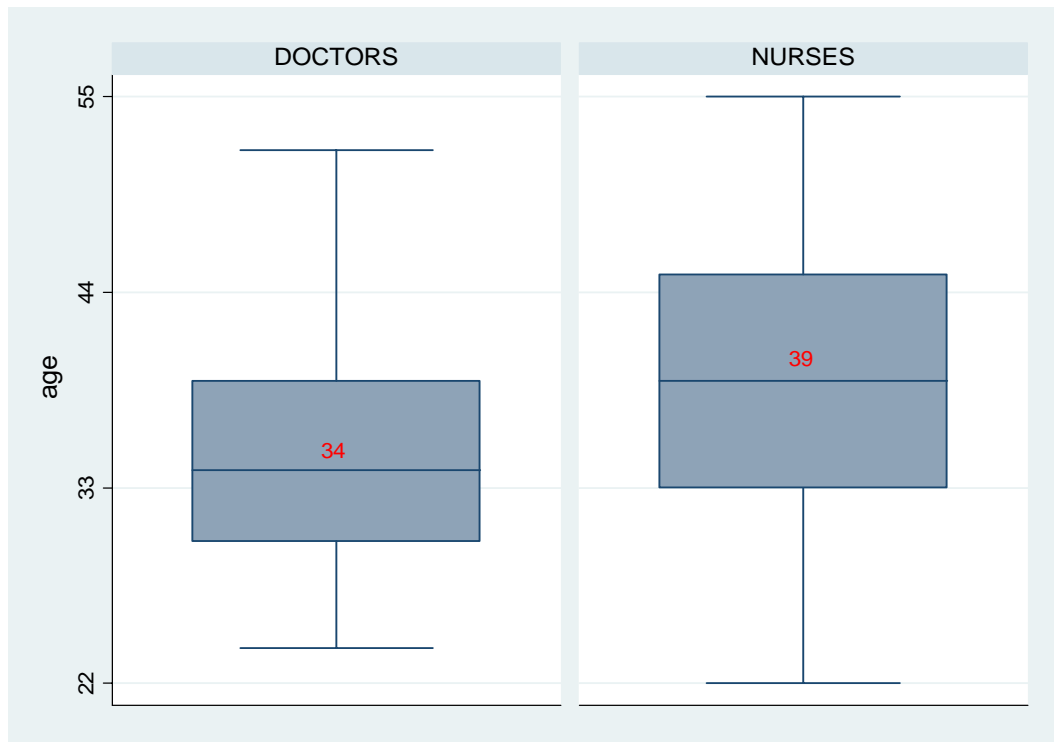


Figure 4.3: Box plot of age distribution of doctors and nurses

4.3.1.2 Respondents' Gender

Figure 4.4 presents the gender pattern of the respondents. There were more females 166 (59.93%) than males 111 (40.07%) in the sample population (n = 277).

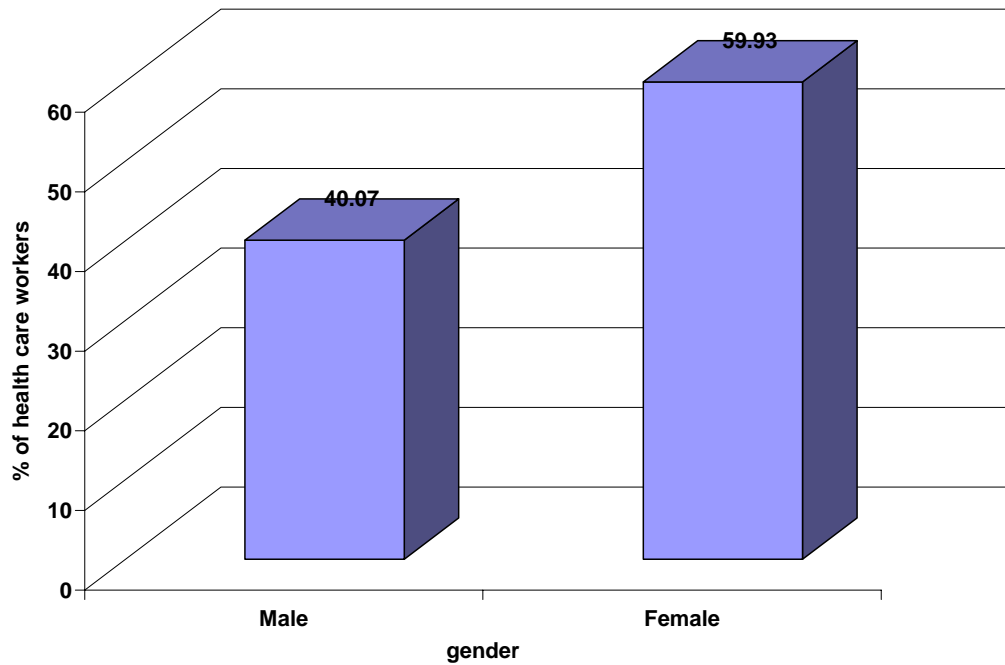


Figure 4.4: Percentage distribution of health care workers by gender

This distribution is consistent with the statistics of gender distribution in the health facilities where the study was conducted.

Table 4.1 presents the frequency distribution of both gender and age groups. Men aged and women 30–39 years had the highest frequency (54.05% and 40.36% respectively).

Table 4.1: Frequency distribution of HCWs by gender and age group

Gender	Age group				TOTAL
	20–29 (%)	30–39 (%)	40–49 (%)	50–55 (%)	TOTAL (%)
Male	11 (9.91)	60 (54.05)	35 (31.53)	5 (4.50)	111 (40.07)
Female	28 (16.87)	67 (40.36)	63 (37.95)	8 (4.82)	166 (59.93)
TOTAL	39 (14.08)	127 (45.84)	98 (35.38)	13 (4.69)	277 (100)

4.3.1.3 Area of Practice

Figure 4.5 presents the distribution of health care workers by practice and gender. The majority of the doctors were males 59 (71.08%) while the majority of the nurses were females 142 (73.20 %). This finding is consistent with the current statistics of male/female distribution in the two areas of practice (doctors and nurses) at the hospitals where the study was conducted.

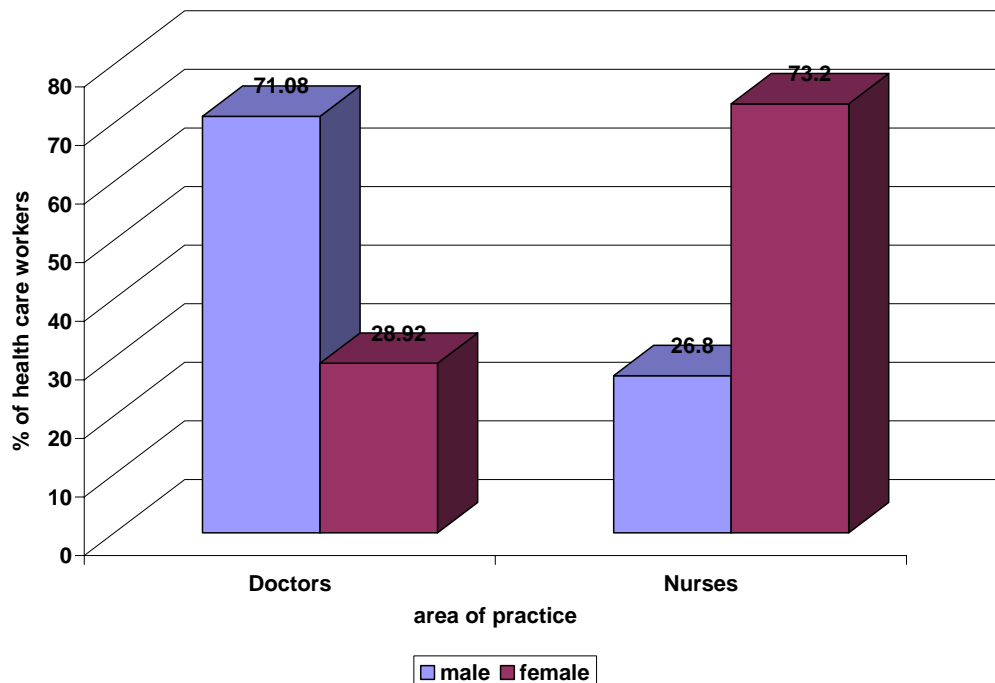


Figure 4.5: Percentage distribution of health care workers by gender and area of practice

