SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCES
UNIVERSITY OF GHANA

NEEDLE STICK AND SHARPS INJURIES AMONG HEALTH CARE WORKERS AT THE 37 MILITARY HOSPITAL

BY

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JULY 2016
DECLARATION

I, Edmund D. Kommogldomo hereby declare that apart from references to other people’s works which have been duly acknowledged, this work has been written independently by me and has not been submitted for the award of any degree in any institution.

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DATE
DEDICATION

This thesis is dedicated to my lovely wife, Mrs. Fusca Kommogldomo for her motivation, support and encouragement.
ACKNOWLEDGEMENT

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To the lecturers of Department of Biological, Environmental and Occupational Health, School of Public Health, I am so grateful for the knowledge imparted in me. May God bless you all.

Finally I give Glory to the Most High God for bringing me this far, Glory be to His name.
ABSTRACT

Background

Needle stick and sharp instrument injuries are occupational exposures encountered by health care workers in the discharge of their duties. These accidental injuries expose them to various infectious diseases as well as the associated psychological trauma that comes with the fear of infection and the side effect of the drugs used for post exposure treatment. This is a serious occupational health hazard among healthcare workers, however, empirical data on the prevalence of needle stick among health care workers in Ghana is unknown.

Objective

The aim of this study was to establish the prevalence of needlestick and sharps injuries among health care workers. It was also to examine the knowledge, attitudes and practices of the health care workers on sharps and needle stick injuries. It also examined the risk factors and the management procedures in place for these injuries at the 37 Military Hospital.

Methods

The study was a hospital based cross – sectional study which employed stratified random sampling technique for sample selection from the various categories of health care workers. The study was conducted at the 37 Military Hospital, Accra. A self-administered questionnaire was distributed to 300 respondents from different job categories of healthcare workers at the hospital who were selected proportionate to the sample frame. Participation in the study was voluntary. Data was entered and analysed using Statistical Package for Social Sciences version 22 (SPSS) and excel.
Results
The number of workers who experienced needle stick or sharps injuries among the respondents was 53.7% (160), while 46.1% (137) did not experience injuries at the time of the study. Healthcare sharp injuries which frequently occurred were needle prick (35.3%), cuts (62.1%), bruises (2.0%) and abrasions (0.7%). The descriptive statistics revealed that 42.8% of the respondents were males with approximately 57.2% being females. Nurses (45.8%) considered in this study were found to be the majority; followed by, doctors (20.9%), laboratory staff (10.8%), ward assistants (6.7%), public health workers (4.7%), laundry staff (4.0%), dental staff (3.7%), cleaners (2.4%) and incinerator attendants (1.0%).

Conclusion
The research concluded that ward assistants were among healthcare workers at the highest risk of sharps injury. Underreporting of medical sharps injury was common while many injured respondents did not seek for post-exposure prophylaxis. There is need for adequate supply and use of safety engineered devices, safe disposal of medical sharps, better reporting and surveillance of sharps injury cases at the hospital. Recapping was found to be the practice that contributed most to needle stick and sharps injuries and should be discouraged.

KEY WORDS: Occupational Exposure, Needle Stick Injury, Health Care Workers
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<tr>
<td>AIDS</td>
<td>Acquired Immune Deficiency Syndrome</td>
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<td>ART</td>
<td>Anti – Retroviral Therapy</td>
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<td>CDC</td>
<td>Centre for Disease Control and Prevention</td>
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<td>EPInet</td>
<td>Exposure Prevention Information Network</td>
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<td>HBV</td>
<td>Hepatitis B Virus</td>
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<td>HCW</td>
<td>Health Care Workers</td>
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<td>HIV</td>
<td>Human Immune Deficiency Virus</td>
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<td>ILO</td>
<td>International Labour Organisation</td>
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<td>MRS</td>
<td>Medical Reception Station</td>
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<td>NSSI</td>
<td>Needle Stick and Sharps Injury</td>
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<td>NSI</td>
<td>Needle Stick Injury</td>
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<td>OSH</td>
<td>Occupational Safety and Health</td>
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<td>PEP</td>
<td>Post Exposure Prophylaxis</td>
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<td>PTSD</td>
<td>Post – Traumatic Stress Disorder</td>
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<td>SI</td>
<td>Sharp Instrument</td>
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<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
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<td>UN</td>
<td>United Nations</td>
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<td>US</td>
<td>United States of America</td>
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<td>WHO</td>
<td>World Health Organisation</td>
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DEFINITION OF TERMS

**Exposure**: A percutaneous injury (e.g. a needle stick or cut with a sharp object) or the contact of mucous membrane or non-intact skin (e.g. exposed skin that is chapped, abraded or afflicted with dermatitis) with blood, tissue or other body fluids that are potentially infectious.

**Hazard**: The inherent potential of a material or a situation to cause injury or to damage people’s health, or to result in loss of property.

**Health-care worker**: A person (e.g. nurse, physician, pharmacist, technician, mortician, dentist, student, contractor, attending clinician, public safety worker, emergency response personnel, health-care waste worker, first-aid provider or volunteer) whose activities involve contact with patients or with blood or other body fluids from patients.

**Incidence**: Refers to the number of new cases that develop in a given period of time.

**Medical sharps**: Any object used in the healthcare setting that can penetrate the skin including, but not limited to, needles, scalpels, broken glass, broken capillary tubes, and exposed ends of dental wires.

**Medical Sharps injury**: An exposure event occurring when medical sharps penetrate the skin.

**Needle stick**: Penetrating stab wounds caused by needles.
**Occupational exposure:** Occupational exposure occurs during the performance of job duties and may place a worker at risk of infection. Exposure is defined as a percutaneous effect or performed through the skin.

**Personal protective equipment (PPE):** Equipment designed to protect workers from serious workplace injuries or illnesses resulting from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards. Besides face shields, safety glasses, hard hats, and safety shoes, PPE includes a variety of devices and garments such as goggles, overalls, gloves, vests, earplugs and respirators.

**Prevalence:** Refers to the number of cases of disease including old and new that are present in a particular population at a given time.

**Post-exposure prophylaxis (PEP):** The immediate provision of medication following an exposure to potentially infected blood or other body fluids in order to minimize the risk of acquiring infection. Preventive therapy or primary prophylaxis is given to at-risk individuals to prevent a first infection; secondary prophylaxis is given to prevent recurrent infections.

**Recapping:** The act of replacing a protective sheath on a needle.

**Risk:** A combination of the likelihood of an occurrence of a hazardous event and the severity of the injury or damage that the event causes to the health of people or to property.

**Safety device:** A non-needle sharp or a needle device used for withdrawing body fluids, accessing a vein or artery, or administering medications or other fluids, with a built-in safety feature or mechanism that effectively reduces the risk of an exposure incident.
CHAPTER ONE

INTRODUCTION

1.0 Background

Blood borne pathogens are microorganisms which transmit disease by contact with blood for example, through needle stick. The most common blood borne infection among health care workers are hepatitis B, hepatitis C and HIV (Gorman et al., 2013). Needle stick injuries (NSI) are wounds caused by sharps such as hypodermic needles, blood collection needles, IV cannulas or needles used to connect parts of IV delivery systems (Salelkar, Motghare, Kulkarni, & Vaz, 2010).

Needlestick injuries and occupational exposures of healthcare workers to blood-borne viruses is one of the most common occupational hazard faced by health workers. Despite low-cost, effective means of prevention, the occupational health of health care workers has not been prioritized (Kholti, 2014).

It is estimated that worldwide, 12 billion injections are given annually and many of these injections are unsafe exposing both the patient if the needle is not sterile and the healthcare worker from exposure to a contaminated needle after its use. According to the World Health Organisation, out of 35.7 million health care workers, about 3 million experience percutaneous exposure to infectious diseases each year. It further notes that 37.6% of hepatitis B, 39% of hepatitis C and 4.4% of HIV/AIDS in healthcare workers around the world were due to needle stick injuries. More than 90% of these infections due to occupational exposure occur in low-income countries. Irrespective of the set-up, most of the exposures and infections are preventable.
(Kholti, 2014; Chalya et al., 2015; Bhardwaj et al., 2014). In Africa the already weakened healthcare system is seriously affected by the HIV/AIDS epidemic which is endemic in most developing countries where unsafe health care practices are very common. Apart from the risk of infection from blood borne pathogens, healthcare workers who experience needle stick also go through some kind of psychiatric morbidity such as depression, including Post-Traumatic Stress Disorder (PTSD) and Adjustment Disorder (AD). The consequence of these effects include absenteeism, poor quality of service which directly affects health care service delivery (Bhardwaj et al., 2014).

1.1 Case Definitions

**Needle Stick Injury (NSI)** are injuries caused by sharps such as hypodermic needles, blood collection needles, IV cannulas, suture needles, winged needles IV sets and needles used to connect parts of IV delivery systems.

**Sharp Injury (SI)** any skin penetrating stab wound caused by a sharp instrument such as lancet, scalpel, trocar, scissors, and drill bit, sawing blade or broken glass.

1.2 Risk Factors

The highest risk exposures of needle stick and sharps injury come from blood filled devices, such as those used to access an artery or vein, for example, phlebotomy needles and needles used for inserting intravenous access lines (Kholti, 2014). Among the documented cases of occupational transmission of HIV by the U.S.CDC, 90% of the cases resulted from a needlestick injury from a hollow-bore blood-filled needle. While it is the HIV epidemic that has stimulated attention and
occupational health regulations to protect healthcare workers from exposure to bloodborne pathogens, hepatitis is much more prevalent and more infectious than HIV research has shown. Although hepatitis B is preventable with immunization and HIV transmission is significantly reduced with post-exposure prophylaxis no immunization exists for hepatitis C so prevention is the best recourse for the health care worker. Analysis of the root cause of the injury or exposure is very necessary to target specific prevention measures. The most effective way to prevent the transmission of blood-borne infections is to prevent the needlestick and sharps injury and as a result prevent exposure to blood (Kholti, 2014).

Research has shown that practices that increase the risk of needle stick injury are often associated with activities such as recapping of needles, transferring of body fluids between containers, failing to dispose of used needles properly, collision with other workers, hidden needles in bed linens etc (Kumar, Khuwaja, & Khuwaja, 2012).

1.3 Control Measures

The implementation of educational programmes, strict adherence to the Universal Precautions and the use of safer needle devices could help reduce needle sticks and other sharps injuries among health care workers. Universal Precautions (UP) is a set of measures taken to prevent exposure to blood and infectious fluids from patients. This means that all patients regardless of whether known or unknown serological status should be treated as if infected. A new term, Standard Precautions, which includes precautions for airborne as well as bloodborne infection transmission, has come into practice in the past few years, superseding Universal Precautions (Wilburn & Eijkemans, 2003).
1.4 Reporting and Documentation

The underreporting of needlestick and sharps injuries is a serious problem accounting for about 40–80% of injuries going unreported. As a result, some injured health workers sometimes do not receive the appropriate care and follow-up when accidentally stuck by needle or injured. Lack of documentation and under-reporting also denies management the opportunity to evaluate the circumstances leading to the injury for consideration in policy directives, practices or products that could prevent similar exposures in the future. There is also lack of data to be used for the purpose of prevention and in the case of later infection (Kholti, 2014). In developing countries, surveillance and monitoring are rarely carried out to protect Health Care Workers from occupational exposure of risks factors that could cause infections, illness, disability and even deaths that may in turn affect the quality of health care delivery (Aderaw, 2013; &Bhardwaj et al., 2014).

Based on the above information, healthcare worker will be threatened should they be accidentally exposed through needle stick or other sharps injuries which could also affect the quality of healthcare delivery. Employers are legally bound to establish and maintain, as far as is reasonably practical, a healthy and safe working environment for the HCWs according to section 24(1) of the 1992 Constitution and the Occupational Health and Safety Policy and Guidelines for the Health Sector June 2010 (“Occupational Health and Safety Policy and Guidelines,” 2010).

1.5 Problem Statement

Many health care workers in the line of their duty often get pricked by hypodermic needles and other sharps. These injuries expose them to various infectious diseases including HIV/AIDS,
hepatitis B, and hepatitis C which pose one of the greatest risks of occupational exposure among health care workers. Most health care workers in addition to the risk of infection with blood borne pathogens through needle stick are also at risk of the side effects of drugs used for post exposure prophylaxis as well as the psychological fear and the uncertainty of acquiring infection (Gorman et al., 2013; Bhardwaj et al., 2014). An observation made at the Anti-Retro-viral Therapy (ART) clinic at the 37 Military Hospital also revealed that most health care workers who access PEP usually have some side effects to the drugs. Therefore are often given excuse duty for the period of treatment which results in loss of productive working time.

In Ghana, data on needle stick and sharps injuries are almost non-existent. Underreporting and lack of documentation is a major challenge. And as a result of lack of data authorities are unable to quantify the impact of these exposures for policy directives. It is very easy to ignore a problem where there are few or no data to prove the existence of the problem, and since these incidence are not documented it could be a silent health hazard (Sagoe et al., 2001; Salelkar et al., 2010). The low rate of reporting in some jurisdictions have been attributed to lack of awareness of appropriate procedures and the perceived low risk of transmission of infections (Chalya et al., 2015). It is therefore important for our hospitals to develop occupational health and safety departments and standard operating procedures for reporting and management of needle sticks and sharps injuries and ensure continuous surveillance.

