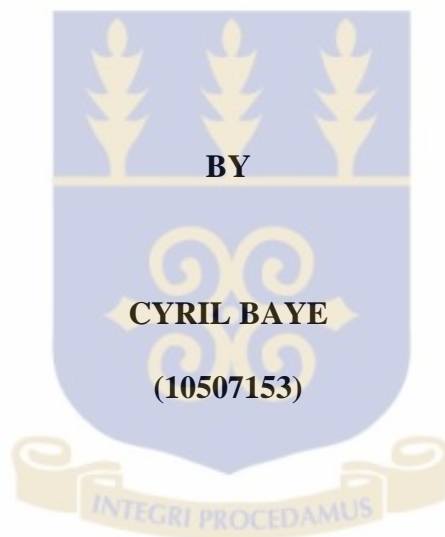


**SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCES
UNIVERSITY OF GHANA**

**LEVEL OF ADHERENCE TO UNIVERSAL PRECAUTIONS BY NURSES AT THE
37 MILITARY HOSPITAL, ACCRA.**



**THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA,
LEGON IN PARTIAL FULFILLMENT FOR THE AWARD OF MASTER OF
SCIENCE (MSc.) DEGREE IN OCCUPATIONAL HYGIENE**

JULY 2015

DECLARATION

I, Baye Cyril, hereby declare that apart from specific references which I have duly acknowledged, this dissertation is the result of my own independent work. I further declare that this dissertation, either in whole or part has not been submitted for the award of any degree in any institution.

.....
CYRIL BAYE

STUDENT



.....
DATE

.....
PROFESSOR ISABELLA A. QUAKYI

ACADEMIC SUPERVISOR

.....
DATE

DEDICATION

I dedicate this work to God Almighty, who by His abundant grace and mercies has lead me this far, mighty is His Name.



ACKNOWLEDGEMENT

To God be the highest glory, for His unmerited love, guidance and mercies for me throughout my study period. To my academic supervisor, Professor Isabella A. Quakyi. I am most grateful. I could not have finished this work without you. I want to specially thank the head of department (BEOH) Professor Julius Fobil for his encouragement, to Dr. Ofori Tutu, Dr. John Arkoh - Mensah, Dr. Reginald Quansah and the entire faculty of Department of Biological, Environmental and Occupational Health Sciences, I thank you all.

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Finally, my sincere thanks goes to my family especially my parents Mr. and Mrs. Paul Favour Baye and my brothers who have supported me morally and spiritually throughout this research and to all those who contributed in diverse ways to the success of my research, I say God richly bless you all.

ABSTRACT

Background

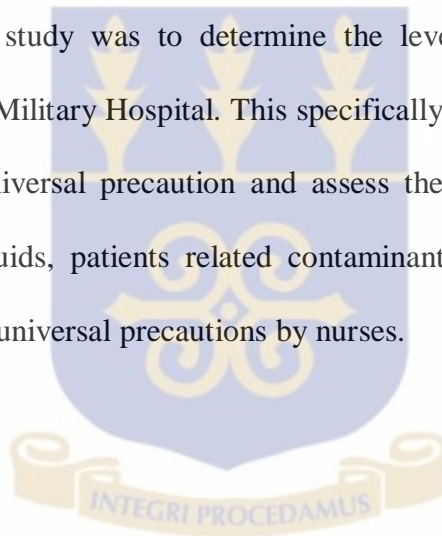
In the process of delivering healthcare to patients, nurses in the quest to meet up with the pressures at work and to satisfy each patient tend to devise irregular approaches to work rather than adhering to the universal precautions. This predisposes them to occupational injuries and risks, such as needle stick injuries, leading to time and efficiency loss resulting in low productivity at the work place.

Objectives

The main objective of the study was to determine the level of adherence to universal precautions by Nurses at 37 Military Hospital. This specifically is to measure the proportion of nurses who adhere to universal precaution and assess the knowledge of nurses in the handling of patient body fluids, patients related contaminants and determine factors that impinge on the adherence to universal precautions by nurses.

Methods

A cross sectional study was conducted to assess the level of adherence to universal precautions by nurses. The sample population for this research was made up of one hundred and twenty (120) nurses aged between 20-60 years. A pre-tested structured questionnaire and checklist were used to obtain the data. Results were analyzed and appropriate measures of centrality and of dispersion were calculated using STATA. In addition, graphical displays such as frequency distributions were created.



Results

Findings from this study shows that 114 (95%) of nurses adhered to universal precautions while 6 (5%) did not. Of the total 120 respondents, 74 (61.7%) were females, with 73 (60.8%) of the nurses aged between 20-29 years. Seventy-four (61.7%) of the respondents have certificate or diploma qualification. Out of 120 respondents, 66 (55%) had worked for at least 3 years and above while 54 (45%) had worked close to 2 years. Only 56 (46.7%) of nurses have had full course hepatitis B vaccination and 40 (30%) of them said there was inadequate provision of basic equipment to promote hand hygiene.

Conclusion

Major factors identified that affect nurses ability to meet the requirement for adherence to universal precautions include, the dearth of equipment, training on the use of personal protective equipment, establishment of policy and procedures in infection prevention and control and mandating nurses to take the Hepatitis B vaccine at a subsidized cost for their safety. The study brings to the fore lack of coordination between safety, standard operation procedures and adherence to universal precaution by nurses.

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LIST OF ABBREVIATIONS

ABBREVIATIONS	MEANING
AIDS.....	Acquired Immunodeficiency Syndrome
BBP.....	Blood Borne Pathogen
CDC.....	Centers for Disease Control
FLCF.....	First Level Care Facilities
GAFMS.....	Ghana Armed Forces Medical Service
HAART	Highly Active Antiretroviral Therapy
HBV.....	Hepatitis B Virus
HCV.....	Hepatitis C Virus
HIV.....	Human Immunodeficiency Virus
HW.....	Health worker
MMWR.....	Morbidity Mortality Weekly Report
NSI.....	Needle Stick Injury
OSHA.....	Occupational Safety and Health Act
PEP.....	Post Exposure Prophylaxis
PEP.....	Post Exposure Protocols
PPA.....	Personal Protective Attire
PPE.....	Personal Protective Equipment
SP.....	Standard precautions
UP.....	Universal precautions

DEFINITIONS OF TERMS

Adherence

The fact of someone behaving or obeying exactly according to rules and norms of the working place.

Universal Precautions

Controlled guidelines designed to protect health workers from exposure to diseases spread by blood and other body fluids by wearing non-porous articles such as medical gloves, goggles, face mask, aprons, among others.

Occupational exposure

An 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.

Personal protective equipment

Specialized clothing or equipment such as gloves, gowns, masks, and eye protection worn by an employee for protection.

CHAPTER ONE

1.0 INTRODUCTION

Universal Precautions (UP) are infection controlled guidelines designed to protect nurses from exposure to diseases spread by blood and other body fluids by wearing non porous articles such as medical gloves, goggles, face mask, aprons, among others. It is also defined as routine use of appropriate barriers and techniques to reduce the likelihood of exposure to blood and other body fluids and tissues (Garner, 1997; Gerberding, 1994).

1.1 Background

The concept of universal health precautions as provided by the Center for Diseases Control (CDC), emphasizes that all patients should be treated as though they have potential blood borne infection and can infect the healthcare worker. In the process of delivering healthcare to clients, nurses in their quest to cope with the stresses at work and to satisfy each client tend to devise approaches rather than sticking to the universal precautions which predisposes them to occupational injuries and risks example needle sticks injuries. This leads to time loss, efficiency loss and low productivity at work place (CDC, 1988).

It is known that compliance with precautions practices requires appropriate attitudes from health professionals over long periods of time, demanding motivation and technical knowledge. This is an effective way to protect health professionals, patients and the public in order to reduce hospital infections. Failure to comply may be reflected in high incidence rates of occupational accidents with exposure to body fluids and sharps (Ferguson, 2009; Roberts, 2000).

Recent studies suggest that compliance with the standard precautions remains low and there are multiple reasons for the failure to comply, the reasons include lack of motivation, poor technical knowledge amongst staff, insufficient training of health professionals, overwork, negative influence of inadequate behaviour by more experienced staff members, failure to perceive risks, conflicts of interest, lack of equipment, lack of time, stress, difficulty in adapting to use Personal Protective Equipment (PPE) and perception of a lack of interest on the part of the institution for the safety of its employees (Campins, 2009).

It is known that some of the injuries are due to conditions in the physical work environment and others to the human component of the work system. Most healthcare workers engage in practices that protect them from exposure to the hazards inherent in their workplace and hence from injuries which promote sustainable change in the safety situations in the healthcare fields (Tharaldsen *et al.*, 2008).

A number of studies carried out in Ghana, one of which has brought into focus a wide gap between knowledge and practice required to protect the health personnel against Human Immune Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS). From these studies, recommendations were made to the Ghana Health Service and the Ministry of Health. These included development of clear policies on the universal basic precautions, training health care providers on the implementation of universal basic precautions and ensuring consistent supply of all protective materials at all times within health institutions (Hesse *et al.*, 2006).

1.2 Statement of Problem

Health workers such as medical doctors, nurses, laboratory staff and aides who work in the hospitals, clinics and other health care settings are frequently exposed to infectious diseases.