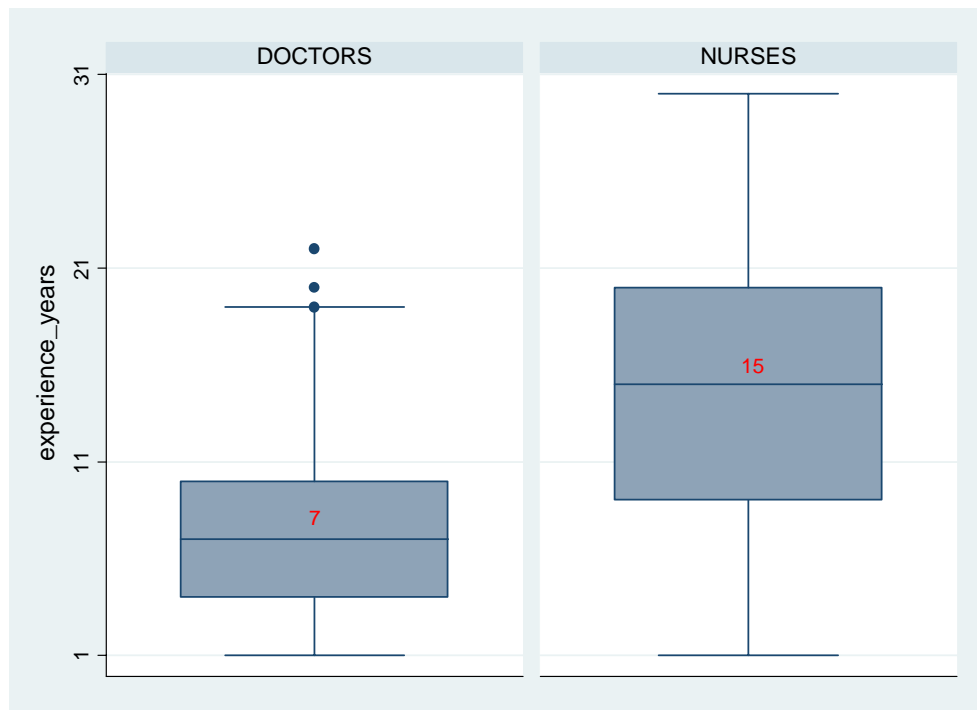
4.3.1.4 Respondents' Professional Experience

Table 4.2 presents the distribution of health care workers by practice and professional experience. Thirty-four (40.96%) of the doctors had less than five years post-graduation professional experience and 94 (48.45%) of the nurses had more than 15 years of post-graduation professional experience. Thirty-one (37.35%) doctors and 44 (22.68%) nurses had 6–10 years professional experience.

Table 4.2: Frequency distribution of HCWs by practice and professional experience

Area of practice	Professional experience				Total (%)
	0–5 (%)	6–10 (%)	11–15 (%)	>15 (%)	
Doctors	34 (40.96)	31 (37.35)	10 (12.05)	8 (9.64)	83 (29.96)
Nurses	27 (13.92)	44 (22.68)	29 (14.95)	94 (48.45)	194 (70.04)
Total	61 (22.02)	75 (27.07)	39 (14.08)	102 (36.82)	277 (100)

Figure 4.6 presents the distribution of HCWs by professional experience and practice. The median years of professional experience for doctors was 7 (IQR: 4; 10) and for nurses 15 (IQR: 9; 20). The maximum years of professional experience for doctors and nurses were 22 and 30 respectively.

**Figure 4.6: Box plot of years of experience of nurses and doctors**

4.3.2 Knowledge of Standard Precautions

Section 2 of the questionnaire consisted of seven items numbered 2.1–2.7, which were included to elicit information on knowledge of standard precautions by the health care workers.

4.3.2.1 *The Concept of Standard Precautions, Potential Ways of Occupational Exposure and Situations Requiring Hand Washing*

Forty-six (23 doctors and 23 nurses) (16.61%) of the respondents knew the basic concept of standard precautions (Table 4.3). At 5% level of significance, there was no association between area of practice and knowledge of the basic concept of standard precautions ($p = 0.283$). Some 117 (42.24%) respondents answered correctly and completely the question on the potential sources of occupational exposure. There was statistical significant relationship between knowledge of the potential sources of occupational exposure and area of practice ($p = 0.011$). However, there was no association between professional experience and knowledge of the basic concept of standard precautions ($p = 0.99$). Only 62 (20 doctors and 42 nurses) (22.38%) respondents answered correctly and completely the set of questions on situations requiring hand washing.

Table 4.3: Frequency distribution of HCWs who knew the standard precautions

<i>Knowledge of standard precautions</i>	<i>Doctors (%)</i>	<i>Nurses (%)</i>	<i>Total (%)</i>
Basic concept of standard precautions	23 (27.71)	23 (11.86)	46 (16.61)
Potential sources of occupational exposure	44 (53.01)	73 (37.63)	117 (42.24)
Situations requiring hand washing	20 (24.10)	42 (21.65)	62 (22.38)

4.3.2.2 *Clinical Conditions and Body Fluids that require Observance of the Standard Precautions*

The majority of respondents [75 (90.36%) doctors and 178 (91.75%) nurses] were aware that standard precautions should apply to all patients irrespective of their diagnosis (Figure 4.7).

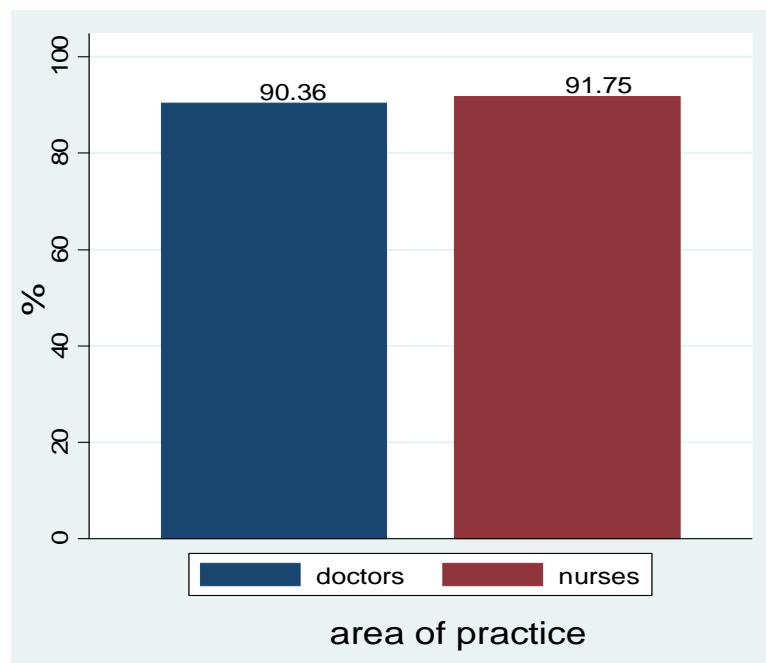


Figure 4.7: Knowledge of clinical conditions requiring standard precautions

The majority of respondents [73 (87.95%) doctors and 180 (92.78%) nurses] knew that standard precautions should be applied to all body fluids (4.8).