In view of this, the study intends to examine the universal precautions among health care workers. The study will however focus on the prevalence of Needle Stick and other sharp instrument injuries and the management procedures in place at the 37 Military Hospital.
1.6 Conceptual Framework for the Investigation of Needle Stick and sharps injuries

The diagram above shows the conceptual framework for the investigation of needle stick and sharps injuries and the factors responsible for needle stick injuries.
The main outcome variable is the cases of needle stick or sharps injuries, however other factors contribute to a case of needle stick injury. These factors have been grouped under three (3) broad categories as follows; human factors, management or organizational factors, and environmental factors. These factors directly influence the incidence of needle stick injury. On the other hand, environmental factors and managerial factors can also have a direct influence on the human factors which will in turn influence the incidence of needle stick and sharps injuries.

1.7 JUSTIFICATION

The 37 Military Hospital is one of the largest and major referral hospital in Ghana. It is a specialist hospital. It serves as the National Disaster and Emergency hospital and also the United Nations Level IV hospital in the West Africa Sub-region. The hospital has a very high client turn-over operating 24 hours a day, 7 days a week all year round providing services to the general public.

Needle stick injury is one of the occupational hazards or exposure which is often overlooked due to various known and unknown reasons. There are little or no data in most health care facilities to inform policy direction in occupational health management of the people at risk. There is also the need for the analysis of the root cause of the injury or exposure for the necessary specific target measures to be put in place, however most facilities do not have these incidence documented.

Developing countries and other resource constraint countries including Ghana have high prevalence of HIV/AIDS, hepatitis B and hepatitis C, therefore healthcare workers are at greater risk of infection from these diseases. Although the prevalence of these infectious diseases is high
in developing countries, documentations of infections as a result of occupational exposure in these countries are scarce. This could be linked to lack of surveillance and low reporting of occupational exposures (Sagoe et al., 2001; Bhardwaj et al., 2014).

Universal Precautions (UPs) or standard precautions have been widely promoted in developed countries to protect health care workers (HCWs) from occupational exposure to blood and the consequent risk of infection with blood-borne pathogens as a result of needle stick and other sharp injuries. However, in low-income countries, the situation is very different, Universal Precautions or standard precautions are usually not effectively practiced, thereby exposing health care workers to preventable risks of infection (Kermode et al., 2005).

The circumstances in which needle stick injury occurs vary in different countries as well as facilities as the engineering safety controls and education of the health care workers also vary (Gorman et al., 2013).

It will therefore be very important to study the prevalence of needle stick and other sharps injuries among healthcare workers at the 37 Military Hospital. Findings of this study would highlight factors responsible for needle stick injury. It will also help in planning and targeting appropriate measures/interventions to improve compliance to standard precautions among healthcare workers. Findings and recommendations of the study will also be useful for ensuring that measures are put in place to minimize or control the incidence of these injuries. Recommendations emerging from this study will be useful for improving occupational health and safety in hospitals in the country. The ultimate beneficiary of these interventions as a result of the findings will be the healthcare worker.
1.8 RESEARCH QUESTIONS

1. How often are needle stick and other sharps injuries reported among healthcare workers at the 37 Military Hospital?

2. What is the prevalence of needle stick and sharps injuries among health care workers in 37 Military Hospital?

3. What are the management procedures of needle stick and sharp injuries in place at the 37 Military Hospital?

1.9 STUDY OBJECTIVES

1.9.0 General Objective

To determine the prevalence of needle stick and other sharps injuries among various categories of healthcare workers at the 37 Military Hospital.

1.9.1 Specific Objectives

1. To examine factors responsible for needle stick and other sharps injuries.

2. To determine the prevalence and severity of needle stick or sharp injury sustained in the course of their duty.

3. To examine the preventive measures of needle stick injuries put in place for healthcare workers in 37 Military Hospital.

4. To assess the knowledge, attitudes and practices of healthcare workers regarding needle stick and other sharps injuries.

1.10 Study Limitations and challenges

There are various aspects of this research that were beyond the control of the researcher in the research process. The respondents were required to recall all incidents of medical sharps injuries
in the past 12 months and beyond, which could be influenced by recall bias. Due to the busy schedules of the study population and the shift system of work, it was difficult to do random sampling in some cases. Therefore convenient sampling was used. Generalizations of findings in this study can only be limited to healthcare workers in similar setups. For lack of time the study could have involved focus group discussions and observation of work processes to give a true picture of the occupational health assessment.
CHAPTER TWO

LITERATURE REVIEW

2.0 Occupational hazards in health care delivery

Hospital settings have many potential hazards that can affect the health of employees and consequently their work output. These hazards include; biological, chemical, ergonomics, hazardous drugs, radiations, shift work, stress and violence. These can only be controlled or managed when identified as hazards. A needle stick or sharps injury (NSSI) can be described as any percutaneous injury that results in piercing of the skin by a needle or other sharp object or device, typically occurring during use of the device and before disposal (Salelkar et al., 2010). Needle stick and sharps injuries (NSSIs) are one of the most common physical hazards, with the consequent psychological effects for many healthcare workers. Needle stick and sharp injury is rated among the top 10 hazards healthcare workers encounter in the discharge of their duties (Bhardwaj et al., 2014).

HIV epidemic actually stimulated attention and occupational health regulations to protect health care workers from exposure to blood borne pathogens, however, hepatitis is much more prevalent and more infectious than HIV (Kholti, 2014). Occupational health and safety among health care workers is very crucial to quality health care delivery. Needle stick and sharps injury remains the major source of transmission of infectious diseases among healthcare workers. This is an occupational safety concern which needs to be addressed to prevent the transmission of various blood borne diseases among health care workers. The people most at risk of occupational exposure to needle stick injury are in resource constraint and developing countries. In most of these countries, there is paucity and lack of standard protocols in reporting needle stick injury (Kumar et al., 2012).
According to Kebede, Molla, & Sharma, (2012), absence of safety instructions and work guidelines is a major factor influencing needle stick injury. Their study recorded high prevalence of needle stick injury which was attributed to inadequate occupational health and safety services. According to Salelkar et al., (2010), their study revealed that the high occurrence of NSSI was due to high rate of ignorance and apathy. The research findings therefore recommended appropriate education and other interventional strategies by the hospital infection control committee to minimise or control NSSI.

2.1 Factors associated with needle stick and sharps injury

The circumstances in which needle stick and sharp injury occurs depend partly on the type and design of the device. Also, apart from the risks associated with the device characteristics, needle stick injuries have been related to certain factors of work practices such as;

1. Recapping of needles.
2. Passing device from one person to another.
3. Transferring body fluids into containers.
4. Failing to properly dispose of used needles.
5. Collision between workers.
6. Hidden needles in bed sheets or linens.
7. During waste collection and disposal.

Needle stick and sharps injuries are usually caused by simple and preventable mistakes in handling needles and sharp devices. Most of these injuries happen before or during disposal process. Some of the causes are; rushing, anger, distraction and multiple attempts to complete a procedure, healthcare worker fatigue, uncooperative patients or teams affected by staff shortage (Kasatpibal et al., 2015).
The estimated preventability of needle stick and sharps injuries through safety devices depends largely on the kind of activity and availability of resources and organisational controls across various health care workers (Wicker, Jung, Allwinn, Gottschalk; Rabenau, 2007).

2.2 Risk of occupational exposure

Many healthcare workers are at risk of infection with blood borne disease as a result of occupational exposure to needle stick and sharp injuries. These professional include; physician, surgeons, nurses, nursing assistants, laboratory staff, technician, students, laundry staff, environmental services and maintenance, and personnel involved in handling biomedical waste. This is especially common in developing countries including Ghana where waste collection is not fully mechanized (Gorman et al., 2013; Kumar, Khuwaja; Khuwaja, 2012)

Protection of healthcare workers in developing countries is a significant challenge because protection of healthcare workers is not in the list of healthcare priorities (Sagoe et al., 2001). Percutaneous injuries, caused by needle sticks and other sharps, are a serious health concern for health care workers (HCWs) as a significant risk of occupational transmission of infectious diseases. Despite the interventions like vaccination for hepatitis B and Post Exposure Prophylaxis for HIV, it does not guarantee control of infection therefore prevention is the best recourse. The purpose of providing Purpose of Post-exposure Prophylaxis (PEP) is to prevent infection subsequent to exposure rather than treatment of an established infection (CDC, 2009).

Needle stick injury can occur even before use, during use, after use, before disposal and during or after disposal of the needle or sharp instrument. However, research has shown that higher
proportions of needle stick injuries occur after use and before disposal by which time the needle or sharp instrument is already contaminated hence pose the risk of transmission of infectious diseases. It has also revealed been revealed by research that the common risk factors associated with needle stick and sharp injury include; training without practice, haste, lack of hazard awareness, inadequate staffing, and obsolete guidelines. And the most common devices that caused most NSSIs have been hollow bore needles. With majority of the injuries mostly recorded in the morning shift. This is usually attributable to the workload around that time (Kasatpibal et al., 2015).

The risks of infection as a result of needle stick or sharp injury to a health care worker are as follows; Hepatitis B virus 6 – 30% for susceptible health care worker without vaccination, Hepatitis C virus 3 – 10% and HIV less than 0.3%. This can however increase with higher levels of viral load from source patient. Apart from the risk of infection, health care workers also experience significant anxiety and emotional distress as well as post-traumatic stress disorder (PTSD) after needle stick or sharp injury (Wicker et al., 2007; Kasatpibal et al., 2015; Kumar et al., 2012). To a large extent these infections are preventable, as demonstrated by the effectiveness of vaccination and PEP interventions in advance countries. In many cases, for example, the injuries arise because systems for managing percutaneous exposures are nonexistent in the country (Prüss-üstün, Prüss-üstün, Campbell-lendrum, Corvalán; Woodward, 2003).

According to Cho et al., 2013, NSIs were significantly associated with years worked, emotional exhaustion related to the job, work environment, use of safety containers for disposal of sharps and needles, and certain specialties. Specifically, the risk for NSI significantly decreased as the
years working increased. However, those who experienced high emotional exhaustion were at significantly increased risk of NSIs than those who experienced low or average emotional exhaustion.

2.3 Risk Assessment

The incidence of every occupational exposure should be subjected to risk assessment and be documented appropriately. This should include;

1. Assessment of the significance of the exposure.
2. The status of the source individual.
3. The status of the exposed person with respect to blood borne viruses including vaccination.

This risk assessment should be conducted on the basis of the type of exposure and the amount and type of infection involved. It should also take into account the degree of exposure guided by the information below, adapted from Centre for Healthcare Related Infection Surveillance and Prevention (CHRISP).

2.4 Occupational Exposure classification.

Massive Exposure: - Risk factors include; Transfusion of blood, Injection of large volume of blood/body fluid (>1mL), Parenteral exposure to laboratory specimens containing high titre of virus.

Definite Exposure: - Skin penetrating injury with a needle contaminated with blood or body fluid, Injection of blood/body fluid not included under ‘Massive Exposure’, Laceration or similar wound which causes bleeding and is produced by an instrument that is visibly contaminated with blood or body fluid. In laboratory settings, any direct inoculation with HIV tissue or material or material likely to contain HIV, HBV or HCV not included below.
Possible Exposure: Risk factors - Intradermal (‘superficial’) injury with a needle contaminated with blood or body fluid. A wound produced with an instrument contaminated with blood or body fluid not associated with visible bleeding. Prior (not fresh) wound or skin lesion contaminated with blood or body fluid. Mucous membrane or conjunctival contact with blood. Human bite with blood exposure or scratch.

For the above three types of exposures the following follow up method should be used:
- Immediately identify the source individual (if known)
- As a minimum undertake baseline screening of the exposed person.
- Provide follow up as per the treatment protocols.
- Seek advice from the expert information network.

Doubtful Exposure: - Intradermal (‘superficial’) injury with a needle considered not to be contaminated with blood or body fluid.
- A superficial wound not associated with visible bleeding produced by an instrument considered not to be contaminated with blood or body fluid.
- Prior wound or skin lesion contaminated with a body fluid other than blood and with no trace of blood e.g. urine.
- Human bite with no blood exposure (e.g. saliva).

The following follow up method should be used:
- Conduct baseline screening of the exposed person.
- Documentation by the way of incident reporting and the possibility of further counselling may still be required.
- Follow up at 3 months may be indicated based on risk assessment.
Non-exposure: - Risk factors are; Intact skin visibly contaminated with blood or body fluid, Needlestick with non-contaminated (clean) needle or sharp.

The following follow up method should be used- No further follow-up, although documentation by the way of incident reporting and the possibility of further counselling may still be required.

- Clean needlestick injuries should be documented only, to allow facilities to identify all causes of needlestick injury to facilitate appropriate risk management.