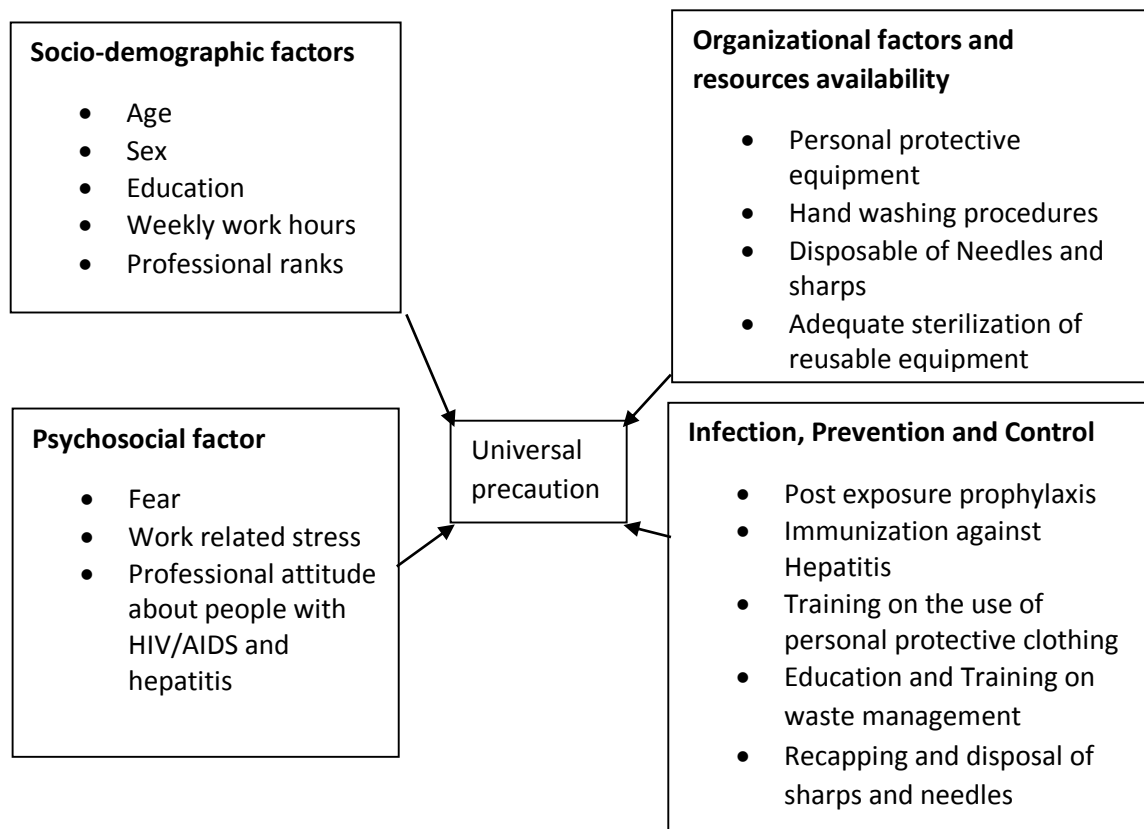
Some of these infectious diseases have no available vaccination or cure; consequently, these blood borne infections are a major cause of anxiety for health care workers (Honda *et al.*, 2011).

The Greater Accra Region is known to be the third leading region in the hierarchy of prevalence of HIV and AIDS infection in Ghana. The 37 Military Hospital, which is also the third largest hospital in Ghana, serves as a referral facility for the other health institutions in the country. Following the review of the 2006 to 2010 National Strategic Framework was reviewed with its stakeholders and the bilateral and multilateral partners, one of the country's goals was to prevent new HIV infections because it is noted that viral infection is the leading cause of death in 37 Military Hospital. (Adjei *et al.*, 2006).

It is important for Nurses and health workers in hospital to be abreast with knowledge, attitude and above all continual adherence to universal precautions in order to minimize or prevent the risk of infection (Adjei *et al.*, 2008).

1.3 Conceptual Framework

Figure 1: Components Leading To Universal Precautions



The conceptual frame illustrated in Figure 1 discusses the various components leading to universal precautions. The risk of health workers contracting HIV and AIDS through occupational injury is generally smaller than the risk from sexual contact, although there is variation in occupational risk across cadres and between countries. This risk may be increased depending on the prevalence of hepatitis infection, HIV and AIDS in the patient population and by low adherence to universal precautions. Much of the driving force for the recommendations and regulations regarding universal precautions has stemmed from concern over HIV and AIDS, Hepatitis B virus (HBV) and Hepatitis C virus (HCV), though they are certainly not the only infections with the potential to circulate in healthcare settings (Liese and Dussault, 2004).

Pathogens from both blood and body fluids may be transmitted by sexual, direct contact or through fomites such as surgical instruments or dried blood on an object (Beltrami *et al.*, 2000).

One major problem among the healthcare population is that many people are still reluctant to be tested for HIV and AIDS, although policies that provide incentives for testing already exist. Developing countries where the prevalence of HIV-infected patients is very high, record the highest needle stick injuries. Needle stick injuries were also reported as the most common occupational health hazard in a Nigerian teaching hospital (Orji *et al.*, 2002).

With the objective of investigating the rates of adherence to Universal Precautions among health professionals, and the motives that lead them to fail to comply with the recommendations and standards related to occupational exposure involving potentially contaminated material, such as the use of Personal Protective Equipment (PPE), two theoretical models of adherence to UP were developed in the United States: the Work System Model (Gershorn *et al.*, 1995) and the Model of Adherence to UP (Dejoy *et al.*, 1995).

The Model of Adherence to Universal Precautions, by means of Likert type scales, has three conceptual areas that reflect the behavior of adherence to UP, namely: a) individual and socio demographic factors, such as occupation, working hours, knowledge of standard precautions; b) psychosocial factors, such as fear, work-related stress and professionals' attitudes about the individual living with HIV and AIDS, hepatitis infection; and, c) organizational factors, which include the organizational safety climate, support of the institution and participation in training (Gershorn *et al.*, 1995).

1.4 Justification

According to World Health Organization (WHO), 2.5% of HIV cases, 40% of both HBV and HCV cases worldwide are the result of occupational exposure among health care workers (Hutin *et al.*, 2001; WHO, 2002).

In recognition of the overburdened health systems with inadequate staffing, supplies and increased patient load on the Ghanaian nurses, there is the need to assess the proportion of nurses who that comply to universal precautions and to take measures to improve if there are lapses. Various studies on the knowledge of universal precautions have been carried out throughout the world and some parts of Ghana, specific studies have not been carried out among nurses at the 37 Military Hospital.

To measure proportion of nurses that adhere to universal precautions in 37 Military Hospital, there is a need to assess the knowledge of nurses in the hospital in handling of patient body fluids and contaminant, to determine factors that affect the adherence to universal precautions by nurses in various department of the hospital. This therefore implies that level of adherence to universal precautions by nurses are unique in specific context, and therefore, studies done in other countries or areas may not be comparable due differences in circumstances surrounding the sites.

The research would also serve as a source of referencing to other related studies. Findings will also serve as a useful guide for program planning formulation and implementation for governments in the region.

Finally, it will contribute to existing academic knowledge and research for future related studies.

1.5 Objectives of the study

1.5.1 Research Questions.

- What proportion of nurses adhere to universal precautions in 37 military hospital?
- What are the levels of knowledge of nurses about adherence to universal precautions?
- What are the factors affecting the practise of universal precautions?

1.5.2 General Objective

To assess the level of adherence to universal precautions by Nurses in 37 Military Hospital.

1.5.3 Specific Objectives

- To measure proportion of nurses who adhere to universal precautions in 37 military hospital.
- To assess the knowledge of nurses handling of patient body fluids and contaminant in the hospital.
- To determine factors that affect adherence to universal precautions by nurses.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 History of Universal Precautions

Universal Precautions were the infection control techniques that were recommended following the AIDS outbreak in the 1980s. They refer to the practice, in medicine, of avoiding contact with patients' body fluids, by means of the wearing of nonporous articles later in the decade, and particularly in response to the HIV/AIDS epidemic, “universal precautions” were instigated to prevent the spread of pathogens responsible for diseases such as HIV and AIDS, HBV and HCV transmitted in blood, and other body fluids containing visible blood, semen and vaginal secretions. The practice was introduced in 1985 to 1988 (Thomas, 2007).

In 1987, the practice of universal precautions was adjusted by a set of rules known as Body Substance Isolation (BSI). In 1996, both practices were replaced by the latest approach known as Standard Precautions (SP). Standard Precautions combine the major features of Universal Precautions (UP) and Body Substance Isolation (BSI) and are based on the principle that all blood, body fluids, secretions, non-intact skin, and mucous membranes may contain transmissible infectious agents. Standard Precautions include a group of infection prevention practices that apply to all patients, regardless of the suspected or confirmed infection status, in any setting in which healthcare are delivered. Current practice of universal precautions has historical significance (McCarthy, 2000).

The universal application of standard precautions is the minimum level of infection control required in the treatment and care of all patients to prevent transmission of HIV, HBV and HCV. These include personal hygiene practices particularly hand-washing, use of personal protective equipment such as gloves, gowns and protective eye wear, aseptic

technique, safe disposal systems for sharps and contaminated matter, adequate sterilization of reusable equipment and environmental controls (Sridhar *et al.*, 2004).

Most of the cardiothoracic surgeons in Nigeria and Ghana practice and adhere to universal precautions. It is known that the risk of accidental infection to operating room personnel through blood contact during surgical procedure is not excessive and can be reduced by universal precautions (Klatt, 1994).

The precautions also apply to tissues, cerebrospinal, synovial, pleural, peritoneal, pericardial, and amniotic fluids. Saliva is included only if visibly contaminated with blood. Additional precautions were used in addition to universal precautions for patients who were known or suspected to have an infectious condition, and varied depending on the infection control needed for that patient (Garner, 1996).

The terms “standard precautions” and “universal precautions” were taken to be synonymous, meaning the set of measures for preventing occupational exposure to blood borne pathogens. Although there are conceptual differences between the two protocols, their similarities of principles and foundations were the aspects of interest for the present study.

2.2 Assessment of Knowledge.

A study conducted on assessment of knowledge about blood borne pathogens (BBP) and use of universal precautions at first level care facilities (FLCF) in two districts of Pakistan from January to September 2004, show that two-thirds of workers reported routinely wearing gloves when performing an invasive procedure. Reported hand washing after patient contact also varied significantly, with the highest rates of routine hand washing reported among licensed

practical nurses (54%) and the lowest among medical technologists. Again, assessing knowledge of blood borne pathogens (BBPs) among medical students in Karachi, Pakistan reported that 100% and 92% of the clinical year's students knew that HBV and HCV could be transmitted through syringes and Needle Stick Injury (NSI) respectively. Majority of the students (87%) knew that wearing gloves and safe disposal of sharp wastes (98%) protects them against these infections while only half students were aware that needles should not be recapped (Janjua *et al.*, 2007).

Another important measure is adequate professional immunization, as this guarantees anticipated protection against immune-preventable diseases. The level of practice of universal precautions by health care workers may differ from one type of health care worker to another. The differences in knowledge of universal precautions by health care workers may be influenced by their type of training. Various studies carried out among different categories of health care workers in Ibadan found that exposure to blood or other body fluids was approximately 25.1 percent (Olowu *et al.*, 2001).

Unsafe practices have been noted to account for quite a greater percentage of occupational safety incidents. Zohar and Luria (2003) identified that about 40% of work accidents result from workers' failure to use protective equipment. Implicitly, this suggests that if healthcare workers can be influenced to engage in safer rather than at-risk work behaviours, then a possible decrease in the rate of work-related injuries and diseases shall be achieved which would promote sustainable change in the safety situations in the healthcare setting.