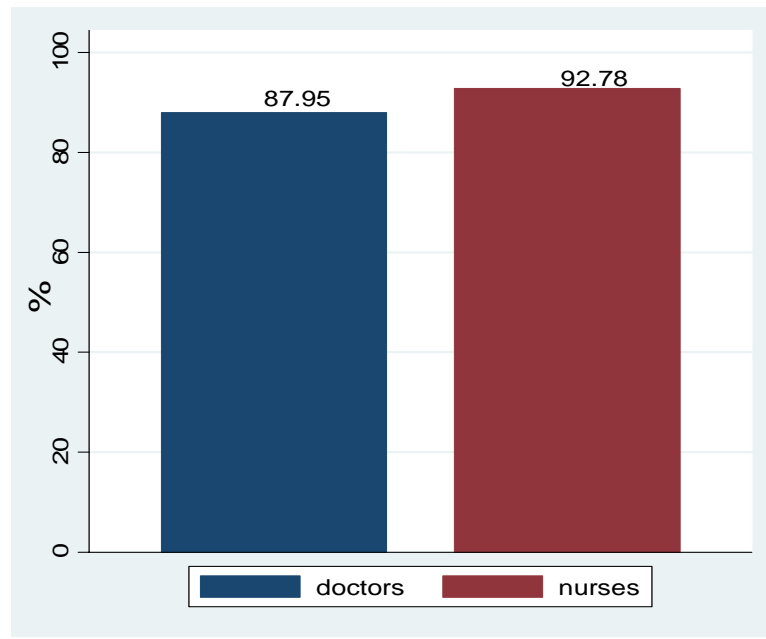


Figure 4.8: Knowledge of body fluids requiring standard precautions

4.3.2.3 Important Patient Factors in Deciding when to use PPE

Few respondents, 66 (23.83%), knew that the decision to use PPE should not depend on any patient factor but on depend on the nature of patient interaction.

Table 4.4: Patient factors that determine the use of PPE

Factors	Responses	
	N	%
HIV/AIDS	57	20.58
Hepatitis B virus infection	95	34.30
Signs and symptoms of infection	59	21.30
None of the above	66	23.83
Total	277	100

4.3.2.4 Post-exposure Prophylaxis

Knowledge of the recommendation on post-exposure prophylaxis was poor among the respondents. The national guideline for HIV and AIDS treatment and care in adolescents and adults recommends that HIV counseling and testing should precede post-exposure prophylaxis (FMOH 2007: 72–73). Only 41 doctors (49.4%) and 110 nurses (56.7%) knew that HIV counseling and testing was required after occupational exposure, and that PEP should be given if the HIV test result is negative.

Fifty-seven doctors (68.67%) and 121 nurses (62%) knew the correct duration for PEP. The majority of respondents (85.54% of doctors and 69.07% of nurses) knew that two or three antiretroviral drugs should be used for PEP within 72 hours of exposure (Table 4.5).

Table 4.5: Knowledge of post-exposure prophylaxis

<i>Knowledge of PEP</i>	<i>Doctors</i>		<i>Nurses</i>	
	<i>Yes (%)</i>	<i>No (%)</i>	<i>Yes (%)</i>	<i>No (%)</i>
HIV C&T required immediately after exposure and PEP given to HIV negative	41 (49.40)	42 (50.60)	110 (56.70)	84 (43.30)
2 or 3 ARV is used for PEP within 72 hours of exposure	71 (85.54)	12 (14.46)	134 (69.07)	60 (30.93)
PEP should be taken for 4 weeks	57 (68.67)	26 (31.33)	121 (62.37)	73 (37.63)

C & T: Counseling and testing; PEP: Post exposure prophylaxis; ARV: Antiretroviral drug

4.3.3 Practice of Standard Precautions

Section 3 of the questionnaire contained questions numbered 3.1-3.14, which were to elicit information on the practice of, and the factors influencing compliance to standard precautions among health care workers. A four-point Likert scale was used for items 3.1, 3.5, 3.7 and 3.8 using the following frequency responses: always, often, seldom and never. The frequency responses ‘always’ and ‘often’ were combined and interpreted as standard precautions practiced while frequency responses ‘seldom’ and ‘never’ were interpreted as standard precautions not practiced.

4.3.3.1 Hand Washing

The majority of the HCWs (96.38% of doctors and 97.94% of nurses) reported that they practiced hand washing with soap and water after any direct contact with patients (Table 4.6), while 7 (3.51%) doctors and 4 (2.06%) nurses reported that they seldom washed their hands. There was no report of doctors and nurses who never washed hands. There was no statistical significant relationship ($p = 0.118$) between hand washing by doctors and nurses, but there was association between hand washing and years of professional experience ($p = 0.002$).

The major constraint reported by respondents who did not wash hands always with soap and water after any direct contact with patients was non-availability of water and soap.

Table 4.6: Frequency distribution of hand washing by respondents

<i>Hand washing</i>	<i>Doctors</i>	<i>Nurses</i>	Total (%)
	N (%)	N (%)	
Always	50 (60.24)	141 (72.68)	191 (68.95)
Often	30 (36.14)	49 (25.26)	79 (28.51)
Seldom	3 (3.61)	4 (2.06)	7 (2.52)
Never	0	0	0
Total	83	194	277

4.3.3.2 Use of Gloves

The majority, 271 (97.83%), of the respondents reported that they used gloves for when having contact with body fluids, non-intact skin and mucous membrane (Table 4.7). Six (2.17%) of the respondents said they seldom used gloves, but none reported never using gloves. There was statistical significant association between doctors and nurses and the use of gloves ($p = 0.014$).

The main constraint reported by respondents who seldom used gloves was lack of supplies.

Table 4.7: Frequency distribution of use of gloves by respondents

<i>Use of gloves</i>	<i>Doctors</i>	<i>Nurses</i>	Total
	N (%)	N (%)	
Always	77 (92.77)	152 (78.35)	229 (82.67)
Often	5 (6.02)	37 (19.07)	42 (15.16)
Seldom	1 (1.20)	5 (2.58)	6 (2.16)
Never	0	0	0
Total	83	194	277

4.3.3.3 Use of Gown/Plastic Apron

The majority, 245 (88.44%), of the respondents (74 doctors and 171 nurses) reported that they wore gown or plastic apron during procedures likely to generate splashes of blood or body fluid (Table 4.8). Twenty-two respondents (7.94%) seldom wore gown or plastic apron during such procedures and a few (1.20% of doctors and 4.64% of nurses) never wore gown or plastic apron. There was no association between area of practice (doctors and nurses) and use of gown or plastic apron ($p = 0.407$).

Twenty-eight (84.50%) of the 32 respondents who seldom or never used gown or plastic apron during procedures likely to generate splashes of blood or body fluid reported lack of supplies as the reason for irregular or non-use of gown or plastic apron.