2.5 Availability of Literature

There is much literature in the developed countries on occupational exposure of health care workers to needle stick and sharps injuries. On the contrary, in most developing countries where most of these exposures are common due to resource constraint and other factors have very little literature in few countries (Jahangiri, Rostamabadi, Hoboubi, Tadayon, & Soleimani, 2015). By virtue of the work environment of the health care worker, the risk of experiencing NSSI is very common. According to a study conducted in Saudi Arabia on needle stick and sharps injuries, the researcher concluded that at an average hospital, HCWs experience approximately 30 NSSI per 100 beds per year (Hashmi, 2012).

2.6 Global Estimates of Occupational accidents and work related diseases

Needle stick and sharps injuries are usually sustained accidentally hence could be categorized under occupational accidents and the resultant infection as work related diseases. Due to limited and non-availability of data in many countries, there are no consistent global figures on work related injuries and diseases. Occupational disease contributes significantly to the burden of disease especially in developing and resource constraint countries (International Labour Organization, 2014).
2.6.1 Healthcare sharps injury in developed nations

It is estimated that 100,000 needlestick injuries occur annually in the UK alone and 500,000 annually in Germany (Ramphal et al 2010). Each year, 3 million health workers worldwide are exposed through the percutaneous route to blood borne pathogens: 2 million are exposed to hepatitis B, 900 000 to hepatitis C and 170 000 to HIV. These injuries result in 15 000, 70 000 and 1000 infections, respectively. More than 90% of these infections occur in developing countries (WHO, 2006). These blood borne infections have serious consequences, including long-term illness, disability and death. In addition to HBV, HCV and HIV, other pathogens can be transmitted to health-care workers by sharps injury, including those that cause tuberculosis, diphtheria, herpes, malaria, Ebola plague, and Epstein-Barr infection (Pruss-Ustun. A., et al., 2005). While several studies report that injuries occur frequently to nurses, physicians and technicians, housekeeping and other support staff are also at risk (Hiransuthikul, Tanthitippong; Jiamjarasrangsi, 2006). As a measure of likelihood of injury among hospital workers, it has been estimated that 28 sharps injuries occur annually for every 100 occupied hospital beds (Perry, Parker & Jagger, 2009 b). According to the (Rapiti et al., 2005), the global burden of disease from sharps injuries to health care workers includes 40% of all hepatitis infections and 4.4 % of all HIV infections among health workers. The risk of health care worker infection following a Needlestick injury from an infected source patient depends on the virus. The Hepatitis B virus is about 10 times more transmissible than hepatitis C virus, which in turn is more easily transmitted than HIV (Wilburn, 2004).

The World Health Organization (WHO, 2005b) estimates that unsterilized syringes cause between 8 to 16 million cases of hepatitis B, 3 to 4.7 million cases of hepatitis C, and 80,000 to
160,000 cases of HIV every year. Needlestick and other sharps injuries are a serious hazard in any medical care situation. These injuries are caused by different types of needles and sharps, such as scalpels and broken glass containers. Contaminated needles and sharps may inject healthcare workers with blood that contains pathogens such as hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV), all of which pose a grave, potentially lethal risk. Although immunization is available to prevent hepatitis B illness, no immunization is available to prevent HCV or HIV (CDC, 2010). Hospital-based U.S. healthcare personnel sustain approximately 385,000 percutaneous injuries from needles and other sharps devices each year - equivalent to more than 1,000 injuries a day. This figure does not include sharps injuries that may have occurred in non-hospital settings, such as in private medical and dental offices, in home healthcare settings, and long-term care facilities. Direct and indirect costs associated with sharps injuries can be substantial. Occupational exposures to blood borne pathogens also take an emotional toll that is more difficult to quantify, but no less significant (CDC, 2005).

The gravity of workplace risks is seen in the International Labour Organization (ILO) estimate that among the world’s 2.7 billion workers, at least 2 million deaths per year are attributable to occupational diseases and injuries (ILO, 2003). The ILO estimates for fatalities are the tip of the iceberg because data for estimating nonfatal illness and injury are not available for most of the globe. Underreporting of sharps injuries by employees is well documented in the literature with estimates ranging from 22% to 99%, and has been found to vary by occupation and by hospital (Nagao et al., 2007). The ILO also notes that about 4 percent of GDP is lost because of work-related diseases and injuries (ILO, 2003). The average direct costs, including laboratory costs for tests of both source patients and exposed employees, labor costs associated with testing and counseling, and the costs of post-exposure prophylaxis, are estimated to be $3,042 (ranging from
$1,663 to $4,838) (O’Malley, Scott, Gayle, Dekutoski, Foltzer, Lundstrom, et al., 2007). Sharps injuries are preventable and the overall goal should be their elimination. As a step in that direction, the U.S. Public Health Service called for the reduction of sharps injuries among health care workers by 30% as a national health objective for 2010 (CDC, 2010). In addition, health care facilities were required by federal regulations to implement comprehensive plans to reduce these injuries. Preventing sharps injuries requires the combined effort of government agencies, employers, and equipment manufacturers, as well as health care workers themselves. Elements of a successful sharps injury prevention program, as outlined by the CDC, include: promoting an overall culture of safety in the workplace, eliminating the unnecessary use of needles and other sharp devices, using devices with sharps injury prevention features, employing safe workplace practices, and training health care personnel, sharps injury surveillance is also a key component of a comprehensive program. (CDC, 2008).

Appropriate measures to minimize the risks of medical sharps injuries would include the provision of safer needle devices and sharps containers. A combination of training, safer working practices and the use of medical devices incorporating sharps protection mechanisms can prevent the majority of Needlestick and sharps injuries (Adams and Elliott, 2006).

2.6.2 Healthcare sharps in developing countries

The results of a WHO 2004 assessment conducted in 22 developing countries showed that the proportion of health care facilities that do not use proper waste disposal methods range from 18% to 64% (WHO, 2005 b). EPInet data for 2008 reports a rate of approximately 26 needle stick injuries (NSIs) per 100 beds in teaching hospitals. There are few reports on NSIs from India and with limited data; it is not possible to estimate an annual incidence (Bairy et al., 2007).
African health care workers suffer on average two to four needle stick injuries per year and over half of the hospitalized patients in South Africa are HIV positive (Nemutandani et al., 2005). In some regions of Africa and Asia close to half of all hepatitis B and C infections among health care workers are attributable to contaminated sharps. In some areas of the Eastern Mediterranean region over two-thirds of hepatitis B and C infections in health care workers are attributable to contaminated sharps. Over two-thirds of all hepatitis B in Central and South America are the result of occupational exposure (Prüss-Üstün et al., 2005). Preventable needle stick injuries, while still common in the United States, occurs most commonly in Africa and Southeast Asia. These are the settings where health care workers are at greatest risk for infection. Factors associated with an increased risk of occupational exposure to sharps injuries can differ from place to place. While developed countries are busy designing new protective devices and improving their policies, the developing world still struggles with the lack of basic equipment, inadequate policies and poor adherence to them. Sub-Saharan countries in Africa have a heavy burden of HIV/AIDS and other blood borne infectious diseases and high usage of injections. Lack of safe devices in hospitals because of the low expenditure on health care, occupational safety and health services and a high ratio of patients to health care worker contribute to a work environment predisposing the health care workers to a great risk of needle stick injuries, and consequently, to blood borne infections. Only a few studies have been published on sharps injuries from developing countries in general although 90% of needle sticks injuries occur in developing countries (Nsubuga and Jaakkola, 2005).

Unreported needle stick and sharps injuries are a serious problem and prevent injured health care workers from receiving post-HIV exposure prophylaxis shown to be 80% effective against HIV infection. Without documentation of the injury, the worker is unlikely to receive worker’s
compensation benefits if later becoming infected with the human immunodeficiency virus (HIV) or hepatitis. Needle stick and sharps injuries (NSSIs) remain a source of infection for health care workers (HCWs) worldwide. Active surveillance and periodic review of interventions are important aspects to reduce NSSIs in targeted high-risk occupational groups (Jahan, 2005). One of the commonest reason given for not reporting was that the wound was minor (Johnson & Asuzu, 2013).

### 2.6.3 Prevalence of Needle stick injuries in similar studies

A hospital-based cross sectional study was conducted in the orthopaedic wards of Melaka General Hospital, Malaysia. The prevalence of NSIs was 32 (20.9%) and majority of it occurred during assisting in operation theatre 13 (37.4%). Among them six (18.8%) were specialist, 12 (37.5%) medical officer, 10 (31.2%) house officer and four staff nurses (12.5%). Among the respondents 142 (92.8%) had been immunized against Hepatitis B and 148 (96.7%) participants had knowledge regarding universal precaution. The incidence of NSI among health care workers at orthopaedics ward was not any higher in comparison with the similar studies and it was found out that the prevalence was more in junior doctors compared with specialist and staff nurses and it was statistically significant (Bhardwaj et al., 2014).

According to a study conducted in the University of Alexandria hospital, Egypt, more than two-thirds of HCWs (438, 67.9%) had sustained at least 1 NSI in the previous 12 months. Of these workers, 33.0% suffered 1 injury, 18.0% 2 injuries, 12.0% 3 injuries and 5.0% more than 3 NSIs. Health Care Workers aged 40+ years and those with 5+ years of work experience were significantly less likely to be injured (Hanafi, Mohamed, Kassem, & Shawki, 2011).
“Needle-stick injuries and splash exposures among health-care workers at a tertiary care hospital in north-western Tanzania” a study conducted by Chalya et al., (2015). Out of 436 HCWs who participated in this study, 212 (48.6%) reported incidents of NSIs and splash exposures within the previous 12 months. NSIs were reported by 65.1% (n= 138) and splash exposures by 27.4% (n = 58). Sixteen (7.5%) respondents had both NSIs and splash exposures. High rates of NSIs were observed among nurses (71.0%), during procedures (53.6%) and occurred commonly in the Accident and Emergency department (33.3%). Hollow bore needles were responsible for 63.8% of NSIs. Splash exposures occurred more commonly in operating theatre (41.4%). At the time of the exposure, 116 (54.7%) HCWs wore protective equipment. The most common action following exposure was washing the site with soap and water (55.6%). Only 68 (32.1%) reported the incident of exposure to the relevant authority (Chalya et al., 2015).

2.6.4 Current epidemiology of needlestick injuries in Ghana

Ghana like many developing nations do not have empirical national data on needle stick injuries even though some individuals might have done some works in that area. These data are however important for policies on occupational health exposure of healthcare workers. The Occupational Health and Safety Policy Guidelines for the health sector of Ghana came into existence in June 2010, therefore it is not farfetched that there is not enough data on occupational health exposures.

International Society of Infectious Diseases, Small Grants Program Final Report by Dr Alex Owusu. This was a study of the epidemiology of blood-borne pathogens and needlestick injuries among health workers in Ghana. This study was aimed at assessing the frequency of needle-stick
injuries and exposure to blood/body fluid among HCWs. The response rate was about 50%, with about 2000 questionnaires being evaluable.

The following findings were made

The prevalence of needlestick/sharp object injuries was 32.4%; 72.3% were performing the procedure and 13.1% were assisting. Cleaning up after the procedure (7.0%) and disposing medical waste (5.9%) were also opportunities for injury. Needles on syringes were the most frequent cause of sharp object injuries (66.9%). Other common sharps include suture needles (9.3%) and butterfly needles (6.7%). More than half (54.9%) of HCWs reported not recapping needles, while 31.3% frequently recap needles with only one hand. Only 13.8% frequently recap with two hands. Recapping is a high-risk procedure and should be strongly discouraged.

Reporting of injuries

Only 20% of injured HCW reported their injury to a supervisor. However, there is neither documentation of these injuries nor any plan for risk assessment. This low level of reporting may reflect the absence of any ‘incentive’; in most cases nothing is done for these injured workers, and few had access to HIV post-exposure prophylaxis (ISIDNEWS • July 2004).

2.7 The Need for Cultural shift

The negative cultural attitude towards Occupational Health and Safety is formed out of ignorance regarding the cause of occupational accidents and diseases and how it can be prevented. This ignorance leads to apathy and less focus for addressing the issues even in high hazard sectors for example needle stick and sharps exposures among health care workers. It has
becomes a vicious cycle of neglect where Occupational Health and Safety never seems to get the needed attention it deserves until the cycle is broken. Due to lack of data as mentioned earlier, occupational disease remain a significant challenge leading to public ignorance and low prioritization and the under reporting of occupational exposures resulting in the cycle of neglect. With availability of data there will be evidence to support policy directives for prevention needs and development of appropriate targeted programmes (ILO 2014). Below is the vicious cycle of neglect for Occupational diseases and exposures adapted from the International Labour Organization 2014 report.

**Figure 2: The vicious cycle of neglect of occupational exposure**
CHAPTER THREE

METHODOLOGY

3.0 Study Design

This study was a descriptive hospital based cross – sectional design conducted by means of pretested, structured self-administered questionnaires. In this study, the 37 Military Hospital was purposefully sampled as the study site and the health care workers within the hospital being the target/source population were randomly selected using randomly generated computer numbers and the duty roasters of the various wards and departments. The study focused on the occupational risks of exposure to needle stick and sharps injuries. It also looked at the frequency and severity of the needle sticks and sharps injuries as well as the factors that contribute to the occurrence of the needle stick and sharps injuries. The study also assessed the measures the hospital has put in place to control and manage these sharps injuries. The study was conducted between May 2016 and July 2016.