2.3 Contents of Universal Precautions

These precautions include set of precautions devised to prevent transmission of all known blood-borne pathogens including HIV, hepatitis B virus, and hepatitis C virus to or from health care personnel when providing first aid or other health care services. These apply to blood and other body fluids containing visible blood, vaginal secretions and semen. The fact that “standard precautions” are recommended for the care delivery to all patients, regardless of their presumed infection state, is important when handling equipment and devices that are contaminated or suspected of contamination, and in situations of contact risk with blood, body fluids, and secretions and excretions except sweat, without considering the presence or absence of visible blood and skin with solution of continuity and mucous tissues (Garner, 1996).

Standard precautions consist of hand hygiene, before and after every episode of patient contact; the use of personal protective equipment; the safe use and disposal of sharps; routine environmental cleaning; reprocessing of reusable medical equipment and instruments; respiratory hygiene and cough etiquette; aseptic non-touch technique; waste management; and appropriate handling of linen. Standard precautions should be used in the handling of blood (including dried blood); all other body substances, secretions and excretions (excluding sweat), regardless of whether they contain visible blood; non-intact skin; and mucous membranes (Draft, 2010).

2.4 Use of Personal Protective Equipment

Personal Protective Equipment (PPE) or Personal Protective Attire (PPA) are selected and worn based upon the nature of the patient interaction and the likely mode of pathogen transmission (Altman *et al.*, 2004).

2.4.1 Gloves

Gloves are to be worn when there is potential for hand or skin contact with blood, other potentially infectious materials or items and surfaces contaminated with these materials. All health care workers should routinely use appropriate barrier precautions to prevent skin and mucous membrane exposure during contact with any patient's blood or body fluids that require universal precautions and wear protective body clothing when there is a potential for splashing of blood or body fluids. Gloves, which should be worn for direct contact with non-intact skin or mucous membrane, should fit well and be made of latex. Gloves can be disposable or non-disposable depending on what procedure is to be carried out. A number of means including accidental damage with needles can breach and puncture gloves. Gloves must be worn as single use item to prevent contamination of health care workers hand if anticipating direct contact with blood or body fluids, mucous membranes and non-intact skin. Glove must be discarded following each procedure in plastic bags and the hands washed. Gloves reduce the incidence of blood contamination of hands during phlebotomy but they cannot prevent penetrating injuries caused by needles or other sharp instruments. Researchers have shown through the years that latex gloves serves as an effective barrier to most pathogens. Gloves should have no influence on their ability to prevent transmission of blood borne diseases from patients to the nurses and vice visa. This is determined solely by the integrity of gloves (Altman *et al.*, 2004).

2.4.2 Goggles

Protective eyewear should be worn when there is risk of splash or spilling of blood or body fluids. Goggles are barrier style of protection for the eyes. Goggles should fit snugly over and around the eyes or prescriptive lenses (Kermode *et al.*, 2005).

2.4.3 Gown and Masks

Gowns and masks should be used as a barrier precaution whenever the possibility of splattering or splashes of blood or other body fluids contaminated with blood or other infectious materials may occur. Immediately wash hands or other skin surfaces thoroughly and if contaminated with blood, body fluids containing visible blood, or other body fluids to which universal precautions apply. Worker education and training in preventive measures should be carried out and safe work procedures developed for all activities having the potential for exposure (Garner, 1996).

2.4.4 Hand hygiene

Hand hygiene is a major component of universal precautions and one of the most effective methods to prevent transmission of pathogens associated with health care. In addition to hand hygiene, the use of personal protective equipment should be guided by risk assessment and the extent of contact anticipated with blood and body fluids, or pathogens. Hand washing reduces the number of potentially infectious micro-organism in the hand and decrease the incidence of infection transmission in the health care facility. It involves the use of antiseptic and or detergents to wash the hands for as little as about 10 to 15 seconds or to use an alcohol based agent to disinfect the hands. The hands and the skin surface should be washed immediately and thoroughly if contaminated with blood and other body fluids to which universal precautions apply or potentially contaminated articles. Hands should be washed after gloves are removed even if the gloves appear to be intact and should be done using appropriate facilities such as utility or restroom sinks. Hands should always be washed with soap and running water following contact with blood or other potentially infectious body secretion even if gloves have been even used for the task (Kaur *et al.*, 2008).

2.4.5 Alcohol Based Hand Sanitizer

Apply and rub the hand sanitizer thoroughly over all surfaces of hands and fingers until hands are dry. Alcohol-based hand sanitizers are not effective when hands are visibly dirty or contaminated with blood or fecal matter as in these instances, washing with an antimicrobial soap and water might be indicated (Stephens and Ludwig, 2005).

2.4.6 Safe handling and disposal of sharps

According to Rana *et al.*, (2000) the risk of infection again increases depending on the prevalence of the occupational injuries, and the nature and frequency of exposure that the health worker finds him or herself. Sharps include needles, scalpels, stitch cutters, glass ampoules and any sharp instrument. The main hazards of sharps injury are hepatitis B infection, hepatitis C infection and HIV. Do not recap, bend, break or hand manipulate used needles. If recapping is required, use the scooping method. Safely dispose used sharps in puncture resistant containers. Education and awareness training for all health care workers must be enforced. Out of 1,550 reported of blood- borne virus exposures from needle sticks in health workers, 42% were nurses or midwives (Gostin, 2007).

2.4.7 Appropriate device handling of patient care equipment and instruments

Handle in a manner that prevents transfer of microorganisms to others and to the environment. Wear gloves if visibly contaminated and perform hand hygiene. Handle used patient care equipment soiled with blood, body fluids, secretions, and excretions in a manner that prevents skin and mucous membrane exposures, contamination of clothing, and transfer of microorganisms to other patients and environments. Ensure that reusable equipment is not used for the care of another patient until it has been appropriately cleaned and reprocessed and that single-use items are properly discarded. Clean and disinfect surfaces that are likely to be

contaminated with pathogens, including those that are in close proximity to the patient such as bed rails, over bed tables and frequently-touched surfaces in the patient care environment (e.g., door knobs, surfaces in and surrounding toilets in patients' rooms) on a more frequent schedule compared to that for other surfaces such as horizontal surfaces in waiting rooms (Garner, 1997).

2.5 Environmental control

Develop procedures for routine care, cleaning and disinfection of an environmental surface especially frequently touched surface in patient care area. Cleaning refers to the removal of visible soil and organic contamination from a device or environmental surface using the physical action of scrubbing with a surfactant or detergent and water, or an energy-based process such as ultrasonic cleaners with appropriate chemical agents. This process removes large numbers of microorganisms from surfaces and must always precede disinfect. Disinfection is generally a less lethal process of microbial inactivation (compared to sterilization) that eliminates virtually all recognized pathogenic microorganisms but not necessarily all microbial forms (e.g., bacterial spores). Emphasis for cleaning and disinfection should be placed on surfaces that are most likely to become contaminated with pathogens, including those in close proximity to the patient (e.g., bedrails) and frequently-touched surfaces in the patient-care environment (e.g., doorknobs). Facility policies and procedures should also address prompt and appropriate cleaning and decontamination of spills of blood or other potentially infectious materials (Siegel *et al.*, 2007).

2.6 Textile and laundry

Workers handling soiled linen and garments can be exposed to bloodborne pathogens from body fluids associated with healthcare, surgical and aftercare treatment. The most significant - and dangerous - diseases caused by bloodborne pathogens are hepatitis B (HBV) and human

immunodeficiency virus (HIV), which causes AIDS. It is required all employees to wear fluid-resistant gowns and gloves. Make face masks, shoe protection, goggles and hair nets available. Be sure personal protective equipment is cleaned, laundered or disposed of by the facility at no cost to workers (Garner, 1996).

2.7 Respiratory protection

Currently requires the use of a respirator with N95 or higher filtration to prevent inhalation of infectious particles. Respirators are also recommended to be worn during the performance of aerosol-generating procedures example intubation, bronchoscopy, suctioning on patients with Severe Acute Respiratory Syndrome Co-V infection, avian influenza and pandemic influenza. Source control measures such as covering the mouth or nose with a tissue when coughing and prompt disposal of used tissues, using surgical masks on the coughing person when tolerated an appropriate hand hygiene after contact with respiratory secretion and spatial separation thus proximity greater than 3 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. Masking may be difficult in some settings, (e.g., pediatrics, in which case, the 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. 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. (Siegel *et al.*, 2007).

2.8 Contributing Factors to Adherence.

Several factors associated with Health Care Workers (HCWs) adherence to UP standards have been documented. One of such document reported that, HCWs often have limited knowledge and training of infection control in their implementation during daily patient care. Poor knowledge has been associated with poor attitude and poor practices of universal precautions (Bolyard *et al.*, 1998).

The deficient knowledge base among some health workers may be due to a lack of investment from in staff training or to limited understanding of the health care workers of safe behavior in the clinical setting (Vaz *et al.*, 2010).

The factors that contribute to these problems include lack of motivation, lack of knowledge of technical staff, insufficient qualification of professionals, work overload, lack of orientation for healthcare professionals to address difficulties to use SP in practice and inappropriate behavior of more experienced professionals negatively influencing other team members (de Carvalho Nagliate *et al.*, 2013).

Some researchers focused on the factors that contribute to non-compliance with universal Precautions. Reported factors were lack of knowledge, lack of time, forgetfulness, negative influence of the equipment on nursing skills, uncomfortable equipment, skin irritation, lack of training and conflict between the need to provide care, self-protection and distance to necessary equipment or facility (Tait *et al.*, 2000).

Despite recognition of the importance of universal precautions, studies have shown that the adherence levels are unsatisfactory. For example, PPE is used inadequately and selectively,

needles are frequently recapped and the level of adherence to standard precautions varies according to professional category (Talaat *et al.*, 2003).

Among the diverse types of occupational exposure, the percutaneous route is considered the most common, as it is the category that most affects nursing. With the intention of minimizing the risk of pathogen transmission such as HIV, several safety measures were established in the health services (Siegel *et al.*, 2007).

Although there is some knowledge on the part of nursing staff regarding the importance of the use of Universal Precautions, adherence does not regularly occur in practice (Vieira and Padilha, 2008).

In addition, differences in adherence to universal precautions were noted when comparing groups of health professionals, such as nurses and physicians and experienced and inexperienced professionals (Madan *et al.*, 2001).

Studies have identified psychosocial factors that interfere with the adoption of universal precautions. For example, the way in which standard precautions interfere with work performance is perceived as a barrier or “obstacle”, as observed in reports from healthcare professionals who felt that they lost manual dexterity through using gloves during the procedure of venous puncture (Brevideilli and Cianciarullo, 2009).