Table 4.8: Frequency distribution of use of gown/plastic apron by respondents

<i>Use of gown/plastic apron</i>	<i>Doctors</i>	<i>Nurses</i>	<i>Total</i>
	<i>N (%)</i>	<i>N (%)</i>	
Always	55 (66.27)	119 (61.34)	174 (62.81)
Often	19 (22.89)	52 (26.80)	71 (25.63)
Seldom	8 (9.64)	14 (7.22)	22 (7.94)
Never	1 (1.20)	9 (4.64)	10 (3.61)
Total	83	194	277

4.3.3.4 Use of Mask and Eye Protector

Some 191 (68.95%) of the respondents (58 doctors and 133 nurses) reported using mask and eye protector for procedures likely to generate droplets or splash of blood or body fluid (Table 4.9). This is similar to the finding in another study conducted in India, where only 32% of respondents used eye protector (goggles & eye glasses) and 59% used mask whenever there was a possibility of blood or body fluid splash (Kermode, Jolley, Langkham, Thomas, Holmes & Gifford 2005: 30). Forty-five (16.25%) of the respondents reported that they seldom used mask and eye protector, while 41 (14.80%) reported never using the mask and eye protector.

Lack of supplies was reported as the main reason for irregular use of mask and eye protector by 74 (85.90%) of the respondents who did not always or often use mask and eye protector for procedures that are likely to generate droplets/splash of blood or body fluid. The implication of this finding is that health care workers who do not use mask and eye protector regularly during procedures that are likely to generate droplets/splash of blood or body fluid have high risk of getting occupational exposure through conjunctival splash and other mucous membrane. This could result in the transmission of any of the blood-borne infections.

Table 4.9: Use of mask and eye protector by respondents

<i>Use of mask and eye protector</i>	<i>Doctors</i>	<i>Nurses</i>	<i>Total (%)</i>
	<i>N (%)</i>	<i>N (%)</i>	
Always	38 (45.78)	97 (50.00)	135 (48.74)
Often	20 (24.10)	36 (18.56)	56 (20.22)
Seldom	15 (18.07)	30 (15.46)	45 (16.24)
Never	10 (12.05)	31 (15.98)	41 (14.80)
Total	83	194	277

Some 255 (92.05%) respondents reported covering cuts and abrasions with waterproof dressing (Table 4.10). This is an essential precautionary measure, because if the skin's integrity is compromised, like in the event of a cut, abrasion, or dermatitis, it becomes susceptible to entry by infectious microorganisms in the blood and other body fluids.

Table 4.10: Frequency distribution of waterproof dressing of cuts and skin abrasion

<i>Waterproof dressing of cuts and skin abrasion</i>	<i>Responses</i>	
	<i>N</i>	<i>(%)</i>
Always	202	72.92
Often	53	19.13
Seldom	16	5.78
Never	6	2.17
TOTAL	277	100

4.3.3.5 Needle Handling After Use

Some 68.67% of doctors and 83.51% of nurses (overall 79.06%) reported that they did not recap needle after giving injection or drawing blood from patients (Table 4.11). This is similar to findings in a study conducted in Abeokuta, Nigeria, where compliance with not recapping of used needle was higher among nurses (58%) than doctors (28%) (Sadoh, Fawole, Sadoh, Oladimeji & Sotiloye 2006:724).

Forty-three (15.52%) (24.10% doctors and 11.86% nurses) of the respondents reporting recapping used needles, contrary to findings in the Abeokuta study where almost on-third of respondents admitted to always recapping used needles. At 5% significance level, there was association between area of practice and recapping of needle after use ($p = 0.01$). A few of the HCWs (4% doctors and nurses) removed needles from the disposal syringes after use.

Table 4.11: Frequency distribution of needle handling by respondents

<i>Needle handling after giving injections</i>	<i>Doctors</i>	<i>Nurses</i>	<i>Total (%)</i>
	<i>N (%)</i>	<i>N (%)</i>	
Do not recap used needles	57 (68.67)	162 (83.51)	219 (79.06)
Remove needles from disposal syringes	3 (3.61)	8 (4.12)	11 (3.97)
Bend needles by hand	3 (3.61)	1 (0.52)	4 (1.44)
Recap used needles	20 (24.10)	23 (11.86)	43 (15.52)

Recapping of used needles has been confirmed as one of the determinants of needle stick injury, therefore, one of the standard control measures in preventing needle stick injury is to avoid needle recapping (Wilburn & Eijekemans 2004: 452–453). The standard precautions recommends that used needles should never be recapped, removed from disposable syringe, or manipulated.

4.3.3.6 *Disposal of Needles and Other Sharps after Use*

Sixty-two (74.70%) doctors and 123 (63.40%) nurses discarded used needles and sharps in a puncture-proof container, 9 (10.84%) doctors used any available container, and 12 (14.45%) doctors used any closed waste bin (Table 4.12). Some 14.43% of the nurses used any available container and 22.16% used any closed waste bin. At 5% level of significance, there was strong statistical significant relationship between availability of puncture-proof container and urban and semi-urban health facilities ($p = 0.001$).

The standard precautions recommends that needle and other sharp items should be placed in appropriate puncture-proof containers (Siegel, Rhinehart, Jackson, Chiarelo and the Health Infection Control Practices Advisory Committee 2007: 125).

Table 4.12: Frequency distribution of needle disposal by respondents

<i>Needle disposal</i>	<i>Doctors</i>	<i>Nurses</i>	<i>Total</i>
	<i>N (%)</i>	<i>N (%)</i>	
Any available container	9 (10.84)	28 (14.43)	37 (13.36)
A waste bin covered with plastic	8 (9.64)	17 (8.76)	25 (9.03)
A closed waste bin	4 (4.82)	26 (13.40)	30 (10.83)
A puncture-proof container	62 (74.70)	123 (63.40)	185 (66.78)
Total	83 (100)	194 (100)	277 (100)

4.3.3.7 *Proximity of Sharp Disposal Containers to the Use Area*

Eighty-one (97.59%) doctors and 173 (89.19%) nurses reported that sharp disposal containers were located as close as possible to the use area (Figure 4.9). This conforms to recommendations in the standard precautions that puncture-resistant containers for sharp disposal should be located as close as possible to the area of use.

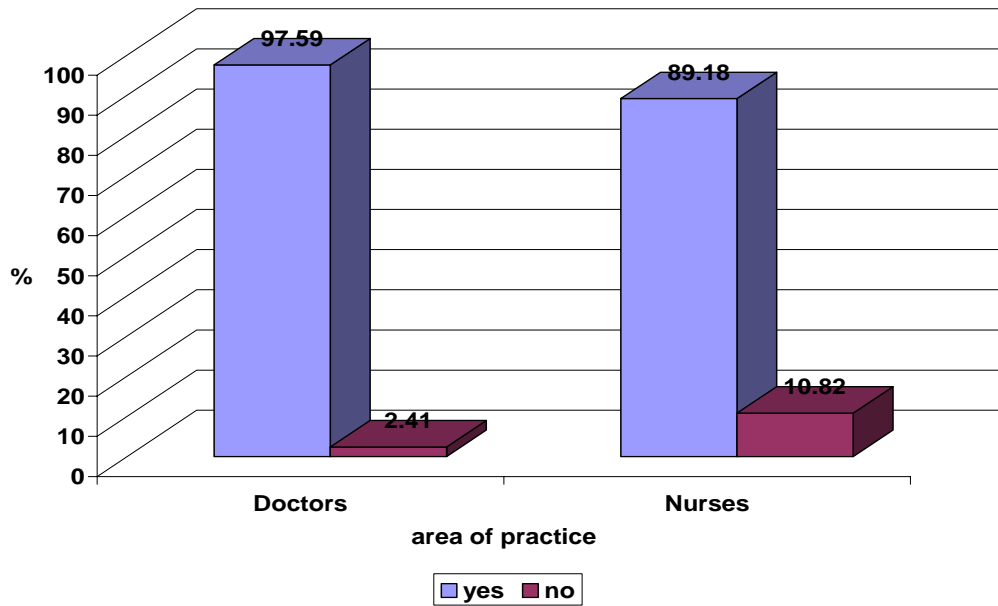


Figure 4.9: Proximity of sharp disposal containers to the use area

4.3.3.8 Needle Stick Injuries

Nineteen (9.79%) nurses and 14 (16.87%) doctors had needle stick injury in the last three months (Figure 4.10). It is not surprising to see more doctors reporting needle stick injury, since more doctors (24.10%) than nurses (11.86%) reported recapping needle after use. There was no statistical significant relationship ($p = 0.096$) between the incidence of needle stick injury and area of practice (doctors and nurses), but the incidence of needle stick injuries is an indirect marker for measuring the level of compliance to standard precautions by HCWs.