3.1 Study site

The 37 Military Hospital is a specialist military based Hospital located in the South – Eastern part of Greater Accra Region. It is located close to Flag Staff House, i.e. the seat of government, at the intersection of the Liberation road and Giffard road. It is the largest Military Hospital in Ghana supported by various Medical Reception Stations (MRSs) in the various military garrisons across the country. It serves as one of the major referral hospitals in Ghana. The 37 Military Hospital serves as the National Disaster and Emergency Hospital, it also serves as the United Nations Level IV hospital for the West African sub region. Therefore provides medical care to United Nations and other International staff within the sub-region. It has a mixed staff of both
military and civilians. The hospital even though its core mandate was to provide health care to soldiers and their dependants, it has over the years diversified to providing health care services to the general public. The hospital has an estimated staff capacity of about 3500 comprising both military and civilian employees. It has a bed capacity of about 500 beds, an estimated annual Outpatient attendance of about 26486 visits, an annual Inpatient attendance of about 13208. About 85% of the annual attendance is from the general public. The map below shows the location of the study area, it was obtained from Centre for Remote Sensing and Geographic Information Systems (CERGIS) University of Ghana.

**Figure 3: Outlined location with legend showing 37 Military Hospital**
3.2 Study Population and Target Population

The study population in this case was healthcare workers at 37 Military Hospital who met the criteria for inclusion in this study. The target population include; 99 Doctors and Dentists, 444 Nurses, 332 Ward Assistants and General Assistants, 63 Laboratory staff, 47 Dental Staff. The rest were 32 Laundry staff, 11 Physician/Medical Assistants, 32 House Officers, 65 Public Health officers/technicians, 31 Cleaners. The study targeted healthcare workers exposed to medical sharps who are potentially at risk of being injured or infected.

3.3 Sample procedure

The hospital has health care workers in different job categories which were considered as different strata. The participants in this research were selected by first receiving the duty roaster from each department, assign numbers to individuals in the list. Random number generator was used to select participants proportionately from each department as shown in the table below.

Table 1: Stratified job categories

<table>
<thead>
<tr>
<th>Job Category</th>
<th>Number available in dept</th>
<th>Number selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse</td>
<td>444</td>
<td>136</td>
</tr>
<tr>
<td>Cleaners</td>
<td>31</td>
<td>7</td>
</tr>
<tr>
<td>Laboratory Staff</td>
<td>58</td>
<td>32</td>
</tr>
<tr>
<td>Dental technicians/staff</td>
<td>46</td>
<td>11</td>
</tr>
<tr>
<td>Doctors/Dentist/Physician Assistants/Student Doctor</td>
<td>149</td>
<td>62</td>
</tr>
<tr>
<td>Public Health officer/technicians</td>
<td>57</td>
<td>14</td>
</tr>
<tr>
<td>Ward Assistants</td>
<td>332</td>
<td>23</td>
</tr>
<tr>
<td>Incinerator Operators</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Laundry staff</td>
<td>32</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>N=1095</td>
<td>n=300</td>
</tr>
</tbody>
</table>
3.4 Sample size

The sample size of 300 health care workers was arrived at using the procedure and formula below. In order to determine the sample size for this research work, three factors were specified so as to obtain the appropriate sample size: the level of precision (sampling error), the level of confidence, and the degree of variability (Miaoulis and Michener, 1976).

For the purpose of this study, a 95% confidence level was used with sampling error of 4.75% and 50% degree of variability (proportion of health workers exposed to the risk of needle stick injuries).

Considering,

\[ n = \frac{Z_{\alpha/2}^2 \times pq}{\varepsilon^2} \]

where

- \( n \): represents the sample size (selected healthcare workers at 37 Military Hospital, Accra)
- \( Z_{\alpha/2} \): denotes the critical value
- \( p \): represents the degree of variability (proportion of health workers exposed to the risk of needle stick injuries)

\[ q = 1 - p \]

\( \varepsilon \) represents the level of precision or sampling error

Considering \( \alpha = 0.05, p = 0.5, q = 0.5, \varepsilon = 4.75\% \) or 0.0475 and \( Z_{0.025} = 1.96 \)

implies,

\[ n = \frac{1.96^2 \times 0.5 \times 0.5}{0.0475^2} = 299.84 \approx 300 \] Healthcare workers at 37 Military hospital.

Therefore, the sample of 300 health workers at 37 Military hospital would be representative enough with 95 percent level of significance, 5 percent sampling error and a maximum measure of variability of 50 percent.
ASSUMPTIONS

- The level of precision or sampling error was assumed to be 4.75 percent with 95 percent confidence level
- The degree of variability or proportion of health workers exposed to needle stick injuries were estimated to be 50 percent approximately since it was unknown.

3.5 Variables

3.5.0 Dependent variable - Needlestick or sharp injuries.

3.5.1 Independent variables – Risk factors of needle stick and sharp injuries.

Personal Factors: - Education, Profession, Work Experience, Age, Sex, Attitude and Job Category.

Management/Organizational Factors: - Safety Culture, Personal Protective Equipment, Surveillance, Post Exposure Prophylaxis for HIV, Vaccination for Hepatitis B.

Environmental Factors: - level of cleanliness, housekeeping, working space and ergonomics

3.6 Inclusion criteria
The study included health care workers who use needles and sharps in their duties and those who come into contact with these devices by virtue of their job and are staff of the hospital.

3.7 Exclusion criteria
Office workers or administrative staff, records and other auxiliary non clinical health care workers who do not come into contact with needles and sharps in the cause of their duties were not considered in the study.
3.8 Quality Control
The questionnaire was pretested at the University of Ghana Hospital, 25 questionnaires were administered and 18 were returned. The questionnaires were made very clear with simple English Language that was easy to understand. Two research assistants were trained at the 37 Military Hospital to help in administering the questionnaires and clarification of issues arising from participants.

3.9 Data Collection Techniques and Tools
A hospital based cross sectional study technique was employed. Data was collected using a structured self-administered questionnaire. Participants were randomly selected from the various job categories using computer generated random numbers. Questionnaires were handed to the individuals selected, who completed and returned them. Research assistants were around to clarify any doubts.

3.10 Data Analysis Strategies
The Statistical Package for Social Scientist (SPSS) version 22 and Excel were the tools used for the analysis of the data. Statistical test such as Independent Sample T-test, Analysis of Variance (ANOVA) test as well as Chi-square test of independence was conducted. A logistic regression model would be fitted so as to determine other factors that contribute to needle stick or sharps injuries.
3.11 Ethics and Human Subjects Issues

Institutional ethical clearances were obtained from the Ghana Health Service, School of Public Health, University of Ghana as well as the 37 Military Hospital Internal Review Board, before the commencement of the study. The participant’s rights and interest were safeguarded as follows;

   a. Participants were made to understand that their participation was voluntary and that they could withdraw from the study at any time or decline to answer any question without any penalty.

   b. The research objectives and all data collection activities were clearly explained to participants.

   c. A written consent form was obtained from participants.

   d. Privacy and confidentiality of data was assured. Participants were not required to write their names on the questionnaire, therefore no information can be linked to their identities. Data was kept with only the principal investigator.
CHAPTER FOUR

RESULTS

4.0 INTRODUCTION

This chapter focuses on a detailed analysis of the primary data obtained from 37 Military Hospital between the period of May 2016 and July 2016 which assessed the occupational risks of exposure to needle stick and sharps injuries, the frequency and severity as well as the factors that contribute to the occurrence of the needle stick and sharps injuries. It will also assess the measures the hospital has put in place to control and manage these sharps injuries. The Statistical Package for Social Science (SPSS) version 22 and Excel were the tools used for the analysis of the data. Statistical test such as Independent Sample T-test, Analysis of Variance (ANOVA) test as well as Chi-square test of independence would also be conducted. A logistic regression model would be fitted so as to determine other factors that contribute to needle stick or sharps injuries.

4.1 Socio-Demographic Information

The socio-demographics considered for the purpose of this study were age, level of education, gender, occupational category, and hours of work per day and years of working experience of different health workers. The descriptive statistics revealed that 42.8% of the respondents were males with approximately 57.2% being females. Hence, it could be inferred that the number of females in 37 Military Hospital seems to be greater than males on the average. Additionally, it was discovered that majority of the health workers were age between 20 and 40 years (83.2%); whereas, 1.3% and 15.5% of the respondents were less than 20 years and between 41 and 60 years respectively. On the other hand, the percentage of the workers with diploma/secondary school, degree, masters, doctorate and those considered as medical doctors were approximately
39.4, 38.0, 2.4, 0.7 and 19.5 respectively. This implies that majority of the respondents are diploma/secondary school and degree holders. However, the number of nurses (45.8%) considered in this study were found to be the greatest; followed by, doctors (20.9%), laboratory staffs (10.8%), ward assistants (6.7%), public health workers (4.7%), laundry staffs (4.0%), dental staffs (3.7%), cleaners (2.4%) and incinerator attendants (1.0%). The above statistics are summarized in table 1.0 below;
<table>
<thead>
<tr>
<th></th>
<th>Number(n)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>127</td>
<td>42.8%</td>
</tr>
<tr>
<td>Female</td>
<td>170</td>
<td>57.2%</td>
</tr>
<tr>
<td><strong>Educational level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diploma</td>
<td>117</td>
<td>39.4%</td>
</tr>
<tr>
<td>Degree</td>
<td>113</td>
<td>38.0%</td>
</tr>
<tr>
<td>Masters</td>
<td>7</td>
<td>2.4%</td>
</tr>
<tr>
<td>Medical doctors</td>
<td>58</td>
<td>19.5%</td>
</tr>
<tr>
<td>Doctorate</td>
<td>2</td>
<td>0.7%</td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doctor</td>
<td>62</td>
<td>20.9%</td>
</tr>
<tr>
<td>Nurse</td>
<td>136</td>
<td>45.8%</td>
</tr>
<tr>
<td>Laboratory staff</td>
<td>32</td>
<td>10.8%</td>
</tr>
<tr>
<td>Dental staff</td>
<td>11</td>
<td>3.7%</td>
</tr>
<tr>
<td>Ward assistant</td>
<td>20</td>
<td>6.7%</td>
</tr>
<tr>
<td>Public Health</td>
<td>14</td>
<td>4.7%</td>
</tr>
<tr>
<td>Cleaner</td>
<td>7</td>
<td>2.4%</td>
</tr>
<tr>
<td>Laundry staff</td>
<td>12</td>
<td>4.0%</td>
</tr>
<tr>
<td>Incinerator attendant</td>
<td>3</td>
<td>1.0%</td>
</tr>
<tr>
<td><strong>Age group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20years</td>
<td>4</td>
<td>1.3%</td>
</tr>
<tr>
<td>20-40 years</td>
<td>247</td>
<td>83.2%</td>
</tr>
<tr>
<td>41-60 years</td>
<td>46</td>
<td>15.5%</td>
</tr>
<tr>
<td><strong>Occupational Infection</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>12</td>
<td>4.04%</td>
</tr>
<tr>
<td>No</td>
<td>4</td>
<td>1.347</td>
</tr>
<tr>
<td>Missing</td>
<td>281</td>
<td>94.61</td>
</tr>
</tbody>
</table>
4.1.1 Average number of hours spent per day as well as the years of working experience of the health workers.