A number of research studies have been conducted globally concerning this topic on universal precautions in respect of health workers and their risk of acquiring HIV, HBV and HCV. One study was conducted in Pakistan where injection use is very common and about 13.6% injections are administered each year per person. Studies shows that, more than 50% of these

injections are provided with previously used syringes, since reuse of the syringe involves manipulation, recapping and disassembly, and this puts providers at risk. This is as a result of lack of equipment and other medical item to improve the delivery of care in such facility. Universal precautions trainings and practices are low cost solution to reducing risk of sharp injuries and have a high likelihood of being adopted in this regard (Janjua *et al.*, 2007).

In another study, the risk of infection among surgeons was found to be 15 times higher in tropical Africa than in developed countries. A Swaziland study in 2005 indicates that a substantial level and proportion of attrition among health workers has been due to staff deaths. Among health staff within the 20–45 year age group, mortality was 4.9% in 2004 (Tawfik and Kinoti, 2006).

According to this report, more women than men are affected by the HIV and AIDS epidemic directly, and indirectly as caregivers. By this report, the attrition rate of front-line workers in the health sector is exacerbated by HIV and AIDS because more women than men serve at the operational level, and said women are leaving clinical nursing services and more women than men are dying of AIDS due to increased disease risk. Front-line health workers in sub-Saharan Africa are largely female at the operational level, while top management and policy levels have been mainly male (Tawfik and Kinoti, 2006).

In Ghana in the late 1990s, 59% of all public health staff were female, but this reduced to 33.5% at the Ministry of Health headquarters. Only 17% of doctors were female as compared to 87.4% of registered nurses and 90.2% of enrolled nurses. In Malawi in 2003, 75% of service providers leaving clinical service provision were women (Tawfik and Kinoti, 2006).

2.9 Control measures for Universal Precautions.

According to the World Health Organization Report, the first step is to save lives of current and existing health workers by treating those with HIV and opportunistic infections. Again one of the policy action that have been projected to be achieved over a decade for health workers between 2006-2015 is to make resources available to provide essential information for prevention and ensure a reliable supply of equipment to prevent infection (WHO, 2006; Hesse *et al.*, 2006)

2.9.1 Hepatitis B immunization

Primary Hepatitis B vaccination of adults usually consists of 3 doses of 10 or 20 µg of recombinant Hepatitis B serum Antigen protein administered intramuscularly into the deltoid muscle on a 0, 1, and 6-month schedule. Alternative schedules (including a 4-dose schedule at 0, 1, 2, and 12 months) are U.S.-approved for routine vaccination for specific ages and vaccine formulations; vaccination according to these schedules elicits final rates of seroprotection similar to those obtained on a 0, 1, and 6-month schedule. Obese persons might require adjustment in the needle length for administering Hepatitis B vaccine to achieve optimal seroprotection (Hoerger *et al.*, 2014).

2.9.2 Post Exposure Management

The risk of infection following a needle-stick injury with needle from an infected source patient is about 0.3% for HIV, 3% for hepatitis C and 6- 30%, for hepatitis B thus an effective response to occupational exposure to blood or other body fluids helps (WHO, 2006).

2.9.3 Guidelines outlining all procedures

Dissemination of guidelines, Information, education on personal protection, Hepatitis B immunization and communication is very important. Support and counseling on those affected by the disease. Possible provision of post exposure prophylactic medication for high-risk exposures. Analysis of surveillance data. Ensure adequate supplies of personal protective equipment such as gloves, goggles or glasses, masks, gowns and plastic aprons and devices with sheathed or retracted sharps after use. Train staff in the correct use of personal protective equipment and management should ensure that standard or quality of the personal protective equipment are used. Use influential senior staff as role models to promote personal protective equipment. Monitor compliance and inappropriate use. Inappropriate glove use wastes resources. Compliance with eye protection often requires additional efforts. Dispose of used personal protective equipment safely (WHO, 2003).

2.10 Measures of Adherence to Universal Precautions

Treatment is a multifactorial problem, great difficulty has been shown in measuring adherence to Universal Precautions by health professionals, since no validated instruments exist in the literature that address all involved aspects. In this regard, differences in adherence were observed when comparing the results of observational studies with research using forms or questionnaire. Many times the adherence is lower in the observational studies than those that employed instruments to which the professional responded (Henry *et al.*, 1994).

In addition, differences in adherence to standard precautions were noted when comparing groups of health professionals, such as nurses and physicians and experienced and inexperienced professionals (Madan *et al.*, 2001).

Work System Model addresses adherence to universal precautions, individual factors and those linked to the institution. Based on American models, researchers translated, adapted and validated a proposal for a theoretical model of adherence to universal precautions for Brazil that addressed individual, work-related and organizational factors. Among the scales that compose this model, the Scale of Adherence to universal precaution (UP) stands out, which contributes to assessing levels of adherence of health professionals regarding the use of Personal Protective Equipment (PPE), disposal of perforating objects and needle recapping. American studies involving the use of the scale for adherence to UP in professionals working in non-hospital environments showed a high score of adherence to SP, with mean scores of 4.54 (Harris and Nicolai, 2010).

2.11 Related Studies on Universal Precautions

Another study of orthopaedic residents from all over Pakistan attending a conference also reported that 93% of the residents knew that HCV could be transmitted through blood transfusion, 88% knew about its transmission through a needle-stick injury and 74% of subjects had been vaccinated for HBV (Rana *et al.*, 2000).

Another research assess the demographic factors and pattern of injuries sustained by nurses, and to determine the occupational hazard of exposure to Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) among nurses. It was found that 11.2% of the nurses who had worked for a period of between 0 and 5 years and 37.1% of those who had worked for a period between 16 and 20 years had evidence of HBV or HCV infection. Of the nurses working in surgical clinics, 59.4% had evidence of previous HBV or HCV infection and those working in hospital clinics had an 18.2% infection rate. Of the nurses occupationally exposed to HBV and HCV infections, 22.4% had received sharps injuries from apparatus and 63.6% had suffered

needlestick exposure. Findings also showed 2.7% Hepatitis B serum Antigen positivity and 5.4% anti-HCV positivity. Of the 452 (76%) nurses who faced the occupational hazard of exposure to hepatitis infections, 27.7% (125/452) had not been vaccinated against HBV. Nurses working in our health-care sector are frequently exposed to occupational exposure for HBV and HCV infections. In order to prevent the infection of nurses with hepatitis, we advocate precautions and protection from sharps injuries. A programme of education, vaccination and post-exposure prophylaxis must be implemented (Kosgeroglu *et al.*, 2004)

Again in a study of compliance with universal precautions in 7 rural hospitals in India showed that 67.6% wore gloves when there was possibility of contact with blood, 53.9% wore apron in procedures whenever there was a possibility of blood or other body fluids splashing and 60.2% did not recap needles (Kermode *et al.*, 2005).

A similar study was carried in Malawi, a country where over 80% of people live in rural areas. The study described the effects of a peer-group intervention on universal precautions and client teaching for rural health workers in Malawi. Controlling for demographic factors, the intervention district had more reported HIV studies at 15 and 30 months and higher universal precautions knowledge and fewer needle stick injuries at 30 months. Observations at 15 and 30 months post-intervention showed higher levels of teaching in the intervention district. Observed glove wearing and hand washing were also higher at 30 months. This intervention was advised to be made available for health workers in Malawi and other countries to serve as a potential model for other high HIV prevalence countries (Tawfik and Kinoti, 2006).

Two other recent studies found that one-third or more of health workers had a needle stick injury in the past year. Similar studies have taken place over the years (Janjua *et al.*, 2007).

Finally another study done on cardiothoracic surgeons in Ghana and Nigeria revealed their unwillingness to operate on HIV/AIDS patients, a common finding in most surveys on surgeon's attitude and practice towards HIV/AIDS patients. Moreover, even if they were on patients stable on HAART or asymptomatic with HIV infection than AIDS patients due to the high risk involved (Kesieme *et al.*, 2011).

CHAPTER THREE

3.0 METHODS

This chapter presents the general approach and the specific techniques adopted to address the research objectives. It addresses into detail, the study design, the study location and population, methods and techniques used in participant selection as well as data collection. The chapter also elaborates on measures put in place to ensure the quality of data collected, the analysis and interpretation of data.

3.1 Study Design

A cross sectional study was conducted to assess the level of adherence to universal precautions by Nurses in 37 Military Hospital between November, 2014 and May 2015. Both quantitative and qualitative methods were used.

3.2 Study Site

The study conducted at 37 Military Hospital, located in Accra, Ayawaso Metropolis District. Accra is the Regional capital of the Greater Accra Region in Ghana with a total projected population of 4,010,054 in 2010 (Briggs, 2010).

The geographical location of the 37 Military Hospital is about 600 meters walk, from the Flag Staff House serving as a residential area for the Nation's President, the road network of the country and commercial nature of Accra make the hospital accessible to all the areas that share the boundaries with Greater Accra Region and others that are further away. As such, referrals are received from all the regions namely Western, Central, Eastern and parts of the Volta Regions. It is the third Largest Hospital in Ghana and trains Doctors, Nurses, Anaesthetists and Health Care Assistants. It has a bed capacity of four hundred (400) which included four

(4) Emergency Unit. The hospital has an Out Patient Department which is composed of Civilian Polyclinic and Military Polyclinic, Medical, Surgical, Paediatric and Family OPDs', the Dental Department, Ear Nose Throat (ENT) Department, Ophthalmic Department, Public Health Department and Physiotherapy Departments. There are four (4) big theaters with their corresponding recovery wards and intensive care units. It also has a pathology department and the Morbid Anatomy.

3.2.1 Historical background

It is the major health facility as well as the base hospital for the Ghana Armed Forces. The Military Hospital was established on 4th July 1941 as the 37th General Hospital to support the World War II effort of the British Imperial power. Ghana Armed Forces Medical Service (GAFMS) was evolved from the 37 Military Hospital. The Ghana Armed Forces Medical Service (GAFMS) with its motto as 'health first', is one of the combat service support elements of the Ghana Armed Forces providing healthcare and related services to all the three Services – Army, Navy and Air Force in both peace and war time. The mission of the hospital is to provide quality healthcare services to all personnel (Serving, Retired and Families) with the view to ensuring a Holistic Force Health Protection, by taking all measures at command as well as individual level to promote, protect, improve, conserve and restore the mental and physical well-being of personnel across the full range of military activity and operations.

It was then upgraded to Level IV in April 2001 with financial assistance from the United Nations because of Ghana's impeccable record in peacekeeping operations. The Base Hospital of the Ghana Armed Forces is one of the teaching hospitals in the country involved in the training of Postgraduate Residents. Current Bed capacity of military hospital is 400 and has

Workforce more than a thousand. Due to the strategic location, it can be accessible by land, air and sea.