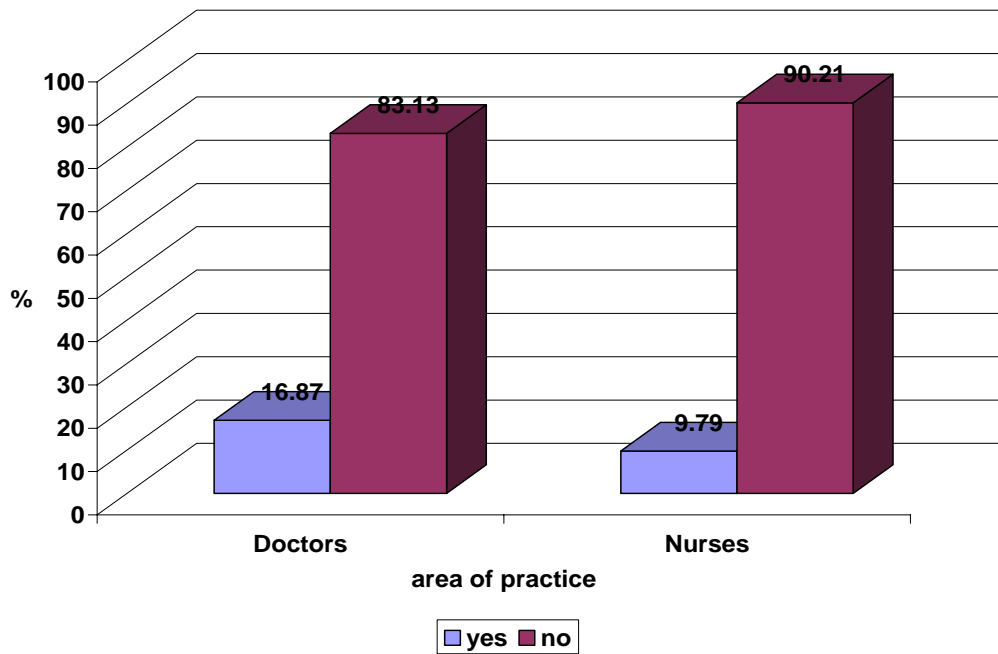


Figure 4.10: Percentage of HCWs that had needle stick injury in the last three months

4.3.3.9 Awareness of the Presence of a PEP Focal Person and Availability of Prophylaxis and Guidelines for PEP Management

Table 4.13 presents the distribution of respondents' awareness of the availability of drugs for HIV PEP, HIV PEP guideline/protocol, and PEP focal person in their respective health facilities. Very few of the HCWs were aware of the minimum requirements for PEP services at the health facility level. Some 101 (36.46%) respondents (31 doctors and 70 nurses) were aware of the availability of antiretroviral drugs for PEP, 32.53% of doctors and 27.84% of nurses were aware of the availability of the HIV PEP guideline in their facility. Forty-three (15.52%) of the respondents were aware of the presence of a PEP focal person in their facility.

The National guideline for HIV and AIDS treatment and care in adolescents and adults (FMOH 2007: 76) clearly recommends the minimum requirements for PEP services at the health facility level. These include availability of a designated PEP officer, ARV drugs, test kits for PEP, and facility PEP guideline/protocol.

Table 4.13: Respondent's awareness of availability a PEP guideline and focal person in their facility

	Doctors		Nurses	
	Yes (%)	No (%)	Yes (%)	No (%)
Presence of a focal person designated for PEP in the facility	9 (10.84)	74 (89.16)	34 (17.53)	160 (82.47)
Availability of PEP prophylaxis	31 (37.35)	52 (62.65)	70 (36.08)	124 (63.92)
Availability of guidelines for PEP management	27 (32.53)	56 (67.47)	54 (27.84)	140 (72.16)

4.3.3.10 Respondents' Hepatitis B Vaccination Status

Table 4.14 presents the hepatitis B vaccination status of the respondents. A low proportion of them (32.53% doctors and 28.87% nurses) had at least one dose of hepatitis B vaccine. Two nurses did not respond to the question on hepatitis B vaccination. There was no statistical significant relationship between the doctors and nurses on hepatitis B immunization status ($p = 0.556$).

Table 4.14: Respondents' Hepatitis B vaccination status

	Doctors		Nurses	
	Yes (%)	No (%)	Yes (%)	No (%)
Had hepatitis B vaccination	27 (32.53)	56 (67.47)	56 (28.87)	136 (70.10)

4.3.3.11 Doses of Hepatitis B Vaccine received by Respondents

Table 4.15 presents the number of doses of hepatitis B vaccination received by the respondents. Some 39.28% of the nurses had the complete three doses, while 18.51% and 59.25% of the doctors got three and two doses, respectively.

Table 4.15: Doses of hepatitis B vaccine received by respondents

<i>Doses of hepatitis B vaccine</i>	<i>Doctors</i>	<i>Nurses</i>	Total
	N (%)	N (%)	
One	6 (22.20)	18 (32.14)	24
Two	16 (59.25)	16 (28.57)	32
Three	5 (18.51)	22 (39.28)	27

CDC (2001) recommends that any person who performs a task that involves having contact with blood, blood contaminated with body fluid, or sharps should receive a complete three-dose vaccination against hepatitis B.

This study further showed that among respondents that never had hepatitis B vaccine, 29 (51.78%) doctors and 61 (44.85%) nurses reported not being aware of the risk/importance of the hepatitis B vaccine, while 27 (48.21%) doctors and 75 (55.14%) nurses reported that the vaccine was not available. Overall, 53% of the respondents reported that the vaccine was not available, but none attributed the reason for not taking hepatitis B vaccination to cost.

4.4 OVERVIEW OF RESEARCH FINDINGS

Respondents aged 30–39 years had the highest frequency of 46%. There were more females (60%) than males (40%) and the nurses had higher post-graduation professional experience than doctors. Median years of professional experience for doctors were seven while that of nurses was 15. Knowledge of the basic concept of standard precautions, potential ways of occupational exposure, and situations requiring hand washing were higher among doctors than among nurses. Knowledge of HIV counseling and testing preceding PEP in cases of occupational exposure was higher among nurses (57%) than among doctors (49%). However, more doctors (86% and 69%) than nurses (69% and 62%) knew that two or three ARVs were used and for four weeks for PEP. The knowledge that standard precautions should be applied to all patients irrespective of the diagnosis

was generally high. So also was the knowledge that standard precautions should be applied to all body fluids.