In addition, the average numbers of hours spent in the hospital each day by the health workers at 37 Military Hospital can be asserted to be approximately eight (8) hours. However, table 3.0 brings to light that doctors tend to spend more hours in the hospital than any others health worker on the average; followed by ward assistants, dental staffs, laboratory staffs, nurses through to incinerator assistants with the least number of hours spent in the hospital. Nonetheless, the mean number of years spent at the hospital by each respondent considered in the study can be concluded to be approximately six years. But, it can clearly be seen that the laundry staffs have averagely spent 15 years in the hospital; followed by, the dental staffs with 12 years of working experience. However, doctors, laboratory staffs as well as public health workers can be affirmed to have the least of working years relative to the other categories of work in the hospital. Table 3 is represented below;
Table 3: Mean Values of the Working Hours and Work Experience of Respondents

<table>
<thead>
<tr>
<th>Health workers</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Number(n)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hours of working per day</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doctor</td>
<td>8.4194</td>
<td>1.37362</td>
<td>62</td>
</tr>
<tr>
<td>Nurse</td>
<td>7.5588</td>
<td>1.23986</td>
<td>136</td>
</tr>
<tr>
<td>Laboratory staff</td>
<td>7.5625</td>
<td>1.38977</td>
<td>32</td>
</tr>
<tr>
<td>Dental staff</td>
<td>7.6364</td>
<td>.67420</td>
<td>11</td>
</tr>
<tr>
<td>Ward assistant</td>
<td>8.1500</td>
<td>1.92696</td>
<td>20</td>
</tr>
<tr>
<td>Public Health</td>
<td>7.2143</td>
<td>.69929</td>
<td>14</td>
</tr>
<tr>
<td>Cleaner</td>
<td>7.1429</td>
<td>.69007</td>
<td>7</td>
</tr>
<tr>
<td>Laundry staff</td>
<td>7.0833</td>
<td>.28868</td>
<td>12</td>
</tr>
<tr>
<td>Incinerator</td>
<td>6.0000</td>
<td>0.00000</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>7.7205</td>
<td>1.33280</td>
<td>297</td>
</tr>
<tr>
<td><strong>Years of working experience</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doctor</td>
<td>4.61</td>
<td>5.380</td>
<td>62</td>
</tr>
<tr>
<td>Nurse</td>
<td>5.23</td>
<td>5.804</td>
<td>136</td>
</tr>
<tr>
<td>Laboratory staff</td>
<td>3.44</td>
<td>4.899</td>
<td>32</td>
</tr>
<tr>
<td>Dental staff</td>
<td>12.27</td>
<td>9.829</td>
<td>11</td>
</tr>
<tr>
<td>Ward assistant</td>
<td>6.30</td>
<td>7.328</td>
<td>20</td>
</tr>
<tr>
<td>Public Health</td>
<td>3.71</td>
<td>2.614</td>
<td>14</td>
</tr>
<tr>
<td>Cleaner</td>
<td>6.86</td>
<td>3.891</td>
<td>7</td>
</tr>
<tr>
<td>Laundry staff</td>
<td>15.33</td>
<td>9.538</td>
<td>12</td>
</tr>
<tr>
<td>Incinerator</td>
<td>7.33</td>
<td>5.033</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>5.63</td>
<td>6.423</td>
<td>297</td>
</tr>
</tbody>
</table>
4.2 Years of working experience and hours spent per day across the gender and the various age groups

The ANOVA and Independent Sample T-test would be used to determine whether the average number of working years (working experience) and hours spent per day is the same across the gender and the various age groups. According to the Central Limit theorem, the sampling distribution of the mean follows a normal distribution if the sample size is large (>30). Consequently, the data on number of working years (working experience) and hours spent per day can be concluded to follow a normal distribution and thus, the underlying parametric comparison methods are appropriate to use. A multiple comparison tests would also be conducted from the ANOVA tests.

From Levene’s Test for Equality of Variances (Appendix IV), the p-values of 0.173 and 0.235 corresponding to the two tests respectively are both less than the 5% level of significance and thus, the null hypothesis must be retained. Hence, there exists no significant mean difference of the underlying respective variables across gender. It can therefore be concluded with 95% confidence level that the average number of working hours spent and working years of males is statistically the same for females.
4.2.1 Compare the average number of working years as well as hours spent across the various age groups

**Hypothesis**

$H_0$: The average number of working years as well as hours spent is the same across the various age groups.

$H_1$: The average number of working years as well as hours spent is not the same across the various age groups.

**Table 4: Analysis of Variance (ANOVA) between groups and within groups for years of work experience and hour of work per day**

<table>
<thead>
<tr>
<th></th>
<th>Sum of squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Years of work experience</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>6462.243</td>
<td>2</td>
<td>3231.122</td>
<td>165.252</td>
<td>0.000</td>
</tr>
<tr>
<td>Within Groups</td>
<td>5748.508</td>
<td>294</td>
<td>19.553</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>12210.752</td>
<td>296</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Hours of work per day</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>4.015</td>
<td>2</td>
<td>2.007</td>
<td>1.131</td>
<td>0.324</td>
</tr>
<tr>
<td>Within Groups</td>
<td>521.790</td>
<td>294</td>
<td>1.775</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>525.805</td>
<td>296</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*ANOVA $\alpha = 0.05$

The null hypothesis must be rejected at 5% significance level since the p-value of the ANOVA test is 0.000 and thus, there is a significant mean difference between the various age groups. It
can be concluded further that the average number of working years spent (working experience) is not the same across the various age groups at 5% level of significance.

The p-value of 0.324 implies that the null hypothesis must be retained and can be concluded at 5% level of significance that there is no significant mean difference among the various age groups with respect to the number of hours spent per day. This also suggests that irrespective of one’s age, the number of hours spent by the healthcare workers is statistically the same.

Below is a multiple comparison test so as to determine in detail the significant mean difference among the various age groups:

<table>
<thead>
<tr>
<th>(I) Age group</th>
<th>(J) Age group</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>P-value</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20years</td>
<td>20-40years</td>
<td>-1.666</td>
<td>2.229</td>
<td>1.000</td>
<td>-7.03</td>
</tr>
<tr>
<td></td>
<td>41-60years</td>
<td>-14.522*</td>
<td>2.305</td>
<td>.000*</td>
<td>-20.07</td>
</tr>
<tr>
<td>20-40years</td>
<td>&lt;20years</td>
<td>1.666</td>
<td>2.229</td>
<td>1.000</td>
<td>-3.70</td>
</tr>
<tr>
<td></td>
<td>41-60years</td>
<td>-12.856*</td>
<td>.710</td>
<td>.000*</td>
<td>-14.57</td>
</tr>
<tr>
<td>41-60years</td>
<td>&lt;20years</td>
<td>14.522*</td>
<td>2.305</td>
<td>.000*</td>
<td>8.97</td>
</tr>
<tr>
<td></td>
<td>20-40years</td>
<td>12.856*</td>
<td>.710</td>
<td>.000*</td>
<td>11.15</td>
</tr>
</tbody>
</table>

* The mean difference is significant at the 0.05 level.
* Dependent Variable: Years of working experience (Bonferroni)

It can also be deduced from table 6.0 that there exist significant mean difference between respondents aged less than 20 years and 41-60 years as well as between 20-40 years and 41-60 years with respect to the number of working years spent in the hospital. However, the mean difference of number of working years spent between health workers aged less than 20 years and
41-60 years is -14.522 which implies workers at between the ages of 41 and 60 years are relatively more experienced (greater working years) than those aged less than 20 years. Similarly, the mean difference with respect to the number of working years between respondents aged 20-40 years and 41-60 years is -12.856 implying that, those aged between 41 and 60 years are also more experienced than those aged 20-40 years. This further suggests that the age of the health workers have an influence on their level of experience due to the greater number of years spent.

4.3 Types of sharps handled by the health workers in the hospital

The medical sharps handled by the health workers include needles, broken glasses, slides, scalpel and blade. Nonetheless, it was discovered that 91.6% of the respondents are more susceptible to needle stick injuries since they work more often with it; whereas, approximately 49.8%, 41.1%, 10.1% and 6.7% of the workers use blades, scalpels, broken glasses and slides which consequently makes them all vulnerable to needle stick and other sharps injuries. But since majority of the respondents work with or handles needles in the course of their works, needle stick injuries could be proposed to be the predominant form of injuries among health workers. The diagrammatic representation of the different types of sharps used in the hospital is as shown;
4.3.1 Prevalence (Frequency and severity of healthcare sharps injuries)

The number workers who had experienced needle stick or sharps injuries among the respondents was 53.7 % (160), with 46.1% (137) experiencing no injuries as revealed in the study. It was discovered also from the study that the healthcare sharp injuries which frequently occurs are injuries such as needle prick (35.3%), cuts (62.1%), bruises (2.0%) and abrasions (0.7%). Thus, the health workers are mostly exposed to cut injuries comparable to other forms of sharps injuries. However, between the period of May to July 2016, a greater percentage of the respondents experienced these underlying injuries once (49.7%); whereas, approximately 31.4% and 19.0% had sharps injuries 2times and more than 2times respectively. This implies further that needle stick and other sharps injuries are very prevalent among health workers from these frequencies.
Table 6: Occurrence, severity and classification of sharps injuries among healthcare workers at 37 Military Hospital

<table>
<thead>
<tr>
<th>Item</th>
<th>Response</th>
<th>Frequency(n)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classification of injury type</td>
<td>Needle prick</td>
<td>54</td>
<td>35.3%</td>
</tr>
<tr>
<td></td>
<td>Cut</td>
<td>95</td>
<td>62.1%</td>
</tr>
<tr>
<td></td>
<td>Bruise</td>
<td>3</td>
<td>2.0%</td>
</tr>
<tr>
<td></td>
<td>Abrasion</td>
<td>1</td>
<td>0.7%</td>
</tr>
<tr>
<td>Number of times experiencing injuries</td>
<td>Once</td>
<td>76</td>
<td>49.7%</td>
</tr>
<tr>
<td></td>
<td>2 times</td>
<td>48</td>
<td>31.4%</td>
</tr>
<tr>
<td></td>
<td>3 times</td>
<td>19</td>
<td>12.4%</td>
</tr>
<tr>
<td></td>
<td>4 times</td>
<td>7</td>
<td>4.6%</td>
</tr>
<tr>
<td></td>
<td>5 times</td>
<td>2</td>
<td>1.3%</td>
</tr>
<tr>
<td></td>
<td>6 times</td>
<td>1</td>
<td>0.7%</td>
</tr>
<tr>
<td>Have you experienced needle stick or sharp injury</td>
<td>Yes</td>
<td>159</td>
<td>53.7%</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>137</td>
<td>46.1%</td>
</tr>
</tbody>
</table>

Figure 5 below shows the prevalence of needle stick and other sharps injuries among the health workers in 37 Military Hospital of Ghana;
Figure 5: Occurrence of needle stick or other sharps injuries among the various categories of healthcare workers.

It can also be deduced from the above diagrammatic representation of the prevalence of sharps injuries among the various categories of health workers that incinerator attendants (100%), dental staffs (63.6%), ward assistants (61.3%), nurses (57.4%) and cleaners are more prone to needle stick and other sharp injuries.

4.4 Risk of exposure to healthcare sharps

4.4.1 Procedures during the sharps injury incidents

The various procedures that result health workers into sharps injuries includes, cannulation, collision with one another, cutting, disassembling/detaching, disposing needles, recapping, drawing samples from patients or clients, waste disposal and suturing of wounds. Out of the 297 respondents considered, the frequent cause of sharp injury was during the process of recapping (27.4%); followed by disposing needle from one place to another (19.7%), disassembling (12.7%), drawing samples (12.1%) through to collision which is least cause of sharp injury. The
Figure 6.0 below throws more light on the procedures leading to sharp injuries among health workers;

**Figure 6: Activities or procedures leading to sharps injuries**

<table>
<thead>
<tr>
<th>Procedures causing injuries</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannulation</td>
<td>5.1</td>
</tr>
<tr>
<td>Collision</td>
<td>3.2</td>
</tr>
<tr>
<td>Cutting</td>
<td>4.5</td>
</tr>
<tr>
<td>Disassembling</td>
<td>12.7</td>
</tr>
<tr>
<td>Disposing needle</td>
<td>19.7</td>
</tr>
<tr>
<td>Recapping</td>
<td>27.4</td>
</tr>
<tr>
<td>Drawing samples</td>
<td>12.1</td>
</tr>
<tr>
<td>Waste disposal</td>
<td>5.7</td>
</tr>
<tr>
<td>Suturing</td>
<td>9.6</td>
</tr>
</tbody>
</table>

4.4.2 Occupational infections likely contracted by respondents

The study revealed that approximately 97.1% of the health workers considered during the primary collection of the data were professionally trained in their respective fields, with just a few (2.9) untrained workers implying the prevalence of occupational infections is at its nadir or lowest point at 37 Military Hospital. In addition, none of them complained of Hepatitis B, Hepatitis C or HIV/AIDS infections or co-infections; but, a few protested to tetanus infections. Moreover, approximately 95% also attested to the fact that they had never contracted any infection in the course of their work. This is not surprising since majority of the respondents, 72.1% have needle stick policies at their respective departments and in view of that, and
precarious incidence from injuries barely ensues. However, relatively fewer workers (47.1%) at the 37 Military Hospital seeks for post exposure prophylaxis (treatments given or action taking to prevent diseases). Nevertheless, table 9 below shows the number of respondents who contracted some infections in the course of their duties;

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Frequency(n)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contracted any occupational infection</td>
<td>Yes</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>133</td>
</tr>
<tr>
<td>Professionally trained in the performed duty</td>
<td>Yes</td>
<td>136</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>4</td>
</tr>
<tr>
<td>Infection prevention control</td>
<td>Yes</td>
<td>140</td>
</tr>
<tr>
<td>Do you have needle stick policy</td>
<td>Yes</td>
<td>101</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Don’t know</td>
<td>28</td>
</tr>
<tr>
<td>Did you seek Post Exposure</td>
<td>Yes</td>
<td>66</td>
</tr>
<tr>
<td>Prophylaxis</td>
<td>No</td>
<td>74</td>
</tr>
</tbody>
</table>

4.5 Factors contributing to the occurrence of healthcare sharps injuries
A Chi-square test was performed to test some factors contributing to sharps injuries among healthcare workers.