3.3 Study Population

All nurses aged 20 to 60 years who daily come in direct contact with patients' body fluids or samples from patients and are likely to get exposure to blood borne infections formed part of study population.

3.4 Variables

Dependent variable

- Adherence level to Universal Precautions.

Independent Variable

Factors that affect adherence to UP

- Knowledge level of UP
- Materials availability for practicing UP
- Socio-demographic; Age, Gender, Professional qualification and ranks, Occupation.
- Education and Training

3.5 Sampling

3.5.1 Sample Size

Sample size for the study was determined using the Cochran formula (1977)

$$N = (Z^2 \times P \times Q) / d^2$$

Where N is the sample size.

Z is the significance level at 95% confidence interval (standard value of 1.96)

P is the assumed the proportion of adherence of 75% (Karunamoorthi *et al.*, 2009).

Q is the assumed proportion who do not adhere to universal precautions.

$Q = 1 - P$ and d is the margin of error = 0.05

$N = (1.96^2 \times .1 \times 0.75) / 0.05^2 = 115.$

A sample size of 120 was used to cater for poorly filled questionnaire and gaps, which may occur during the study.

3.5.2 Sampling Method

Simple random sampling was used to select the department that comes first and respondents from each of the various departments. In selecting, the department each of the nine departments had its name written on nine different sheets and thoroughly mixed. The first to be picked was noted until the department that was picked ninth was determined. By this method, each of the nine departments had a fair chance of being selected first.

At the department level, papers were cut into pieces with the letter 'P' and 'E' denoting 'Participating' and 'Exempted' respectively. The papers were thoroughly mixed in a bag, potential participants who picked P became eligible to participate; in the same way a potential participant was exempted if they picked E. By this method, each of the participants from the various departments had an equal chance of participating.

Participants were selected for the quantitative method using simple random sampling. The qualitative method helped employ the use of purposive sampling using the snowballing method to select participants for the focus group discussions and simple random sampling for the in-depth interviews.

3.6 Data Collection Techniques and Tools

Questionnaire was used to collect data from the sampled study group which had seven sections namely socio demographic data, direct working unit, knowledge assessment, occupational injury, attitudes and practices, materials availability for practicing Universal Precautions, and risk and implementation of universal precautions. Structured questionnaire, which consisted of both open-ended and close-ended questions, were designed to gather information. Observation were done using checklist and Likert scale or psychometric test for universal precautions. The questionnaire were administered to all clients who agreed to take part in the study. Trained research assistants were used in the data collection process. The study also employed a sample size of 120 sample size calculation as above. Socio-demographic data were obtained from all participating clients. The questionnaire used in this study have four sections. Section A (socio-demographic data), Section B (knowledge, attitude, perception questionnaire), Section C and Checklist was designed to document factors that affect nurses in adhering to universal precautions. Privacy and confidentiality were assured throughout the study.

3.6.1 Inclusion criteria

All nurses between the ages of 20 and 60 years and had worked for at least 3 months were included in the study.

3.6.2 Exclusion criteria

Nurses who were on cover up duties (locum) and had not worked for at least 3 months were excluded.

3.7 Data Quality Control

This included training of data collection and entry field workers on processes involved in abstracting data from the registers and interview processes. Data was double entered into

STATA and merged in order to detect errors. During data collection in the field, forty (30%) of the completed questionnaire containing raw data were selected by the supervisors at random and checked to identify errors and/or omissions and corrective actions made. The checks were repeated during data entry. All the data were backed up with external storage device. The questionnaire was pre-tested at another hospital (Ridge Hospital) that was not part of the study site.

3.8 Data Processing and Analysis.

Demographic variable containing age, gender, education, professional ranks. Instrument variable were coded using Epi info and catalogued into codebook. Data based were constructed, doubled entered and data validation and analysis was performed using software STATA version 12. Graphical representation was used to interpret most statistical proceedings. Charts were drawn with Microsoft Excel 2013 and Microsoft Word 2013 for word processing. Logistic Regression was used to determine the association between the dependent variable (level of adherence) and the factors that influence adherence to universal precautions (independent variables). The results were presented in tables, which displayed the frequencies, percentages, crude odds ratios (ORs) and 95% confidence intervals (CIs) and p-value.

3.8.1 Statistical methods

The questionnaire was numbered serially at the time of data entry. Epi Info software was used to design the template and data was entered. The data was transformed into STATA version 12, which shows frequencies, percentages, crude odd ratios. Charts and tables were used to visualize data. Charts were drawn with Microsoft Excel 2013 and Microsoft Word 2013 for word processing. Logistic Regression was used to determine the association between the dependent variable (level of adherence) and the factors that influence adherence to universal

precautions (independent variables). Fisher's exact test was alternatively chosen as the most appropriate test to measure association between the variables being studied.

3.9 Ethical Issues

Ethical consideration was sought from Ghana Health Service Ethical Review Board. Approval was obtained from the Ghana Armed Forces Medical Service (GAFMS) with an introduction letter, which was provided, by the School of Public Health, University of Ghana, Department of Biological, Environmental, Occupational Health Sciences, and (BEOH). Anonymity was maintained throughout the study. The respondents were adequately informed about all aspects of the study (objectives, interview procedures and potential benefits) before data collection start. Interviewers outlined the scope of the interview and its approximate length prior to the start of the interview and the respondents were informed that participation was voluntary, was conducted in privacy and confidentially, and that they had the right to do the interview, to refuse or withdraw from the study at any time. There was no compensation for participants in this study. There were no risk to the study participants as far as this study was concerned.

3.10 Instrument Administration Procedure

The questionnaire was administered in English. Before then, self-introduction were done and the purpose of the study were explained with permission sought from authority. The interview guide was self-administered. Interview guide was used because it measures uniform ideas on the topic. The data was collected on daily basis for 14 days.

3.11 Procedure for Data Presentation and Analysis

Data was imported from Excel to STATA. Data collected were processed and analyzed using STATA version 12. The analysis of the findings were based solely on the true findings of the researcher based on specific objectives.

3.12 Pretest or Pilot Study

Pre-test was done at the Ridge Hospital to identify errors in the questionnaire. To ensure that the questions were clear, and the respondents understand the questions as intended, the pre-test was done outside the study area during training of field workers.

CHAPTER FOUR

4.0 RESULTS

The Chapter provides the descriptive results of the survey data. It highlights on the socio-demographic characteristics, knowledge level of respondents in adhering to universal precautions and logistic regression of the factors that affect respondents in adhering to universal precautions.

4.1 The demographic characteristics of the study respondents.

The demographic characteristics of the study respondents are presented as Table 1.

A total of 120 respondents were included in the analysis.

Table 1, majority 114 (95%) of respondents adhered to universal precautions and 6 (5%) did not adhere to universal Precautions.

Out of 120 respondents, majority 74 (61.7%) were females, with majority 73 (60.8%) of the respondents aged between 20-29 years, 22 (18.3%) were between 40-49 years, 14 (11.7%) within 30-39 and 11 (9.2) were aged 50-59 years respectively.

Of the total respondents, majority 74 (61.7%) of the respondents have certificate or diploma with 46 (38.3%) having bachelor degree and above. Majority of the nurses 66 (55%) had worked for at least 3 years and above while 54 (45%) has worked for at most 2 years.

Table 1: Demographic characteristics of study respondents

Characteristics	Frequency n=120	Percentage (%)
Sex		
Female	74	61.7
Male	46	38.3
Age category		
20 - 29	73	60.8
30 - 39	14	11.7
40 - 49	22	18.3
50 - 59	11	9.2
Ethnicity		
Akan	50	41.7
Ewe	27	22.5
Ga	26	21.7
Hausa /Others	17	14.2
Religion		
Christian	103	85.8
Muslim	15	12.5
Traditional	2	1.67
Education		
Bachelor and above	46	38.3
Certificate/ Diploma	74	61.7
Professional grade		
Student/Staff nurse/ Senior staff nurse	87	72.5
Nursing Officer and above	33	27.5
Years of working		
≤ 2 years	54	45.0
≥ 3years	66	55.0
Adherence to universal precautions		
Adhere	114	95.0
Do not adhere	6	5.0

4.2 Association between the demographic characteristics of respondents and adherence to universal precautions.

Out of 120 respondents, the proportion of the respondents adhered to universal precautions were 114 (95%) with 6 (5%) not adhering to universal precautions.

Out of the 74 female respondents, 71 (96%) adhered to universal precautions as compared to 3 (4%) who did not adhere. Out of 46 male respondents, 43 (93.5%) adhered to universal precautions. Male nurses had a decrease odd of 40% adhering to universal precautions compared to Female nurse [95% CI (0.13-3.17)]

Within the Age category of 20-29 years, out of the 79 that were interviewed, 73 (92.4%) of the respondents adhered to universal precautions.

In the Ethnic category, out of 50 respondents, 48 (96%) are Akans. The odds of respondents from Ewes adhering to universal precautions was 1.1 (0.09-12.73) times compared to the odds from Akans. The odds of Hausa/others respondents was 0.7 times and Ga 0.5 times compared to the odds of Akans.

Out of 103 respondents, 98 (95.2%) from Christian religion adhered to universal precautions and 5 (4.8%) did not adhere. Respondents from Islamic religion had decrease odds of 30% adhering to universal precautions compared to respondents from Christian Religion [95% CI (0.08-6.64)].

Within the educational qualification category, 45 (97.83%) out of 46 respondents with bachelor degree and above adhered to universal precaution. Out of 71 respondent, 66 (93%) with certificate or diploma adhered.

Within the professional ranks category, out of 73 with ranks of staff nurse or senior staff nurse 68 (93.2%) adhered and 5 (6.8%) did not adhere. With the rank of nursing officers and above, all the respondents 46 (100%) adhered to universal precaution. The odds of Nurses with Diploma or Certificate qualification likely to adhere to universal precautions was 70% compared to nurses with bachelor and above [95% CI (0.03-2.77)].