The practice of hand washing and of not recapping needle was better among nurses (73% and 84%) than doctors (60% and 69%). The use of gloves when contact with body fluids, non-intact skin, mucous membrane is anticipated and the use of gowns or plastic apron during procedures likely to generate splashes of blood or body fluid were higher among doctors (93% and 66%) than nurses (78% and 61%). The majority of the respondents (98% doctors and 89% nurses) reported that containers for the disposal of sharps were located as close as practical to the use area. Awareness of the availability of PEP, PEP guideline, and PEP focal person was generally poor among the respondents. Hepatitis B vaccination among the respondents was low; most of the few respondents who had the vaccination had incomplete doses. A reasonably higher percentage of doctors (17%) than nurses (10%) reported needle stick injury in the last three months.

4.5 CONCLUSION

This chapter discussed the management and analysis of data and discussed the results of the study on knowledge and practice of standard precautions among health care workers in the Federal Capital Territory of Nigeria were. The findings showed that there were variations in the level of knowledge and practice of the standard precautions among respondent HCWs. Knowledge of PEP and the use of personal protective equipment, especially gown, mask and eye protector, was poor. Urgent action in needed to address the poor hepatitis B vaccination status of the HCWs.

Based on the findings of the study, conclusions will be made on the knowledge and practice of standard precautions among HCWs in FCT, Nigeria in the next chapter. The chapter will discuss the limitations of the study and recommendations to improve knowledge and practice of the standard precautions among HCWs.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter presents a summary of the most significant findings and conclusions from this study of the knowledge and practice of standard precautions among HCWs in FCT. It also presents the study limitations and recommendations.

5.2 SUMMARY AND INTERPRETATION OF THE RESEARCH FINDINGS

The findings of this study have been presented in the previous chapter. The objectives of the study were to:

- assess the knowledge of standard precautions among health care workers in public secondary health facilities in Abuja;
- determine the practice of standard precautions among health care workers in public secondary health facilities in Abuja;
- identify factors affecting the practice of standard precautions among health care workers in public secondary health facilities in Abuja.

In accordance with the research objectives, the interpretations of findings and conclusions are presented in the following section:

5.2.1 Biographical data

A total of 277 health care workers (doctors and nurses) participated in this study, out of which 83 (29.96%) were doctors and 194 (70.04%) were nurses. Their median ages were 34 and 39 years for male and female, respectively.

5.2.2 Knowledge of standard precautions among health care workers

Knowledge of the basic concept of the standard precautions was inadequate among the health care workers. They had inadequate knowledge of cough etiquette, the potentials for transmission of infectious agents in patient placement decision, safe injection practices,

and hand washing before and after any direct contact with patients. Few respondents answered correctly all questions on the components of the concept of standard precautions. In contrast, the majority of HCWs knew that standard precautions should apply to all patients and to all body fluids irrespective of the diagnosis. HCWs were more familiar with this aspect of the universal precautions. There was statistical significant relationship between respondents' knowledge of the potential ways of occupational exposure and area of practice ($p = 0.011$).

There was variation in the knowledge of post-exposure prophylaxis among the HCWs. The knowledge that HIV counseling and testing should be conducted immediately after exposure and PEP given only to those that test negative was low among the respondents. A higher proportion of the respondents knew that two or three antiretroviral drugs should be used within 72 hours of exposure and should be taken for a duration of four weeks. Respondents' awareness of the availability of drugs for PEP, PEP guideline/protocol and PEP focal person in their respective health facilities was very low.

5.2.3 Practice of Standard Precautions among Health Care Workers

A low proportion of the HCWs reported that they did not always wash their hands with soap and water after any direct contact with patients, which is a simple routine infection prevention and control measure. There was a significant statistical association between hand washing practice and years of professional experience. The major constraint reported by respondents who said they did not always wash hands with soap and water after any direct contact with patients was irregular availability of water and soap.

Findings from the study show that the majority of the respondents always used gloves when they anticipate contact with body fluids, non-intact skin and mucous membrane. There was statistical significant relationship between area of practice (doctors and nurses) and the use of gloves. However, the use of other personal protective equipment such as wearing gown or plastic apron, mask and eye protector by respondents during procedures likely to generate droplets/splashes of blood or body fluid was low. The main constraint given for the irregular use of PPE was the lack of regular supplies.

Recapping of needle after use was low among the respondents in general but higher among doctors than nurses. There was statistical significant relationship between respondents' area of practice (doctors and nurses) and the practice of needle recapping after use. A higher proportion of respondents disposed used needles in puncture-proof containers and the majority of them reported that sharps disposal containers were located as close as possible to the use area. The incidence of needle stick injury among HCW's was generally low, but it was higher among doctors than nurses. A low proportion of the respondents already had at least one dose of hepatitis B vaccine, and among these only few had the full course of the vaccine.

5.3 CONCLUSION

Knowledge of the current expanded scope of universal precautions, the renamed standard precautions, was low among HCWs in the FCT of Nigeria. The respondents were more familiar with certain aspects of the universal precautions. The knowledge that HIV counselling and testing is a prerequisite for PEP, to rule out previously established HIV infection, was low. Most of the HCWs were not aware of the availability of ARV drugs for PEP, PEP guideline and PEP focal person in their facility. This implies that occupational exposures were not properly reported and were likely not given the required treatment.

Knowledge that standard precautions should be observed while dealing with all patients and body fluids irrespective of the diagnosis was high among the respondents. However, this knowledge did not seem to translate to high rate of compliance to the requirements for the use of personal protective equipment.

Compliance with the standard precautions was suboptimal among HCWs in FCT. Irregular availability of water and soap was found to be the major constraint to regular washing of hand after any direct patient contact. Similarly, irregular supply was the major barrier to regular use of PPE during procedures likely to generate droplets/splashes of blood or body fluid. Recapping of needles and incidence of needle stick injury were found to be relatively high among doctors. Report of hepatitis B vaccination was low among the HCWs.

5.4 RECOMMENDATIONS

Based on the findings of the study, the following recommendations are made to improve the knowledge and practice of standard precautions among health care workers in the Federal Capital Territory of Nigeria.

5.4.1. Recommendations to Improve Knowledge of Standard Precautions

A comprehensive infection prevention and control (IPAC) program should be developed at all levels of healthcare in Nigeria, namely federal, state, local government and health facility levels. Such program, among other things, should include basic measures of infection prevention and control, which are:

- standard and additional precautions
- education and training of health care workers
- protection of health care workers through immunization
- identification of hazards and risks
- routine practices essential to infection control
- effective work practices and procedures such as waste management, surveillance and incident monitoring, outbreak investigations, and research (WHO 2004: 5).

The government should established IPAC committees in the federal and state ministries of health and IPAC teams at the facility level. These committees and teams will comprise representatives of relevant departments and will ensure compliance to the standard precautions by health care workers in facilities.

Knowledge of the standard precautions, including additional (transmission-based) precaution and infection control and prevention, should be improved among HCWs by:

- providing the infection prevention and control manual and PEP guidelines to HCWs at facilities;
- training and re-training HCWs on IPAC practices that are relevant to their job, including PEP;

- developing and making available information, education and communication (IEC) materials and other job aids on standard precautions, PEP and IPAC to health workers.

5.4.2 Recommendations to Improve Practice of Standard Precautions

- Health facility managers should ensure regular supply of personal protective equipment and other items required for IPAC in their facility.
- A clinician should be appointed as PEP focal person in each health facility and trained on how to handle cases of occupational exposure.
- Awareness of the importance of hepatitis B vaccination should be increased among HCWs
- Hepatitis B vaccine should be provided for workers in healthcare facilities at no cost.