4.5.1 Determining factors influencing needle stick and other sharps injuries
The Chi-square test of independence brought to light that a worker’s age group ($\chi^2 = 5.7, p-value = 0.059**$), level of education ($\chi^2 = 12.4, p-value = 0.015*$) and categories of work or occupation ($\chi^2 = 25.6, p-value = 0.001*$) have significant effect on the occurrence of
needle stick and other sharps injuries; whereas, one’s sex and the level of professional training (professionalism) does not really influence or predict whether or not a worker can be injured or not. Below is the tabular representation of the association tests;
Table 8: Association of Other Factors on Needle Stick and Sharps Injuries

<table>
<thead>
<tr>
<th>Personal Factors</th>
<th>Percentages (%)</th>
<th>Chi-Square</th>
<th>df</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>42.8</td>
<td>0.034</td>
<td>1</td>
<td>0.854</td>
</tr>
<tr>
<td>Female</td>
<td>57.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20 years</td>
<td>1.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 – 40 years</td>
<td>83.3</td>
<td>5.670</td>
<td>2</td>
<td>0.059**</td>
</tr>
<tr>
<td>41 – 60 years</td>
<td>15.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational Level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diploma</td>
<td>39.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor’s Degree</td>
<td>38.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masters</td>
<td>2.4</td>
<td>12.415</td>
<td>4</td>
<td>0.015*</td>
</tr>
<tr>
<td>Medical Doctors</td>
<td>9.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doctorate Degree</td>
<td>0.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doctor</td>
<td>20.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurse</td>
<td>45.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laboratory Staff</td>
<td>10.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ward Assistant</td>
<td>6.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Health</td>
<td>4.7</td>
<td>25.578</td>
<td>8</td>
<td>0.001*</td>
</tr>
<tr>
<td>Cleaner</td>
<td>2.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laundry Staff</td>
<td>4.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incinerator Attendant</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professionally Trained</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>97.0</td>
<td>2.162</td>
<td>1</td>
<td>0.142</td>
</tr>
<tr>
<td>No</td>
<td>3.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* implies significance at 5% level

** implies significance at 10% level
4.5.2 Assessing other factors influencing needle stick and other sharps injuries

The Multinomial logistic regression model would be used to determine other factors influencing needle stick and other sharps injuries. This model evaluates the strength of the underlying factors by computing their individual odds ratios so as to determine how likely an individual factor could occur relative to a reference point or control.

Model’s development

The dependent variable for the Logistic regression model is the variable “Experienced needle stick or sharp injury” with categories, ‘Yes’ or ‘No’; whereas the independent variables (categorical) considered under the model are; level of education, work experience (Number of working years spent), gender and work instructions.

Assumptions of the Logistic Regression model

- The independent variable may either be categorical or numerical
- The dependent variable has to be categorical
- The data does not need to have normal distribution, no linear relation and no equality of variance.

Assessing the overall significance of the model, Hypothesis

$H_0$: There is no association between the dependent variable (experienced needle stick or sharp injury) and the independent variables (level of education, work experience, gender and work instructions)

$H_1$: There is association between the dependent variable (experienced needle stick or sharp injury) and the independent variables (level of education, work experience, gender and work instructions)
The output of the Log likelihood Chi–square test gave an initial log likelihood value of 222.379 which is the measure of the model with independent variable; whereas, the final log likelihood value of 206.281 is the measure of the model after entering all the independent variables (level of education, work experience, gender and work instructions) into the model. The difference between two log likelihood values measures the model’s chi-square value of 16.098 with a significant p-value of 0.024 at 5% alpha level. Consequently, it can be concluded that the overall model is fit or other words, association exist between the dependent and independent variables. (See Likelihood Chi-square test in Appendix IV)

4.5.4 Finding statistically significant predictor variables

It was revealed from the logistic regression model that the level of education and workers with laid down work instructions significantly influence whether or not one would suffer from needle stick and other sharps injuries. However, one’s working experience (number of working years spent) and sex does not really contribute to sharps injuries.

4.5.5 Assessing the likelihood of each independent or predictor variables

The logistic regression coefficient, B corresponding to a variable tells us how likely a particular variable can occur relative to the reference point depending on the sign of its value. If its value is less than zero, it designates that variable is less likely to occur relative to the reference point; whereas, a value greater than zero rather indicates that the variable is more likely to occur comparable to the reference variable. In addition, \( \exp(B) \) represents the odds ratio of a particular variable relative to the reference point or variable. The Wald statistics is the test statistics for the significance of each estimate from the model.
The detailed description of the variables under consideration;

Job experience represents the number of working years spent (continuous variable)

[Educ_level=1] represents diploma level (Reference is doctorate level)

[Educ_level=2] represents degree level

[Educ_level=3] represents masters level

[Educ_level=4] represents medical doctors

[Work instructions=1] represents Yes (Reference is No)

[Gender=1] represents males (Reference is females)

Below is the estimate of the parameters for each variable;

**Work experience (Number of working years spent)**

Healthcare workers with many years of experience on the average could be asserted to have more knowledge on the causes and repercussions of needle stick and sharp injuries. The logistic regression model (Appendix IV: Parameter Estimates), nonetheless revealed that depending on one’s working experience, he or she is approximately 1.009 times more likely to sustain sharps injuries. This further implies that health workers need to develop the maximum level of training and skills with regards to sharps used in their respective fields before handling or using them.

**Level of education**

The model revealed that health workers with diploma, degree, masters and those who are medical doctors are approximately more likely to experience needle stick or sharps injuries relative to workers with doctorate. However, workers with diploma level of education were found to be more susceptible to needle stick and sharps injuries than the other levels from their respective odds ratios. In addition, the health workers with doctorate are less likely to experience needle stick and sharps injuries due to the fact that they tend to be more informed on how to use
the sharps, its dangers and above all, have relatively more years of working experience. Even most of them are consultants therefore do not deal with needles and sharps as frequently as the others.

**Work instruction**

Those with stated instruction of work were found to be approximately 0.360 times less likely to experience sharps injuries as compared to health workers with no work instructions. This is because workers with work instructions are well informed about the guidelines on how to handle the sharps relative to workers with virtually no instructions of work.

**Gender**

Moreover, male health workers were found to be approximately 0.920 times less likely to experience needle stick and sharps injuries relative to females. This is also because nurses from literature and other studies have been discovered to be more vulnerable to needle stick and sharps injuries. And moreover, females are averagely more than the number of males in every hospital or health care centre making them more exposed to this underlying form of injury.

### 4.6 Suggested preventive measures of needle stick and sharps injuries

The preventive measures as suggested by the health workers of 37 Military Hospital were elimination of unnecessary sharps that could result in injuries, regular vaccination, provision of post-exposure prophylaxis by the hospital management, encouraging the use of safe medical devices or personal protective equipment. Others include conducting regular continuous professional development, as well as creating awareness on occupational safety. They also emphasized on infection prevention control and above all, proper management of medical sharps by establishing occupational safety and health committee to monitor activities.
4.7 Assessing the knowledge, attitudes and practices of healthcare workers regarding needle stick and other sharps injuries

Majority of the respondents asserted that the use of masks, gloves, aprons, overalls, lab coats, safety boots and goggles are mostly the personal protective materials/equipment distributed to them for use in their respective fields of work. Moreover, approximately 93% of the health workers asserted that there are standard guidelines to disposing sharps; with approximately 69.3% reporting their injuries to a colleague or other health workers. This simply implies further that majority of the respondents are educated enough to know the repercussions of such injuries if left unreported and unattended. However, 66 (47.1%) of the workers still believe that the personal protective materials are not adequate enough taken into accounts the size of the work force at the hospital. In conclusions, a greater percentage of 66.4 of the workers had vaccinated themselves against likely occupational diseases such as Hepatitis B infection whiles approximately 33.6% had not. But the 33.6% who did not go for the vaccination proclaimed that fear of the injection and its side effect, forgetfulness of the actual day of vaccination, ignorant of the requirement and other busy schedules prevented them from taking the Hepatitis B vaccine. Nonetheless, a relatively larger number of the health workers never sought for post-exposure prophylaxis; which needs greater attention to the hospital management and the government as a whole. Below is a summary of the above findings;
Table 9: Attitudes and Practices of Healthcare Workers Regarding Needle Stick and Other Sharps Injuries

<table>
<thead>
<tr>
<th>Items</th>
<th>Frequency (n)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you contracted any occupational infection</td>
<td>Yes</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>133</td>
</tr>
<tr>
<td>Do you have needle stick policy</td>
<td>Yes</td>
<td>101</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Don’t</td>
<td>28</td>
</tr>
<tr>
<td>Did you seek Post Exposure Prophylaxis</td>
<td>Yes</td>
<td>66</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>74</td>
</tr>
<tr>
<td>Did you report the injury to anybody</td>
<td>1</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>43</td>
</tr>
<tr>
<td>Are there standard guidelines disposing sharps</td>
<td>Yes</td>
<td>130</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Don’t</td>
<td>8</td>
</tr>
<tr>
<td>Are Personal Protective Equipment adequate</td>
<td>Yes</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>66</td>
</tr>
<tr>
<td>Have you been vaccinated against hepatitis B</td>
<td>Yes</td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>47</td>
</tr>
</tbody>
</table>
CHAPTER FIVE

DISCUSSIONS

5.0 Introduction

This section outlines the entire findings of study conducted at the 37 Military Hospital between the period of May and July 2016, it assessed the occupational risks of exposure to needle stick and sharps injuries, the frequency and severity of the needle stick and sharps injuries. It also reviewed factors that contribute to the occurrence of the needle stick and sharps injuries and the measures the hospital management has put in place to control and manage these sharps injuries. Below is the outline of various findings and discussions made;

5.1 Socio-Demographic Information

The descriptive statistics revealed that 42.8% of the respondents were males with approximately 57.2% being females. Hence, it could be inferred that the number of females in 37 Military Hospital seems to be greater than males on the average. Additionally, it was discovered that majority of the health workers were age between 20 and 40 years (83.2%); whereas, 1.3% and 15.5% of the respondents were less than 20 years and between 41 and 60 years respectively. This is similar to the finding by (Bhardwaj et al., 2014). On the other hand, the percentage of the workers with diploma, degree, masters, doctorate and those considered as medical doctors were approximately 39.4, 38.0, 2.4, 0.7 and 19.5 respectively. This implies that majority of the respondents were diploma and degree holders. However, the number of nurses (45.8%) considered in this study were found to be the greatest in number; followed by, doctors (20.9%), laboratory staffs (10.8%), ward assistants (6.7%), public health officers (4.7%), laundry staffs (4.0%), dental staffs (3.7%), cleaners (2.4%) and incinerator attendants (1.0%).
In addition, the average numbers of hours spent in the hospital each day by the health workers at 37 Military Hospital can be asserted to be approximately eight (8) hours. It was discovered however, that doctors tend to spend more hours in the hospital than any others health worker on the average; followed by ward assistants, dental staffs, laboratory staffs, nurses through to incinerator operators with the least number of hours spent in the hospital. Nonetheless, the mean number of years spent at the hospital by each respondent considered in the study can be concluded to be approximately six years; with laundry and dental staffs being the most number of years of experience group. Doctors, laboratory staffs as well as public health workers can be affirmed to have the least of working years relative to the other categories of workers in the hospital.

On the other hand, the ANOVA test revealed that there is no significant mean difference among the various age groups with respect to the number of hours spent per day as well across sex. This also suggests that irrespective of one’s age and sex, the number of hours spent by the health workers is statistically the same. Nevertheless, it was also established that there exists significant mean difference between respondents aged less than 20 years and 41-60 years as well as between 20-40 years and 41-60 years with respect to the number of working years spent in the hospital. However, respondents aged between 41 and 60 years were relatively more experienced (greater working years) than those aged less than 20 years and between 20 and 40 years. This further suggests that the age of the health workers has an influence on their level of experience due to either the greater or less number of years spent.
5.2 Types of sharps handled by the health workers in the hospital

The medical sharps handled by the health workers included needles, broken glasses, slides, scalpel and blade. Nonetheless, it was discovered that 91.6% of the respondents are more susceptible to needle stick injuries since they work with it more often; whereas, approximately 49.8%, 41.1%, 10.1% and 6.7% of the workers use blades, scalpels, broken glasses and slides which consequently makes them all vulnerable to needle stick and other sharps injuries. But since majority of the respondents work with or handles needles in the course of their works, needle stick injuries could be proposed to be the predominant form of injuries among health workers. These finding are consistent with a study conducted by Hanafi et al., 2011 at the University of Alexandria Hospital in Egypt.

5.3 Prevalence (Frequency and severity of healthcare sharps injuries)

The number workers who had experienced needle stick or sharps injuries was found to be 53.7%, while 46.1% experiencing no injuries as revealed in the study. According to Hanafi et al., 2011, a study conducted at the University of Alexandria Hospital, it also found relatively higher prevalence of needle stick and sharps injuries among health care workers of about 67.9%. This is consistent with the findings made in this study as more than half of the respondents experienced needle stick and sharps injuries.

It was also discovered from the study that the healthcare sharp injuries which frequently occurs are injuries such as needle prick (35.3%), cuts (62.1%), bruises (2.0%) and abrasions (0.7%). Thus, the health workers are mostly exposed to cut injuries comparable to other forms of sharps injuries. However, between the period of May to July 2016, a greater percentage of the respondents experienced these underlying injuries once (49.7%); whereas, approximately 31.4%
and 19.0% had sharps injuries 2times and more than 2times respectively. This implies further that needle stick and other sharps injuries are very prevalent among health workers from these frequencies (Hanafi et al., 2011).