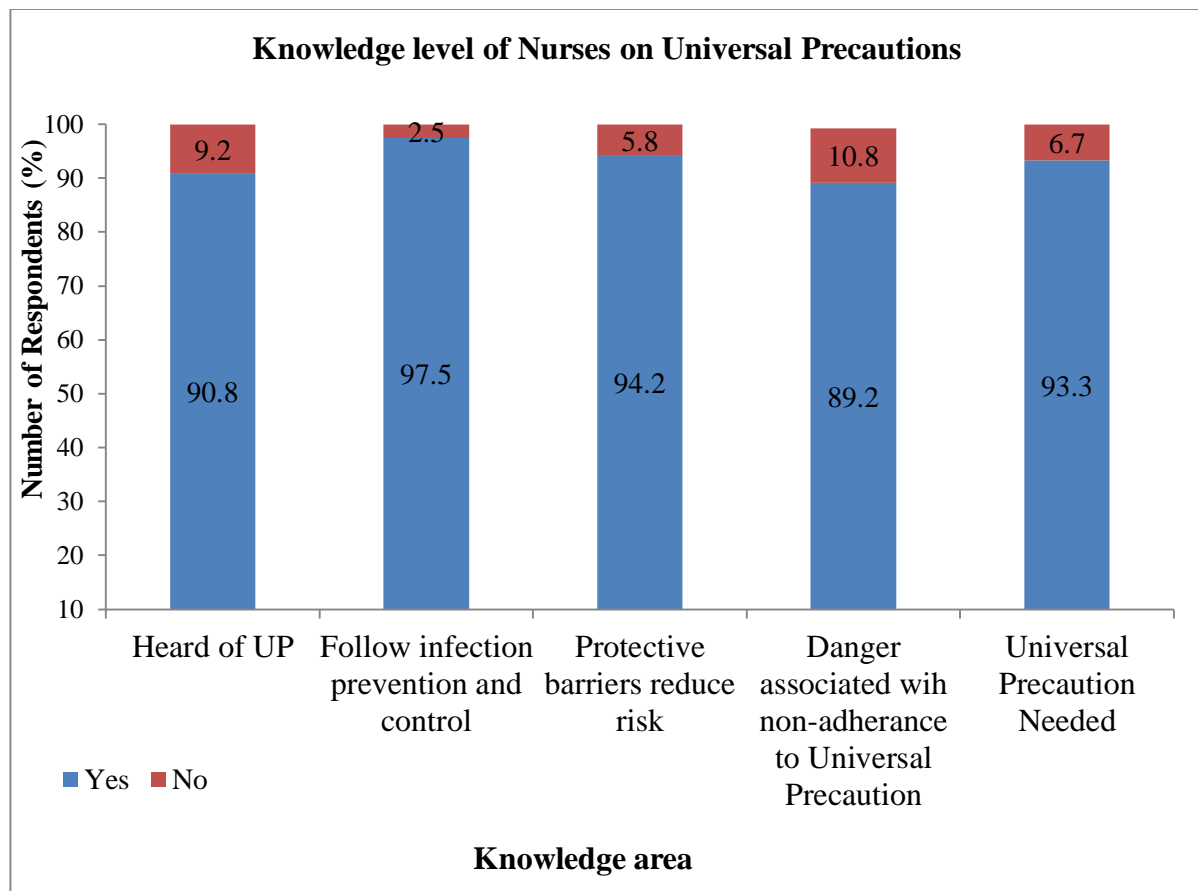
Out of 54 respondents with working experience of at most two year, 52 (96.3%) adhered to universal precautions as compared to 2 (3.7%) who did not. Of 66 respondents with at least three years working experience, 66 (93.9%) adhered and 4 (6.1%) did not.

Nurses with at least 3 years working experience had 40% decrease in adhering to universal precautions compared to nurses with at most 2 years working experience [95% CI (0.1-3.4)].

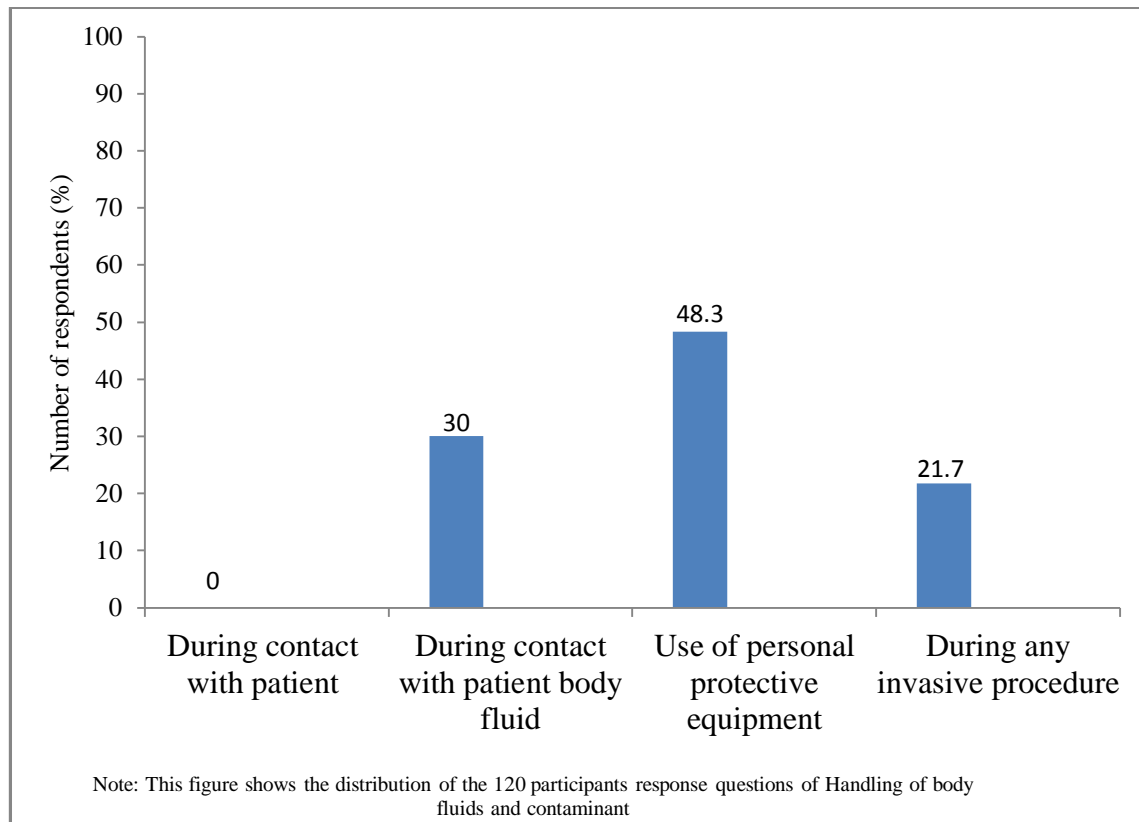
Table 2: Association between the demographic characteristics of respondents and adherence to universal precautions.

Characteristics	Adhered n (%)	Did not adhere n (%)	P-value	cOR (95% CI)	P-value
Sex			0.67		
Female	71 (96.0)	3 (4.0)		1.0	
Male	43 (93.5)	3 (6.5)		0.6 (0.1-3.2)	0.55
Age category			0.43		
20 - 29	73 (92.4)	6 (7.6)			
30 - 39	31 (100.0)	0 (0.0)			
40 - 49	7 (100.0)	0 (0.0)			
50 - 59	3 (100.0)	0 (0.0)			
Ethnicity			0.88		
Akan	48 (96.0)	2 (4.0)		1.0	
Ewe	26 (96.3)	1 (3.7)		1.1 (0.1-12.7)	0.95
Ga	24 (92.3)	2 (7.7)		0.5 (0.1-3.9)	0.50
Hausa/others	16 (94.1)	1 (5.9)		0.7 (0.1-8.0)	0.75
Religion			0.61		
Christian	98 (95.2)	5 (4.8)		1.0	
Muslim	14 (93.3)	1 (6.7)		0.7 (0.1-6.6)	0.77
Traditional	2 (100)	0 (0.0)		0.0	0.75
Education			0.41		
Bachelor and above	45 (97.83)	1 (2.2)		1.0	
Diploma/ Certificate	66 (93.0)	5 (7.0)		0.3 (0.1-2.8)	0.26
Professional grade			0.73		
Staff nurse/ Senior staff nurse	68 (93.2)	5 (6.8)			
Nursing Officer and above	46 (100.0)	0 (0.0)			
Years of working			0.69		
≤2 year	52 (96.3)	2 (3.7)		1.0	
≥ 3 years	62 (93.9)	4 (6.1)		0.6 (0.1-3.4)	0.56

Note: cOR=Crude Odds ratio, CI= confidence interval, *statistically significant

Figure 2: The knowledge, Perception and practice of nurses on universal precaution.

From figure 2, Out of total 120 respondents, those who practice infection prevention and control had the highest frequency 117(97.5%). Respondents who perceived that protective barrier reduce the risk of infection were 113(94.2%) followed by 112 (93.3%) respondents thought universal precautions was important and needed. Respondents 109 (90.8%) have heard of universal precautions and 107 (93.3%) think there are dangers associated with non-adherence to universal precautions.

Figure 3: Responses from Question of Handling of Body Fluids and Contaminant.

From figure 3, none of the respondents 0 (0%) scored for during contact with patient. On the other hand, 36 of 120 (30%) respondents scored for during contact with patient body fluid, while 58 of 120 (48.3%) scored for the use of personal protective equipment and 26 of 120 (21.7%) scored on during any invasive procedure.

4.3 Association between facility and work related risk factors and adherence to universal precautions.

Table 4 shows association between facility and work related risk factors and adherence to universal precautions.

The results shows that, providing resource required by nurses for hand washing in the hospital is likely to allow nurses to adhere to universal precautions [10 (1.7-63.6)] and p-value 0.002 is statistically significant thus there is strong evidence that null hypothesis value (0.002) is less than 0.05 that is fewer than half the population of nurses have inadequate resources for hand washing.

It was also noted that, the odds of respondents who said 'Yes' to the provision of resources necessary for hand washing were 10 times likely to adhere to universal precautions.

Training on respondents who receive the proper use of personal protective equipment are likely to adhere to universal precautions compared to respondents not trained on the use of personal protective equipment [4.9 (0.8-29.1)] with p-value 0.052.

The odds of respondents who indicates that leaders and managers encourage respondents to attend safety seminar in universal precautions and infection prevention and control at 95% confidence interval was 1.5 (0.2-13.4) with p-value 0.73

Respondents who said 'Yes' to the availability of material and personal protective equipment for protection them from direct contact with blood borne pathogen were likely to adhered to universal precautions compared to respondents who said 'No' [1.7 (0.2-13.4)] with p-value 0.55 .

Nurse who said yes to hepatitis vaccine available at no cost to all employee at risk of occupational exposure has an increase of 70% adherence to universal precautions compared to nurse who said 'No' 95% CI (0.1-1.7) with p-value 0.17.