5.4.3 Recommendations for Further Studies

The researcher recommends the following for further studies:

- A comparative study of the knowledge and practice of standard precautions among HCWs in private and public health facilities in Abuja, Nigeria. There are many private health facilities that provide health care services to a good proportion of the population in Abuja. A comparative study will help determine the extent of adherence to the standard precautions in both private and public health facilities.
- A comparative study of knowledge and practice of standard precautions among HCWs in tertiary, secondary and primary health facilities in Abuja, Nigeria. Health care services are being rendered in the three levels of health facilities. A comparative study will explore the extent of compliance to standard precautions in the three levels of health facilities.
- An evaluation of infection prevention and control program in health facilities in Abuja, Nigeria. The study findings show that compliance to standard precautions by HCWs, a component of infection prevention and control is suboptimal. The proposed study will examine the whole components of infection prevention and control, including administrative issues relating to IPAC.

5.5 CONTRIBUTIONS OF THE STUDY

This study sought to determine the knowledge and practice of standard precautions among HCWs in secondary health facilities in FCT, Nigeria. In accordance with the objectives, the study assessed and determined the level of knowledge of HCWs and the extent to which HCWs adhere to the provisions of the current concept of standard precautions in practice.

The study findings further identified the factors affecting the practice of standard precautions by HCWs in public secondary health facilities in FCT, Nigeria. Based on the study findings, recommendations have been made on how to improve the knowledge and practice of standard precautions, including infection prevention and control among health care workers. Based on these recommendations, the federal and state ministries of health can plan and target cost-effective interventions to increase knowledge of the standard precautions among HCWs and improve adherence to infection prevention and control.

5.6 LIMITATIONS OF THE STUDY

This study was limited because it used the self-report method for assessing the practice of standard precautions. Observation may have been a better method for assessing the level of adherence to standard precautions, although observation would influence normal routines. The descriptive nature of the study limits its ability to establish temporal relationship between knowledge and practice of standard precautions among the respondents. The study was conducted among HCWs (doctors and nurses) in public secondary health facilities in FCT, thus the findings cannot be generalized to primary and tertiary health facilities in FCT.

5.7 CONCLUDING REMARKS

HCWs are potentially exposed to blood-borne and other infections through contact with body fluids during the course of performing their duties. Therefore, blood and other body fluids from patients are hazardous to those who provide patient care. Occupational safety of HCWs in developing countries are often neglected in spite of the greater risk of infection due to the higher disease prevalence, low level awareness of the risks associated with occupational exposure, inadequate supply of personal protective equipment, and limited organizational support for safer practices (Sagoe-Moses, Pearson, Perry & Jagger 2001: 538–41). This is worse in public health facilities (especially secondary and primary) where

resources are limited, thus HCWs are continuously exposed to unnecessary risk of infection. Therefore, efforts should be made to continually improve the knowledge and practice of standard precautions among health care workers.

This study has revealed valuable information about the knowledge and practice of standard precautions among HCWs in secondary health facilities in Abuja, Nigeria. The findings can be useful in planning appropriate measures to improve the knowledge and compliance of HCWs to standard precautions, thus reducing the risk of infection transmission. The findings may also serve as a database for future studies along similar lines.

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ANNEX A

APPROVAL FROM THE UNIVERSITY

UNIVERSITY OF SOUTH AFRICA
Health Studies Research & Ethics Committee
(HSREC)
College of Human Sciences

CLEARANCE CERTIFICATE

Date: 14 September 2009 Project No: 3731 652 4

Project Title: **THE KNOWLEDGE AND PRACTICE OF STANDARD PRECAUTIONS
 AMONG HEALTH CARE WORKERS IN SECONDARY HEALTH
 FACILITIES IN THE FEDERAL CAPITAL TERRITORY OF
 ABUJA, NIGERIA**

Researcher: **Ms OE Franklin**

Supervisor/Promoter: **Ms ME Chauke**

Joint Supervisor/Joint Promoter: **Dr BL Dolamo**

Department: **Health Studies**

Degree: **MPH (Masters in Public Health)**

DECISION OF COMMITTEE

Approved

Conditionally Approved

Date: 14 September 2009


Prof VJ EHLERS

RESEARCH COORDINATOR: DEPARTMENT OF HEALTH STUDIES

MS ME CHAUKE: SUPERVISOR

DR BL DOLAMO: JOINT SUPERVISOR

PLEASE QUOTE THE PROJECT NUMBER IN ALL ENQUIRIES

ANNEX B
DATA COLLECTION TOOL
STUDY ON THE KNOWLEDGE AND PRACTICE OF STANDARD PRECAUTIONS AMONG
HEALTH CARE WORKERS IN PUBLIC SECONDARY HEALTH FACILITIES IN ABUJA,
NIGERIA

Dear colleagues

Health care workers are constantly exposed to various infectious agents during the course of carrying out their duties. Standard precautions have been shown to effectively reduce occupational exposure. I am conducting a study on '*The knowledge and practice of standard precautions among health care workers in public secondary health facilities in Abuja, Nigeria*' as a requirement for partial fulfillment of the award of Masters in Public Health (MPH) at the University of South Africa

You are requested to participate in the study by responding to the attached questionnaire. By completing this questionnaire, you will be contributing to the understanding of the factors that influence compliance to standard precautions as well as ways of improving it.

Please note that:

- Permission to conduct the study has been granted by Health & Human Services Secretariat (HHSS) of FCTA (Federal Capital Territory Administration)
- Your participation in the study is voluntary and you are under no obligation to participate.
- Completion of this questionnaire implies your informed consent to participate in the study
- All information provided by you will be treated as confidential and your responses will **never** be associated to you because you are not required to write your name on the questionnaire.
- You have the right to withdraw from the study at any time.

INSTRUCTIONS

- The questionnaire has 3 sections and each section has a number of questions, some with multiple choice answers.
- Please answer all questions as completely as you can; **for pre-coded questions, encircle the code number that corresponds with your chosen response.**

Thanking you for your cooperation
Okechukwu Emeka Franklin
Student number: 3731-652-4
E-mail: drlongusf@yahoo.co.uk

SECTION 1
BIOGRAPHICAL DATA

Please

- Write the number of years in response to questions 1.1. and 1.3
- Encircle the number code that corresponds to your chosen options for 1.2 and 1.4

Q/No	ITEM /QUESTION	Response option	Code
1.1	What is your age (years) as at your last birthday		
1.2	What is your gender	Male	1
		Female	2
1.3	Number of years of post qualification experience		
1.4	Area of practice	Doctor	1
		Nurse/Midwife	2

SECTION 2

KNOWLEDGE OF STANDARD PRECAUTIONS

- Please encircle the number code that corresponds with your chosen answer/ option to the items
 - You can choose more than one response for items 2.1- 2.6

2.1	The concept of standard precautions includes	Hand washing before and after any direct contact with patient	1
		Consideration of the potential for transmission of infectious agents in patient placement decisions.	2
		Cough etiquette such as directing patients/relatives with symptoms of a respiratory infection to cover their mouths/noses when coughing or sneezing	3
		Safe injection practices such as use aseptic technique	4
2.2	What are potential ways of occupational exposure?	Needle stick /sharp injury	1
		Splash on the eye	2
		Inhalation	3
		Talking to patients	4
		Touching patients	5
2.3	According to the standards	Before any direct contact with patients	1

	precautions, hand washing is performed	Between patients' contact	2
		Immediately after removing gloves	3
		After touching body fluids such as blood, excretions and sweat	4
2.4	For which of these conditions should standard precautions be followed?	HIV/AIDS	1
		Tuberculosis	2
		Patients with skin infections	3
		All patients	4
2.5	Which of the following body fluids require standard precautions?	Blood	1
		Vaginal fluid	2
		Blood tinged body fluids	3
		Saliva in dental procedures	4
		All of the above	5
2.6	Which of these patient factors are important in deciding when to use personal protective equipments such as goggles, mask, gloves, gowns and apron?	HIV/AIDS	1
		Hepatitis B virus (HBV) infection	2
		Signs and symptoms of infection	3
		None of the above	4
2.7.1	For post exposure prophylaxis (PEP) for HIV, HIV counseling & testing is done immediately after the exposure and PEP is given only to HIV negative test result	YES	1
		NO	2
2.7.2	Two or three antiretroviral drugs are given immediately after the exposure but within 72 hours.	YES	1
		NO	2
2.7.3	The antiretroviral drug is taken for 4 weeks	YES	1
		NO	2