It can also be deduced from the sharp injuries among the various categories of health workers that incinerator attendants (100%), dental staffs (63.6%), ward assistants (61.3%), nurses (57.4%) and cleaners are more prone to needle stick and other sharp injuries (Hanafi et al., 2011).

5.4 Procedures during the sharps injury incidents

The various procedures that result in health workers sustaining sharps injuries were found to be cannulation, collision with one another, cutting, disassembling/detaching, disposing needles, recapping, drawing samples from patients or clients, waste disposal and suturing of wounds. Out of the 297 respondents considered, the frequent cause of sharp injury was during the process of recapping (27.4%), followed by disposing needle from one place to another (19.7%), disassembling (12.7%), and drawing samples (12.1%) through to collision which is least cause of sharp injury. Wilburn & Eijkemans, 2003 identified these factors as the procedures most commonly associated with needle stick and sharps injuries. These finding are also consistent with the findings by Dr Alex Owusu 2004 in Ghana for the International Society of Infectious Diseases. He found recapping a common practice and recommended that it should be discouraged. In a study by Jagger et al., it is reported that one third of injuries occurred during recapping of the needle. The recapping of needle is strictly prohibited under the Occupational Safety and Health Administration (OSHA) blood borne pathogen standard. The research at the
37 Military Hospital revealed that recapping was the leading procedure during which most injuries occur. There is therefore the need to discourage this act among health care workers.

5.5 Occupational infections likely contracted by respondents

According to Wilburn & Eijkemans, 2003, factors that can increase the risk of transmission of HIV include a deep wound, visible blood on the device, a hollow-bore blood-filled needle, use of the device to access an artery or vein, and high-viral-load status of the patient. However most of the injuries reported were superficial and mostly with unused needles. In the study it was revealed that approximately 97.1% of the health workers considered during the primary collection of the data were professionally trained in their respective fields, with just a few (2.9) untrained workers implying the prevalence of occupational infections is at its nadir or lowest point at 37 Military Hospital. Furthermore, none of the respondents complained of Hepatitis B, Hepatitis C or HIV/AIDS infections or co-infections; but, a few protested to tetanus infections. Approximately 95% also attested to the fact that they had never contracted any infection in the course of their work. This is not surprising since majority of the respondent (72.1%) have needle stick policies at their respective departments and wards and in view of that; precarious incidence from injuries barely ensues. It also shows that the level of exposure was relatively low (Wilburn & Eijkemans, 2003). However, relatively fewer workers (47.1%) at the 37 Military Hospital seeks for post exposure prophylaxis (CDC, 2009).
5.6 Determining factors influencing needle stick and other sharps injuries

The Chi-square test of independence brought to light that a worker’s age group, level of education and categories of work or occupation have significant effect on the occurrence of needle stick and other sharps injuries; whereas, one’s sex and the level of professional training (professionalism) does not really influence or predict whether or not a worker can be injured or not.

On the other hand, the logistic regression model revealed that more experienced health workers on the average could be asserted to have more knowledge on the causes and repercussions of needle stick and sharp injuries. Nonetheless, it exposed the fact that depending on one’s working experience, he or she is approximately 1.009 times more likely to sustain sharps injuries. This furthers implies that health workers need to acquire the maximum level of training and skills with regards to sharps used in their respective fields before handling or using them.

Furthermore, those with stated instruction of work were found to be approximately 0.360 times less likely to experience sharps injuries as compared to health workers with no work instructions. This is because workers with work instructions are well informed about the guidelines on how to handle the sharps relative to workers with virtually no instructions of work. Additionally, male health workers were found to be approximately 0.920 times less likely to experience needle stick and sharps injuries relative to females. This is also because nurses from literature and other studies have been discovered to be more vulnerable to needle stick and sharps injuries. And moreover, females are averagely more than the number of males in every hospital or health care centre making them more exposed to this underlying form of injury(Bhardwaj et al., 2014).

The model discovered also that, health workers with diploma, degree, masters and those who are medical doctors were approximately more likely to experience needle stick or sharps injuries
relative to workers with doctorate. However, workers with diploma level of education were found to be more susceptible to needle stick and sharps injuries than the other levels of education, from their respective odds ratios. In addition, the health workers with doctorate are less likely to experience needle stick and sharps injuries due to the fact that they tend to be more informed on how to use the sharps, its dangers and above all, have relatively more years of working experience (Cho et al., 2013). According to Bhardwaj et al., 2014, the majority (70.4%) of the hospital nurses had experienced needlestick or sharp injuries in the previous year. The non-use of safety containers for disposal of sharps and needles, less working experience, poor work environments with regards to staffing and resource adequacy and high emotional exhaustion significantly increased risk for needlestick or sharp injuries.

5.7 Suggested preventive measures of needle stick injuries for healthcare workers in 37 Military Hospital

The preventive measures as suggested by the health workers of 37 Military Hospital were elimination of unnecessary sharps that could result in injuries, regular vaccination, provision of post- exposure prophylaxis by the hospital management, encouraging the use of safe medical devices or personal protective equipment, conducting health education as well as creating awareness on occupational safety and infection prevention control and above all, proper management of medical sharps by establishing occupational safety and health committee (Prüss-üstün, Prüss-üstün, Campbell-lendrum, Corvalán, & Woodward, 2003).
5.8 Knowledge, attitudes and practices of healthcare workers regarding needle stick and other sharps injuries

Majority of the respondents asserted that masks, gloves, aprons, overalls, lab coats, safety boots and goggles are the most common personal protective materials/equipment distributed to them for use in their respective fields of work. Moreover, approximately 93% of the health workers asserted that there are standard guidelines to disposing sharps; with approximately 69.3% reporting their injuries to friends and other health workers. This simply implies that majority of the respondents are educated enough to know the repercussions of such injuries if left unreported and unattended. However, 66 (47.1%) of the workers still believes that the personal protective materials provided are not adequate enough taken into accounts the size of the working force at the hospital. According to Bhardwaj et al., 2014, in their study, it was observed that out of 153 respondents, 142 (92.8%) them were immunized with Hepatitis B vaccine and 11 (7.2%) were not immunized at all. Similarly in this study, a greater percentage of 66.4 of the workers had vaccinated themselves against Hepatitis B infection whiles approximately 33.6% had not. But the 33.6% who did not go for the vaccination proclaimed that fear of the injection and its side effect, forgetfulness of the actual day of vaccination, ignorant of the requirement and other busy schedules prevented them from taking the Hepatitis B vaccine (Hanafi et al., 2011). It therefore implies that most health care workers are aware of the protection by vaccination, however, there is more room for improvement. Nonetheless, a relatively larger number of the health workers never sought for post-exposure prophylaxis at the 37 Military Hospital; which needs greater attention to the hospital management and the government as a whole (Bhardwaj et al., 2014 & CDC 2009).
5.9 Implications of the study findings

The findings suggest that most respondents suffered cuts and needle prick and that they were injured 1-5 times in the course of their practice at the hospital. These were reported incidents of which the real cases could be higher due to recall bias on the part of the respondents. This means there could be more cases that were not reported in this study (Johnson & Asuzu, 2013). Therefore a stringent surveillance mechanism to complement improved reporting systems needs to be implemented to address the frequency of sharps injuries and establish root causes.

The results also suggest that most respondents suffered moderate sharps injuries. In the event of severe injuries, there is a predisposition to the risk of acquiring blood borne infections. The respondents who suffer sharps injuries experience anxiety and worry on the implications of injuries on their lives and career. They spend considerable time seeking for treatment after exposure which would have been used in attending to the sick. The hospital may also lose workforce or incur high costs in treating health workers due to sharps injuries. The reporting and documentation rate of sharps injury occurrence among health workers at the hospital suggests that the workers perceive the current reporting and documentation mechanism as ineffective, as earlier mentioned, the real cases of sharps injuries could be higher if they were all reported and documented. The hospital has put in place several measures to control and manage incidents of sharps injury which have been effective to a certain extent. However, these measures need to be evaluated and improved by putting in place several corrective measures as recommended in this research.
CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.0 Introduction

This chapter deals with a summary of the conclusions and recommendations drawn from the study which assessed the prevalence of needle stick and other sharps injuries among various categories of healthcare workers at the 37 Military Hospital.

6.1 Conclusion

The average numbers of hours spent in the hospital each day by the health workers at 37 Military Hospital was estimated to be approximately eight (8) hours. However, it was discovered that doctors tend to spend more hours in the hospital than any other health worker on the average; followed by ward assistants, dental staffs, laboratory staffs, nurses through to incinerator operator with the least number of hours spent in the hospital.

Moreover, respondents aged between 41 and 60 years were found to be relatively more experienced (greater working years) than those aged less than 20 years and between 20 and 40 years. This further suggested that the age of the health workers have an influence on their level of experience either due to the greater or less number of years spent.

In addition, the medical sharps handled by the health workers were needles, broken glasses, slides, scalpel and blade. Nonetheless, it was discovered that 91.6% of the respondents are more susceptible to needle stick injuries since they work with it most often; whereas, approximately 49.8%, 41.1%, 10.1% and 6.7% of the workers use blades, scalpels, broken glasses and slides which consequently made them all vulnerable to needle stick and other sharps injuries.
The number workers who had experienced needle stick or sharps injuries was 53.7%, with 46.1% experiencing no injuries to that regards within the period of the study. However, the health workers were mostly exposed to cut and needle stick injuries comparable to other forms of sharps injuries.

Moreover, approximately 95% also attested to the fact that they had never contracted any infection in the course of their work. Conversely, relatively fewer workers (47.1%) at the 37 Military Hospital sought for post exposure prophylaxis after exposure.

The factors influencing needle stick and sharps injuries were found to be worker’s age group, level of education, categories of work or occupation and laid down work instructions since they had significant effect on the occurrence of needle stick and other sharps injuries.

The preventive measures as suggested by the health workers of 37 Military Hospital were elimination of unnecessary sharps that could result in injuries, regular vaccination, provision of post- exposure prophylaxis by the hospital management. They also suggested encouraging the use of safe medical devices or personal protective equipment, conducting health education as well as creating awareness on occupational safety and infection prevention control. Proper management of medical sharps by establishing occupational safety and health committee to monitor activities was also suggested.

In a nutshell, majority of the respondents asserted that the use of masks, gloves, aprons, overalls, lab coats, safety boots and goggles were the most common personal protective materials/equipment distributed to them for use in their respective fields of work. Nonetheless, a relatively larger number of the health workers never sought for post-exposure prophylaxis; which requires greater attention by the hospital management.
6.2 Recommendations

The following recommendations are made from the findings of the study;

The Public Health Division in collaboration with the hospital management should ensure adequate supply of safety boxes, proper use, and timely collection of used medical sharps in puncture proof containers such as safety boxes and ensure safe transportation for incineration. There should also be periodic in-service training, education, and awareness for all staff to be abreast with current safety practices.

The hospital management should design a policy on vaccination for newly recruited staff, which will ensure that all health care workers are vaccinated against hepatitis B and other occupational exposures. There should also be clear procedures on access to HIV post exposure prophylaxis as well as decentralisation of post exposure treatments to wards and departments to enable access at all times of the day.

All heads of departments and wards should improve the reporting of medical sharps injuries by designing a log form that captures information on the demographic data of the employee, date and time of injury, type of sharp, procedure involved, part of body involved, where it occurred and how the exposure incident occurred. The log forms can be entered in a data base and be used for surveillance of injuries in the hospital. The data obtained should be analysed in order to understand the root causes, conduct surveillance and prevent further occurrence of injury.

The hospital management should provide adequate protective equipment and safe medical devices that will minimise or if possible eliminate needle stick and sharps injuries. There should be regular evaluation and continuous improvement of systems.
REFERENCES

Adams, D., Elliott, T.S.J. Impact of safety needle devices on occupationally acquired Needlestick injuries; a four year prospective study, *Journal of Hospital Infection.*, (2006); 64:50-55


APPENDIX I

INFORMED CONSENT FORM

CONSENT FORM

Form number [   ]

Project little
NEEDLE STICK AND SHARPS INJURIES AMONG HEALTH CARE WORKERS AT THE 37 MILITARY HOSPITAL.

Name and address of Principal Investigator
Edmund D. Kommogldomo, Department of Biological, Environmental and Occupational Health Science, University of Ghana, Accra, Legon or 37 Military Hospital, Public Health Division.
Mobile: 0206446482
Email Address: komeddie@yahoo.com

Institution affiliated
School of Public Health, University of Ghana, Legon, Accra

Introduction
I am a student from the School of Public Health, University of Ghana conducting a research on needle stick and sharps injuries among health care workers. Please kindly spend some few minutes to fill the questionnaire. All information collected will be treated as confidential and no one will be able to trace any information back to you.

Procedure
The study is targeted at health care workers who are at risk of exposure to needle stick injuries. Selection of participants is by random sampling and participation is voluntary. Participants will be made to complete a questionnaire and return to the principal investigator.

Risks and benefits
You may feel uncomfortable with some of the questions, however, it will be helpful for the purpose of the research. Your inputs may help change policies on occupational exposures of health care workers through needle stick and sharps injuries.