The odds of respondents who said 'Yes' to the outline of policies and procedure on risk assessment, reprocessing errors and failures in the hospital is 90% likely to adhere to universal precautions compared to respondents who said 'No' 95% CI (0.2-6.2) with p-value 0.83.

Table 3: Association between facility and work related risk factors and adherence to universal precautions.

VARIABLES	cOR (95% CI)	P value
Facility provide resources necessary for Hand washing		0.002*
No	1.0	
Yes	10.4 (1.7-63.6)*	
Nurses given the opportunity to be trained.		0.052*
No	1.0	
Yes	4.9 (0.8-29.1)	
Managers and leaders encourages nurse to attend safety seminars.		0.73
No	1.0	
Yes	1.5 (0.2-13.4)	
Materials and personal protective equipment available to protect respondents.		0.49
No	1	
Yes	0.3 (0.1-1.7)	
Routine maintenance for sterilization equipment is performed according to manufacturer instructions		0.55
No	1.0	
Yes	1.7 (0.3-9.9)	
Policies and procedures are in place outlining facility response (i.e., recall of device and risk assessment)		0.83
No	1.0	
Yes	1.2 (0.2-6.2)	
Is Hepatitis B vaccination available at no cost to all employees who are at risk of occupational exposure?		0.17
No	1.0	
Yes	0.3 (0.1-1.7)	

Note: cOR= Crude Odds ratio, CI= confidence interval, *statistically significant

CHAPTER FIVE

5.0 DISCUSSION

5.1 Introduction

This is a relatively small scale study carried among nurses in 37 Military Hospital compared with the pretest or pilot studies done at Ridge Hospital and other studies worldwide. This aids in identifying errors in the questionnaire.

Universal precautions are infection control guidelines designed to protect people from diseases spread by blood and certain body fluids. One should always assume that all "blood and body fluids" are infectious for blood-borne diseases such as HBV (Hepatitis B Virus), HCV (Hepatitis C Virus) and HIV (Human Immunodeficiency Virus).

5.2 Knowledge level of universal precaution by respondents

In this study, majority of the respondents showed high knowledge on Universal Precautions (UP), a common finding confirmed in similar studies (Hesse *et al.*, 2006; Janjua *et al.*, 2007) and all 114 respondents (95.0%) in this study have heard about Universal Precautions. Surprisingly this was higher than the Hesse study that had 92%. This is because of the nature of how policy guideline are abided in the military institution.

Majority 74 (61.7%) of the participants have either certificate or Diploma with 46 (38.3%) having Post Diploma, Bachelor or Masters. Most of the nurses, 66 (55%) had worked for at least three years and above whilst 54 (45%) has worked at most two years. Nurses of 109 (90.8%) have heard of universal precautions. The level of knowledge of universal precautions among respondents in this study was adequate and may reflect the fact that in Ghana Universal Precautions have been incorporated in all health curriculum of institution. These results are

consistent with those in Pakistanian study which had quite a number of respondents (67%) who had heard of universal precautions in schools.

This investigation also shows that age, gender, length of clinical experience, and numbers of trainings attended are not determinants of the knowledge on the principles of sterile technique. This implies that nurses regardless of their age, gender, length of clinical experience, and numbers of trainings attended do not differ in knowledge on sterile technique. This finding disagrees with the previous studies conducted which identified staff nurses' years of experience as an indicator of better knowledge with regards to infection control measures (Vij *et al.*, 2001).

Another significant finding of the study was that the mean percentage of knowledge scores in the area of use of vaccination in prevention of occupational hazards was significantly low 56 (46.7 %) which clearly indicate that the nurses showed less interest in this area. The study findings with regard to use of Hepatitis B vaccine to prevent hepatitis B correctly answered by minority (46.7%) of the nurses. These findings were congruent with findings of a survey study that revealed 94 (78.3%) of nurses had definite knowledge that vaccination is required to prevent blood borne diseases like Hepatitis B and would like to receive vaccine. In conclusion, nurses had an average knowledge regarding universal precautions still continuing education coupled with supervision, motivation and provision of adequate facilities from health care establishment are essential to create a feeling of personal and professional adequacy (Campins, 2009).

The total respondents 117 (97.5%) had conviction that the practice of Universal precautions help in infection prevention and control. This also serves as a means of protecting both nurses and patients. This is in agreement with the study conducted by Janjua *et al.*, (2007) which

reported that respondents who know about Universal Precautions, know it as infection control practices.

Ideally all nurses are to know their HIV and Hepatitis B status as well as immunize against Hepatitis B due to the higher risk involved as health workers; interestingly the knowledge about their risk have not had the required impact expected, in that, only 56 (46.7%) have been immunized compared with Pakistani, Rana *et al.*, (2000) study of orthopedic residents, which had 74% of its respondents immunized. However, in their case, all the subjects were medical students so a higher percentage of vaccination was expected.

5.3 Handling of body fluid and contaminant

Ideally, Nurses are expected to have a good understanding about the risk of Blood Borne Pathogens at the work place and about the preventive measures for reducing risk. This study found, they had adequate knowledge. In contrast to this, some other studies in Pakistan have reported a higher level of knowledge and awareness about these risks among residents and physicians working at the tertiary care hospitals. A study of orthopedic residents from all over Pakistan attending a conference reported that 93% of the residents knew that HIV could be transmitted through blood transfusion, 88% knew about its transmission through a needle-stick injury and 74% of subjects had been vaccinated for HBV (Rana *et al.*, 2000).

All nurses should routinely follow these precautions at any time there is the possibility of touching or being splashed with any person's blood or body fluids on their skin or mucous membrane. From the responses from the question on when they come into contact with body fluids and contaminants, 36 of 120 (30%) respondents selected during contact with patient body fluid, while 58 of 120 (48.3%) selected during the use of personal protective equipment and 26 of 120 (21.7%) selected during any invasive procedure. Thoughtful adherence to universal

precautions remains the primary means of reducing the occupational risk of infection with blood borne pathogens. With regards to risk, 56 (46.7%) perceive themselves of the risk of acquiring blood borne infection like HIV and Hepatitis B as nurses and this corresponds the Pakistanian study, where 93% of orthopedic medical students knew they were at risk of blood borne infection but in their case they were all medical students (Janjua *et al.*, 2007).

5.4 Association between facility and work related risk factors and adherence to universal precautions.

In the case of Pakistan, they practice needle reuse very often, a practice that is contrary in Ghana because needle reuse involves manipulation of the needle, which increases the likelihood of needle prick. Again the study found out the number of times hand gel have been applied on hands; only 58 (48.3%) have applied it more than five times. This finding is in agreement to another study in United State which illustrates low rate 19 (10%) of adherence to alcohol rub even though in their case it was available in a dispenser at patient's bedside (Kaur, Kaur, and Walia, 2008). Out of 120 nurses 68 (57%) of the nurses possess their personal sanitizer and now according to WHO guidelines (WHO, 2006), if hands are not visibly soiled, the routine use of an alcohol-based hand rub to decontaminate hands is regarded as sufficient (Stephens and Ludwig, 2005).

Again, 93 (77.5%) responded there is regular provision of sharp boxes at places where needed. On the issue of hand glove availability, 71 (59.2%) said nurses sometimes encounter shortage of resource in adhering to universal precautions. This shortage of materials coincides with the Hesse *et al.*, (2006) study, which led to the recommendation of adequate supply of hospital materials a problem similar in most developing countries confirmed by Bemelmans *et al.* (2010) in Malawi.

Majority of nurses 64 (53.3 %) were not been immunized against Hepatitis B, compared to the findings also showed. Of the 452 (76%) nurses who faced the occupational hazard of exposure to hepatitis infections, 125 of 452 (27.7%) had not been vaccinated against Hepatitis B Virus. Nurses working in our health-care sector are frequently at risk of occupational exposure for HBV and HCV infections (Kosgeroglu *et al.*, 2004).

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

In conclusion, it should be known that knowledge on universal precautions exists but its practice is insufficient as expected. The main barrier of inadequate practice is due to shortage of materials as confirmed by Bemelmans *et al.*, (2010) in Malawi and Hesse *et al.*, (2006) in Korle-Bu.

After much education in our institutions, non-adherence to Universal Precautions remains a major absolute problem due to shortage of materials such as gloves and training on the use of personal protective equipment.

The case of 37 Military Hospital reinforces the idea of the need to ensure constant supply of resources, to address the regular shortage leading to crisis because it is not enough requirement for hand washing practice which remains a problem in a health institution. We are in an era where elbow, wrist, sensor, mixer, or foot-operated taps, soap pump dispensers, wall-mounted paper towels, or foot-operated waste bins with lids in the hand-washing area are available in a number of countries and it is important that Ghana should be part of this innovation.

It can be conclusively proven in Ghana, particularly 37 military hospital that, nurses are eager to practice Universal Precautions due to the fact that 57% of the nurses possess their personal a sanitizer clear practical evidence that with availability of materials adherence to UP will be higher than this current result.

6.2 Recommendations

From the findings of this study, it is recommended that:

Nurses

- Management should ensure the regular training of nurses (pre-service and in-service) on universal precautions.
- Nurses should be trained on proper use of personal protective equipment.
- Should be educated on infection control and prevention
- Nurses should be educated on the avoidance of needle recap and even if there should be need, scoop method should be used.

Hospital management team;

- Management should encourage staff to take the Hepatitis B vaccine at a subsidized cost for the safety of staff.
- Management should encourage all nurses on the need to possess a personal hand sanitizer and hand towels.
- Management should introduce the coordinator of Post Exposure Prophylaxis to staff to make use of the office before any future danger and to save the lives of the existing health workers.
- Management should set up infection control committee to develop and update annually relevant protocols as new information becomes available on the best practice.
- Management should make all departmental heads role models to play a pivotal change since negative role models are influential in as much as good practice can also be learned at any setting within the hospital.

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APPENDICES

Appendix I: Information Sheet

Project Title: Level of Adherence to Universal Precautions by Nurses in 37 Military Hospital.

Institutional Affiliation

Department of Biological, Environmental, Occupational Health Sciences (BEOH),
School of Public Health, College of Health Sciences,
University of Ghana, Legon.

Background

The principal investigator is Cyril Baye, a student of the School of Public Health, University of Ghana, Legon, Department of Biological, Environmental, and Occupational Health Sciences (BEOH). The purpose of this research is to measure proportion of nurses that adhere to universal precautions in 37 military hospital. To assess the knowledge of nurses in the hospital in handling of patient body fluids and contaminant. To determine factors that affect to adherence to universal precautions by nurse. This study is solely for academic purposes and requirement for the award of Master of Science in occupational hygiene. The project is under the supervision of Professor I. Quakyi of the school of public health, university of Ghana, Legon.