**SECTION 3: PRACTICE OF STANDARD PRECAUTIONS AND FACTORS THAT INFLUENCE
COMPLIANCE TO STANDARD PRECAUTIONS**

Please encircle the number code that corresponds with one chosen option

3.1	I wash hands with soap and water after any direct contact with patients.	Always	1
		Often	2
		Seldom	3
		Never	4
3.1.2	Give reasons if your response to 3.1 is 2, 3 or 4	Water and soap not available at patient care areas	1
		It is a waste of time and it increases patient waiting time	2
		Not all patient contact is infectious	3
		It is costly	4
		Other (specify)	5
3.2	After giving injections or drawing blood from the patients,	I do not recap used needles	1
		I remove needles from the disposal syringes	2
		I bend needles by hand to prevent injury to other health workers	3
		I recap used needles	4
3.3	When I discard used needles and sharps, I use	any available container	1
		a dust bin covered with plastic	2
		a closed dust bin	3
		a puncture proof container	4

3.4	The sharps disposal containers are located as close as practical to the use area	YES	1
		NO	2
3.5	I wear gloves for contact with body fluids, non-intact skin and mucous membrane	Always	1
		Often	2
		Seldom	3
		Never	4
3.5.1	Give reasons if your response to 3.5 is 2, 3 or 4	Lack of supplies	1
		Discomfort with use of gloves	2
		Might cause fear in patients	3
		Other (specify)	4
3.6	I wear gown/plastic apron during procedures likely to generate splashes of blood or body fluid	Always	1
		Often	2
		Seldom	3
		Never	4
3.6.1	Give reasons if your response to 3.6 is 2, 3 or 4	Lack of supplies	1
		Discomfort with use of gowns/plastic apron	2
		Might cause fear in patients	3
		Other (specify)	4
3.7	I wear a mask and eye protection for procedure likely to generate droplets/splash of blood or body fluid	Always	1
		Often	2
		Seldom	3
		Never	4
3.7.1	Give reasons if your response to 3.7 is 2, 3 or 4	Lack of supplies	1
		Discomfort with use of gowns/plastic apron	2
		Might cause fear in patients	3
		Other (specify)	4

3.8	I cover all cuts and abrasions with a water proof dressing	Always	1
		Often	2
		Seldom	3
		Never	4
3.9	I have had needle stick injury in the last three month	YES	1
		NO	2
3.9.1	If yes, how many times	Once	1
		Twice	2
		Three times	3
		More than three times	4
3.10	Do you have a focal person designated for PEP in the facility?	YES	1
		NO	2
3.11	Is post exposure prophylaxis (PEP) available	YES	1
		NO	2
3.12	Are you aware of guideline for PEP management?	YES	1
		NO	2
3.13	Have you been vaccinated against Hepatitis B?	YES	1
		NO	2
3.13.1	If YES, how many doses?	One	1
		Two	2
		Three	3
3.13.2	If NO, Why?	Not aware	1
		Not available	2
		High cost	3

THANK YOU FOR YOUR PARTICIPATION

ANNEX C

**APPROVAL FROM THE HEALTH RESEARCH ETHICS COMMITTEE, HEALTH AND
HUMAN SERVICES SECRETARIAT (HHSS), FCTA, ABUJA**



FEDERAL CAPITAL TERRITORY
HEALTH RESEARCH ETHICS COMMITTEE
Office of the Secretary of the Committee
(Research Unit, Room 10, Annex Building,) HHSS Secretariat Area 11, Garki - Abuja

February 4, 2009

**Re: Study of Knowledge and Practice of Standard Precautions among Health Care Workers in
Secondary Health Facilities in the Federal Capital Territory - Abuja, Nigeria.**

Name of Principal Investigator: Dr. Emeka Okechukwu Franklin
Address of Principal Investigator: FHI/GHAIN, FCT Zonal Office, Coscharis Plaza, Area 3, Garki - Abuja
Date of receipt of valid application: 13/01/2009

NOTICE OF FULL APPROVAL AFTER FULL COMMITTEE REVIEW
Protocol Approval Number: FHREC/2009/01/2/04-02-09

This is to inform you that the research described in the submitted protocol, the consent forms, advertisements and other participant information materials have been reviewed and given full approval by the Federal Capital Territory Health Research Ethics Committee.

This approval dates from 04/02/2009 to 03/02/2010. If there is delay in starting the research, please inform the FHREC so that the dates of approval can be adjusted accordingly. Note that no participant accrual or activity related to this research may be conducted outside of these dates.

All informed consent forms used in this study must also carry FHREC assigned protocol approval number and duration of FHREC approval of the study. In multiyear research, endeavour to submit your annual report to the FHREC early in order to obtain renewal of your approval and avoid disruption of your research. At the end of the research, a copy of the final report of the research should be forwarded to FHREC.

The National Code for Health Research Ethics requires you to comply with all institutional guidelines, rules and regulations and with the tenets of the code including ensuring that all adverse events are reported promptly to the FHREC. No changes are permitted in the research without prior approval by FHREC except in circumstances outlined in the code. The FHREC reserves the right to conduct compliance visit to your research site without previous notification.

Ikwubiela S. Adem
Secretary, FHREC
For: Chairman FHREC



Abuja
The Heart of Nigeria

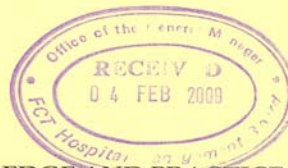
ANNEX D**PERMISSION LETTER FROM HHSS, FCTA, ABUJA**

**HEALTH & HUMAN SERVICES
FEDERAL CAPITAL TERRITORY ADMINISTRATION
KAPITAL STREET, BLOCK A, AREA 11, P.M.B 24, GARKI ABUJA - NIGERIA**

Our Ref:
Your Ref:

Tel/Fax:
Date: 4th February 2009

The General Manager,
Hospital Management Board



**STUDY OF KNOWLEDGE AND PRACTICE OF STANDARD
PRECAUTIONS AMONG HEALTH CARE WORKERS IN SECONDARY
HEALTH FACILITIES IN THE FEDERAL CAPITAL TERRITORY - ABUJA,
NIGERIA**

Dr. Emeka Okechukwu, a postgraduate student of the University of South Africa has been given ethical approval by the FCT Health Research Ethics Committee (FHREC) to carry out Studies on the Knowledge and Practice of Standard Precautions among Health Care Workers in Secondary Health Facilities in the Federal Capital Territory - Abuja, Nigeria

He has therefore applied to the FCT Health and Human Services Secretariat for permission to use Some FCTA secondary health facilities for the purpose of the study. The hospitals are as follows:

DISTRICT HOSPITALS

1. Maitama
2. Asokoro,

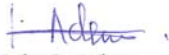
GENERAL HOSPITALS

1. Wuse
2. Gwarinpa
3. Nyanya
4. Kubwa
5. Karshi
6. Bwari

7. Abaji
8. Kwali
9. Kuje

Kindly give him the necessary cooperation please.

Thank you.



Ikwubiela S. Adem
For: Secretary, HHSS