Right to refuse
Your consent to participate in this study is voluntary, you are not under any obligation to participate, and you are at liberty to withdraw from this study at any point in time. However, I will appreciate it if you can complete it.

Anonymity and confidentiality
Be assured that any information given will be used purely for the purpose of research. Any information given will be treated with utmost confidentiality. Your name will not be used in any report, but your ideas and suggestions will help us to design programmes or policies that will
improve occupational health of health care workers to needle stick and sharps injuries and the consequences of it.

**Your rights as a Participant**
This research has been reviewed and approved by the Ethical Review Committee of the Ghana Health Service as well as the 37 Military Hospital Internal Review Board. If you have any questions about your rights as a research participant you can contact the Ethical Review Coordinator Ghana Health Service on 0507041223 (Ms. Hannah Frimpong). Or contact the 37 MH IRB Office between the hours of 0730hrs and 1500hrs through the landline 0302775958 or email address: irb37milhosp@hotmail.com.

Do you have any questions to ask me? (If yes, note questions below)

**Voluntary agreement form for health care workers**
The above document describing the benefits, risks and procedures for the research topic “Needle stick and Sharps injuries among health care workers at the 37 Military Hospital” I have read and understood. I have been given an opportunity to ask any questions about the research. I agree to participate as a participant.

Name………………………………………………………Date……………………..
Signature………………………………………………………………………………

**Interviewer’s statement**
I………………………………………………………..the undersigned, have explained to the subject in the language he/she understand and the subject has agreed to take part in the study.
Signature of interviewer………………………………………………….. Date ……..
APPENDIX II

QUESTIONNAIRE

Instructions
You have been asked to participate in a research study. Please note that by completing this questionnaire you are voluntarily agreeing to participate in this research study. You will remain anonymous and your data will be treated confidentially at all times. Please complete the questionnaire in full. Mark the appropriate answer with a tick/cross or write in the space provided.

Please indicate your answer with a tick (√).

1. Gender.
   □ Male [ ]
   □ Female [ ]

2. Please indicate your age category
   □ < 20
   □ 20 - 40
   □ 41 - 60
   □ 60 and above

3. What is your highest education level?
   □ Secondary/Middle School/ Diploma [ ]
   □ Degree [ ]
   □ Masters [ ]
   □ Medical Doctor [ ]
   □ Doctorate [ ]
   □ Other (specify)…………………………………………

4. Which category of healthcare workers do you belong to?
   □ Doctor/Physician/Dentist/ Physician/Medical Assistant
   □ Professional Nurse/Community Health nurse[ ]
   □ Laboratory staff[ ]
   □ Nursing Assistant/Ward Assistant /General Assistant [ ]
   □ Dental staff/Dental technician [ ]
   □ Laundry staff [ ]
   □ Student (specify)……………………………………...
   □ House officer [ ]
   □ Public health officer/technician [ ]
   □ Cleaner [ ]
   □ Other (specify)…………………………………..

5. Were you trained in infection prevention control during your professional training?
   □ Yes [ ]
6. Are you professionally trained in the type of work that you perform in your ward/unit/department?
   □ Yes [ ]
   □ No [ ]

7. How long have you worked in the above job category at the hospital? ________

8. How long do you work (on a daily basis) at the hospital? ________

9. Are you given clear work procedures/guidelines in your job?
   □ Yes [ ]
   □ No [ ]

10. What types of sharps do you handle in the course of your job? (Select all that apply)
    □ Needle [ ]
    □ Blade [ ]
    □ Scalpel [ ]
    □ Slide [ ]
    □ Broken Glass (e.g. vials/Ampoules) [ ]
    □ Broken Thermometer [ ]
    □ Any other (specify) ............................................................
    □ Not applicable [ ]

11. Do you use syringes with auto-retractable needles?
    □ Yes [ ]
    □ No [ ]

12. Have you ever experienced needle stick or other healthcare sharps injury in the course of your work?
    □ Yes [ ]
    □ No (then go to question number 17)

13. Which of the following incidents/injuries have you experienced in the course of your work? (Select all that apply)
    □ Needle prick [ ]
    □ Cut [ ]
    □ Bruise [ ]
    □ Abrasion [ ]
    □ Infection related to sharps injury (specify) [ ]
    □ Blood splash [ ]
    □ Glove tear while handling sharps [ ]
    □ Any other (specify) .............................................................

14. What type of sharp instrument caused the accident/injury mentioned in question 12 above?
    □ Needle [ ]
☐ Blade [ ]
☐ Scalpel [ ]
☐ Slide [ ]
☐ Broken Glass (e.g. vials/Ampoules) [ ]
☐ Broken Thermometer [ ]
☐ Any other (specify)………………………………………………
☐ Not applicable [ ]

15. How would you classify the injury mentioned in question 12 above?
☐ Superficial/Mild (no bleeding) [ ]
☐ Moderate (skin punctured, some bleeding) [ ]
☐ Severe (profuse bleeding) [ ]
☐ Fatal (led to disability) [ ]

16. During what procedure or activity did the injury mentioned in question 12 above occur?
☐ Recapping [ ]
☐ Disposing the needle [ ]
☐ Drawing sample from a patient/client [ ]
☐ Suturing [ ]
☐ Passing the device or receiving from someone else[ ]
☐ Waste disposal (clean up) [ ]
☐ Cannulation [ ]
☐ Collision with another worker [ ]
☐ Collection from basin/receptacle [ ]
☐ Cutting [ ]
☐ Disassembly/ detaching [ ]
☐ Inflicted by other person using the device [ ]
☐ Sharps in unexpected areas e.g. locker, linen/bed sheet etc. [ ]
☐ Any other (specify)………………………………………………

17. Do your department have any needle stick policy?
☐ Yes [ ]
☐ No [ ]
☐ Don’t know [ ]

18. If yes, where is it located?
☐ On the notice board [ ]
☐ With the ward in-charge [ ]
☐ In the desk [ ]
☐ In the shelf [ ]
☐ Other, please specify………………

19. How many times in the course of your practice at the hospital have you ever experienced needle stick or other sharp injury?_________
If nil proceed to question 24
20. Did you seek for Post exposure prophylaxis?
   □ Yes [ ]
   □ No [ ]

21. If the answer to question 19 above is NO, then why didn’t you seek for it (PEP)?
   …………………………………………………………………………………………………………

22. Did you report the injury that occurred to anybody?
   □ Yes [ ]
   □ No [ ]

23. If the answer to question 21 above is No, then why did you not report the incident/accident?
   □ Fear of punitive response by employer/in-charge [ ]
   □ Use of self-care [ ]
   □ Time constraint [ ]
   □ Belief I am at low risk of infection [ ]
   □ Belief my vaccination status is sufficient [ ]
   □ Lack of knowledge of appropriate procedure after injury [ ]

24. If the answer to question 21 above is Yes, to whom did you report the injury to?
   □ The ward in-charge[ ]
   □ The next senior person in the ward [ ]
   □ Public health division[ ]
   □ The doctor on duty[ ]
   □ Other, please specify………………………

25. Are there standard guidelines for handling used disposable healthcare sharps in your ward/dept?
   □ Yes [ ]
   □ No [ ]
   □ Don’t know [ ]

26. Where do you dispose used healthcare sharps after use?
   □ Safety boxes [ ]
   □ Plastic bags [ ]
   □ Left on the floor [ ]
   □ Waste bins [ ]
   □ Left on the operating table [ ]
   □ Mixed with other wastes [ ]
   □ Other (specify)………………………………………………………………………………

27. What personal protective equipment/ material does the hospital provide for your use? (Select all that apply)
   □ Masks [ ]
   □ Gloves [ ]
   □ Aprons [ ]
   □ Overalls [ ]
28. Are the personal protective equipment provided adequate for use all the time?
   □ Yes [ ]
   □ No [ ] (explain briefly) .........................................................

29. How often do you use the personal protective equipment/material listed in question 24 above?
   □ Always [ ]
   □ Occasionally [ ]
   □ Rarely [ ]
   □ Not at all [ ]

30. What would you consider as the contributing factor(s) to needle stick and other sharps injuries?
   □ Fatigue [ ]
   □ Pressure [ ]
   □ Non-co-operative/restless clients [ ]
   □ Unsafe medical sharps [ ]
   □ Overuse of medical sharps [ ]
   □ Inadequate supply of barrier products such as gloves and pads [ ]
   □ Unclear work procedures [ ]
   □ Lack of guidelines on handling healthcare sharps [ ]
   □ Poor housekeeping [ ]
   □ Unsafe practices [ ]
   □ Any other (specify) .........................................................

31. Have you been vaccinated against Hepatitis B?
   □ Yes [ ]
   □ No [ ]

32. If the answer to question 30 above is No, then why have you not been vaccinated?
   □ It is not provided for by the hospital [ ]
   □ I am not aware of the requirement for vaccination [ ]
   □ I am too busy to get time for vaccination [ ]
   □ It cannot protect me from Hepatitis B [ ]
   □ I fear injections [ ]
   □ Fear of side effects of the vaccination [ ]
   □ Any other reason (state) .........................................................

33. Have you ever contracted any occupational related infection at the hospital?
   □ Yes [ ]
   □ No [ ] (proceed to question 35 below)
34. Which one of the following infections did you contract in the course of your occupation/job at the hospital.

- Hepatitis B [ ]
- Hepatitis C [ ]
- Tetanus [ ]
- HIV/AIDS [ ]
- Any other (specify) ..............................................................................................................

35. What steps did you take to handle the infection(s) in question 31 above?

.................................................................................................................................................

36. What measures has the hospital management put in place to control occupational related infections caused by HBV, HCV and HIV? (Select all that apply)

- Eliminating unnecessary sharps [ ]
- Vaccination [ ]
- Providing post-exposure testing [ ]
- Providing post-exposure prophylaxis [ ]
- Providing safe medical devices [ ]
- Providing barrier products such as gloves and pads [ ]
- Conducting education and awareness on occupational safety and infection prevention control [ ]
- Developing and availing guidelines on precautions [ ]
- Proper management of medical sharps [ ]
- Establishing an occupational safety and health committee [ ]
- Establishing a needle stick committee [ ]
- Any other (specify) ..............................................................................................................

37. What measures would you suggest the hospital management put in place to better control occupational exposure of healthcare sharps?

_____________________________________________________________________________________


APPENDIX III

ETHICAL CLEARANCE LETTERS

Institutional Review Board
37 Military Hospital
Nehelli Barracks
ACCRA

Tel: 0302-775958
Email: irb37military@ugspace.ug.edu.gh

March 2016

37MH-IRB IPN 050/2016

On 16th February 2016 the 37 Military Hospital (37MH) Institutional Review Board (IRB) at a Board meeting reviewed and approved your protocol.

TITLE OF PROTOCOL: NEEDLE STICK AND SHARP INSTRUMENTS INJURIES AMONG HEALTH CARE WORKERS AT THE 37 MILITARY HOSPITAL

PRINCIPAL INVESTIGATOR: EDMUND D. KOMMOGLDOMO

Please note that a final review report must be submitted to the Board at the completion of the study.

Please report all serious adverse events related to this study to 37MH-IRB within seven (7) days verbally and fourteen (14) days in writing.

This certificate is valid till 16th February 2017.

DR EDWARD ASUMANU
(37MH-IRB, Vice Chairperson)

37 MILITARY HOSPITAL
INSTITUTIONAL REVIEW BOARD

DATE 10/03/16

Cc: Brig Gen (Dr) EC Saka Jrn
GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In case of reply the number and date of this Letter should be quoted.

My Ref: GHS/RDD/ERC/Admin/App/
Your Ref. No.

Edmund D. Kommegloodo
University of Ghana
School of Public Health
Legon, Accra

ETHICS APPROVAL - ID NO: GHS-ERC: 53/12/15

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol titled:

“Needle Stick and Sharp Instrument Injury among Health Care Workers at the 37 Military Hospital”

This approval requires that you submit yearly review of the protocol to the Committee and a final full review to the Ethics Review Committee (ERC) on completion of the study. The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Please note that any modification without ERC approval is rendered invalid.

You are also required to report all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.

You are requested to submit a final report on the study to assure the ERC that the project was implemented as per approved protocol. You are also to inform the ERC and your sponsor before any publication of the research findings.

Please note that this approval is given for a period of 12 months, beginning 25th February, 2016 to 24th February, 2017. However, you are required to request for renewal of your study if it lasts for more than 12 months.

Please always quote the protocol identification number in all future correspondence in relation to this approved protocol.

SIGNED

PROFESSOR MOSES AIKINS
(GHS-ERC VICE-CHAIRPERSON)

Ce: The Director, Research & Development Division, Ghana Health Service, Accra
APPENDIX IV

STATISTICAL TABLES

Levene’s Test for equality of Variance

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<tr>
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*Independent Samples Test α = 0.05

Output of the Log likelihood Chi-square test

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Likelihood Ratio Test

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*.implies significance at 5% level
**.implies significance at 10% level
# Parameters Estimates

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a. The reference category is: No.
b. This parameter is set to zero because it is redundant.