Risk and benefits

This study is non-invasive and will not cause any form of discomfort to participating clients. The results will be used to inform policy on quality of care and maintaining safety standards to staffs which will lead to the improvement of services provided by hospital.

Right to refuse

Participation in this study is voluntary and you can choose not to answer any individual question or all the questions. You are at liberty to withdraw from the study at any time. However, I will encourage you to fully participate since your opinions are very important to us. Your opinions will enable us understand your needs and expectations and also aid in improving the quality of services you receive in our facility.

Anonymity and confidentiality

I will like to assure you that whatever information you will provide will be handled with strict confidentiality and will be used purely for research purposes. Your responses will not be shared with anybody who is not part of the study team. Data analysis will be done at the aggregate level to ensure anonymity.

Costs and/or Payments to Subject for Participation in Research

There were no costs for participating in this research and there were no payments awarded for participating clients in this research.

For further questions and clarification concerning the research, you may contact Professor Isabella A. Quakyi (+233284631575), Professor Julius Fobil (+233243462514), Cyril Baye (+233264033369 or +233275911111) all of the Department of Biological, Environmental and Occupational Health Sciences; School of Public Health, University of Ghana, Legon and Madam Hannah Frimpong (+233243235225) or +233507041223) the administrator of Ghana Health Service Ethical Review Committee.

Appendix II: Participant Informed Consent

I,..... declare that the purpose, procedures as well as risks and benefits of the study have been thoroughly explained to me in English language and I have understand. I understand that all discussions and interviews will be written if necessary and that I have the right to withdraw from the study at any time without it in any way affecting my further medical care.

I hereby agree to answer the questionnaire provided below.

Signature/Thumbprint of participant Date.....

Interviewer's statement

I, the undersigned, have explained this consent form to the subject in the English language, that He/She understands the purpose of this study, procedures to be followed as well as the risks and benefits involved. The subject has freely agreed to participate in this study.

Signature of interviewer.....

Date... / /

Address

Appendix III: Structured Questionnaires

This is a confidential assessment tool to be used to identify adherence to universal precautions by nurses in 37 Military Hospital. It will bring to fore linkages between safety, standard precautions and its adherence by nurses during any clinical encounter. Your cooperation were very much appreciated. Thank you.

Date _____

Questionnaire on the level of adherence to “Universal precautions” in hospitals

Please tick/ write your appropriate answer by the alphabet or space provided

SOCIO DERMOGRAPHIC DATA

1. **Ethnicity** a) Ga b) Akan c) Ewe d) Hausa/others.....
2. **Highest Educational level** a) bachelor and above
b) diploma/certificate
3. **Sex** a) Male b) Female
4. **Religion** a) Christian b) Muslim c) Traditionalist
specify.....
5. **Age**.....

DIRECT WORKING UNIT

6. **Professional Qualification (Rank)**
7. **Current Department**
8. Number of years practicing nursing? a) ≤ 2 years b) 3years and above

KNOWLEDGE ASSESMENT

- 1) Have you ever come across the phrase ‘Universal precautions’? a) Yes b) No
If yes, where
- 2) Do you **think Universal Precautions** is needed a) Yes b) No
If yes, comment.....

- 3) Do you **follow Infection control techniques** a) Yes b) No

If No, Comment.....

- 4) Do you think protective barriers **reduces the risk of exposure?** a) Yes b) No

Comment.....

- 5) Which of the following have you experienced three months ago while working? a) Needle Prick b) fluid splash from patient c)

Other.....

- 6) Do you think there are dangers associated with not adhering to universal precautions?

a) Yes b) No

OCCUPATION HAZARDS

- 7) Do you think insufficient preparation can predispose you to the hazards of universal precautions? a) Yes b) No

- 8) What do you think are some of the hazards associated with not adhering to universal precautions?

- 9) What measures did you put in place to check the unfortunate accident?.....

ATTITUDES AND PRACTICES

- 10) Have you **ever** been introduced to universal precautions in this facility before? a) Yes b) No

- 11) When do you come into contact with body fluids or contaminant. a) anytime the health worker comes in contact with patient. b) When in contact with patient blood only c) when in contact with any body fluid from patient d) during any invasive procedures e) with the use of personal protective equipment .

- 12) How often do you apply hand gel/ sanitizer on your **hands** ?

a) never b) 2-5 c) more than 5 times d) anytime

- 13) Have you **ever** attended Hospital Infection control training before? a) Yes b) No
- 14) Are there enough time to use universal or standard precautions? a)Yes b) No
- 15) Following universal or standard precautions, does it make yours worker harder? a) Yes b) No, If Yes.....
- 16) Do your activities often interferes with you being able to comply with universal precautions? a) Yes b)No
- 17) Do universal precautions keeps you from doing your job to the best of your activities? a) Yes b) No
- 18) Do the facility maintains a log of needle sticks, sharps injuries, and other employee exposure events? a) Yes b)No
- 19) Which of these universal precautions do you **often practice** as far as your work in this facility is concerned? a)Hand Washing b) wearing of gloves c) nose masking d) application of hand gel/ spirit e) All above g) Other.....
- 20) Use Letter a-k to answer question 20 i, ii.
- a) Nasal secretions b) Blood c) Urine d) saliva/sputum e) peritoneal fluid f) semen g) vomitus h)Vaginal secretions i) Cerebrospinal fluid j) Sweat k) Pleural fluid

Which of these body fluids above, from patients do you know as infectious and non-infectious? (Write the letter in the space provided)

- 1) Infectious..... 2) Non infectious.....

20i) which of these fluids (above) can cause HIV?

.....

20ii) Which of these fluids (above) have you had spilled on your body 1-3months ago?

.....

MATERIALS AVAILABILITY FOR PRACTICING UNIVERSAL PRECAUTIONS

- 21) How often do you encounter shortage of resources pertaining universal precautions in this facility? a) Very often b) Sometimes c) Always d) Never e) other (specify).....
- 22) Are there hand towels readily available to be used after hand washing? a) Yes b) No
- 23) Do you always dispose all sharps in a puncture-resistant sharps container? a) Yes b) No c) sometimes

RISK AND IMPLEMENTATION OF UNIVERSAL PRECAUTIONS

- 24) Do you perceive for yourself at risk of acquiring a blood borne infection like HIV and Hepatitis B? a) Yes b) No
- 25) Do you perceive for yourself the need for an individual status examination for HIV and Hepatitis B? a) Yes b) No Comment.....
- 26) Have you ever checked your **HIV** status before? a) Yes b) No (skip to ii)
- i) When was that? a) This year b) last year c) 1 month ago d) Other.....
-
- 27) Would you **like to know** your HIV status? a) Yes b) No
- 28) Have you **ever checked** your Hepatitis **B** status before? a) Yes b) No (skip to ii)
- i) When was that ? a) This year b) last year c) 1 month ago d) Other.....
-
- ii) Would you **like to know** your Hepatitis B status? a) Yes b) No
- 29) Would you like to **receive immunization** against Hepatitis B? a) Yes b) No (go to ii) Why.....
- 30) Have you **ever observed** a post exposure protocol posted anywhere in this hospital before? a) Yes b) No

- 31) Are you aware there is post exposure treatment for HIV, in case, you experience direct exposure or contact accidentally from an HIV patient/ sample while working? a) Yes b) No
- 32) Do you know the coordinator in charge of the Post Exposure Prophylaxis? a) Yes b) No
- 33) Have you **ever** taken HIV Post exposure prophylaxis treatment before? a) Yes b) No
(skip to question 32)
- 34) Have you been immunized against hepatitis B? a) Yes b) No

SECTION C. ADHERENCE TO UNIVERSAL PRECAUTIONS QUESTIONNAIRE

Nurses answer Yes (Y) = 2; No (N) = 0,

	HAND WASHING	Y	N
35)	Do facility provides resources necessary for adherence to hand hygiene (e.g., soap, water, paper towels, alcohol-based hand rub) and ensures they are readily accessible to HCP in patient care areas		
36)	Do you Ensure availability of hand hygiene products (clean water, soap, single use clean towels, alcohol-based hand rub)?		
37)	Do you ensure availability of hand-washing facilities with clean running water?		
	TRAINING AND AVAILABILITY OF PERSONAL PROTECTIVE EQUIPMENT (PPE)		
38)	Are employee taught to be aware of PPE?		
39)	Are nurses given the opportunity to be properly trained to use PPE?		
40)	Do managers and leaders encourages nurse to attend safety seminars on universal precautions, infection prevention and control?		
41)	Is my unit or hospital offering specific training on blood borne pathogen?		
42)	Do your unit have equipment and materials needed to protected nurses?		

43	Are all necessary equipment available to avoid direct contact with blood borne pathogens?		
44	Do you get use to using personal protective equipment?		
OCCUPATIONAL HEALTH		Y	N
45	Routine maintenance for sterilization equipment is performed according to manufacturer instructions (confirm maintenance records are available?)		
46	Policies and procedures are in place outlining facility response (i.e., recall of device and risk assessment) in the event of a reprocessing error/failure.		
47	Following an exposure event, post-exposure evaluation and follow-up, including prophylaxis as appropriate, are available at no cost to employee and are supervised by a licensed healthcare professional		
48	Hepatitis B vaccination is available at no cost to all employees who are at risk of occupational exposure		
49	Post-vaccination screening for protective levels of hepatitis B surface antibody is conducted after third vaccine dose is administered		
50	Facility has written protocols for managing/preventing job-related and community-acquired infections or important exposures in HCP, including notification of appropriate Infection Prevention and Occupational Health personnel when applicable		

Appendix IV: Universal Precaution Checklist

Please tick if procedure is done appropriately

The employee will implement the following procedure

- Wash hands between patients.
- Wash hands between procedures.
- Wear gloves when contact with blood or other potentially infectious materials is anticipated.
- Treat all patients as HIV, HBV, HCV infectious.

- Never recap contaminated needle or use the scoop method.

The employer will make the following PPE readily available

- Disposable and sterile examination gloves
- Disposable gowns or apron
- Masks
- Eye wears and Goggles
- Face shields
- Resuscitation equipment

The employer will implement the following requirements

- PPE will be made available in various sizes for individual employees.
- Hypoallergenic PPE will be made available to any employee who is allergic.
- Equipments will be decontaminated immediately after use.
- Appropriate containers will be available for disposal of regulated waste and sharps.
- Ensure regulated waste and linen or equipment are properly labelled.
- Remove regulated waste according to policy and procedure
- Make sure Hepatitis B vaccination are complete.
- In case of needle stick injuries, go through Post Exposure Prophylaxis process