UNIVERSITY FOR DEVELOPMENT STUDIES, TAMALE

KNOWLEDGE OF AND COMPLIANCE TO INFECTION PREVENTION AND CONTROL AMONG NURSES IN THE NORTHERN REGIONAL HOSPITAL

BY

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MARCH,2021

DECLARATION

Student's declaration

I hereby declare that, except for references to other people's work which have been duly acknowledged, this thesis is the result of my own work. It contains no materials previously presented by another person which has been accepted for the award of any degree elsewhere

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SIGNATURE: ……. DATE: ……..

Supervisor's declaration

I declare that the preparation and presentation of the dissertation was supervised in accordance with the guidelines on supervision of dissertation laid down by the University for Development Studies.

NAME: SHAMSU-DEEN ZIBLIM (PhD)

Signature: ……. Date: ……./……../……

DEDICATION

This work is dedicated to my dear wives Rukaya and Ruth and my lovely children for their support and encouragement and for creating a peaceful environment conducive to learning at home.

ABSTRACT

Introduction: Hospital-acquired infections (HAIs) also known as a nosocomial infection is associated with increased morbidity and mortality among hospitalized clients and predisposes health care workers (HCWs) to an increased risk of infections. Therefore, an effective Infection Prevention and Control (IPC) programme is fundamental to quality health care. This study looked at the knowledge of and compliance with infection prevention and control among Nurses at the Northern Regional Hospital Tamale, Ghana.

The goal of this study was to assess the knowledge level and compliance with infection prevention and control practices among Nurses in the Northern Regional hospital Tamale, Ghana.

Methodology: The study adopted a facility-based descriptive cross-sectional study. Data were collected from 268 staff nurses at Central Hospital, Tamale. A mixed-method was employed and using Self- administered questionnaire and key informant interview guide. Data were collected and entered into IBM SPSS V. 21 for analysis.

Results: At the Northern Regional Hospital majority (60.5%) of the respondents had high IPC knowledge, 25.8% had moderate IPC knowledge level and only 13.8% had low IPC knowledge level. The findings on IPC compliance revealed that majority (77.6%) of the respondents had a low IPC compliance level, 19.8% had a moderate IPC compliance level and only 2.6% had a high IPC compliance level.

Conclusion: Although the study revealed that most of the respondents had good knowledge of the IPC. However, compliance with IPC guidelines was still very low in the hospital. It was observed from the study that, the hospital has limited access to IPC training manuals couple with inadequate IPC materials such as Hand hygiene materials and Personnel protective equipment (PPEs).

The Ghana Health Service in collaboration with the Ministry of Health should intensify monitoring and supervision at all levels of service delivery points to ensure health care providers compiles with IPC standard protocols. The Ghana Health Service, Ministry of Health and Development Partners should ensure IPC materials are in constant supply and made available to all health care service points. The Hospital should regularly conduct refresher training on current IPC standards and ensure compliance through effective monitoring. Health staff should make conscious efforts to protect themselves and clients against infections by ensuring that IPC standards and protocols are strictly followed in the discharge of their duties.

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CHAPTER ONE

1.1 Background to the study

The term infection as used in medicine and health describe the capability of microorganisms to enter or invade the underlying tissues of the human body and discover conducive conditions that can facilitate its growth, survival and replication (http://www.columbia.edu/itc/hs/medical/pathophys/id/2009/conceptsNotes.pdf).

Explaining this further, infection ensues when a microorganism (agent) including viruses, bacteria, parasite and fungi invades an individual's body (host) and eventually causes harm to the host's body (https://www.medicalnewstoday. com/articles/196271).Equally, an infection may arise as a result of the host's immunological reactions to the agent its toxic products resulting in either clinical or subclinical illness (http:// www.Columbia.edu/itc /hs/medical/pathophys/id/2009/conceptsNotes.pdf). An infection can be localized or spread throughout the "blood or lymphatic vessels to become systemic". The term prevention in healthcare refers to general measures and actions taken by individuals (both health workers and non-health workers) to prevent the contraction and establishment of diseases. The concept of prevention in healthcare is further categorized into three main levels including primary prevention, secondary prevention and tertiary prevention.

In preventive medicine, the primary prevention is directed at avoiding the development of a disease (infection) among persons presumed to be healthy but may have the risk factors. The main objective of prevention is to side-step the occurrence of infection or disability in healthy people (Last, 2001). In the healthcare setup, health promotion activities such as health education to increase the knowledge of individuals

(health-workers) on hospital-acquired infections (HAIs) to reduce their risk can be regarded as a primary preventive measure.

In the medical field, the concept of control may consist of several guidelines and principles adopted by healthcare facilities to deliberately avoid the transmission of disease-causing agents and diseases among staff, patients and other visitors or users of the facility (https://centrak.com/solutions/infection-control/). To deliberately avoid the transmission of infectious disease-causing agents and diseases in the health system, steps that many facilities adopt include the development of IPC Standards which is a requirement for health- workers to have adequate knowledge of and put in to practice. Infection prevention and infection control are therefore two main approaches that are predominantly used in medicine to stop the transmission and management of infectious diseases.

The term infection prevention is recognized as the incursion and multiplication of germs such as "bacteria, viruses, and parasites" that are usually not present inside the body. An infection could have no sign or symptoms, or the infection could result in symptoms leading to it becoming clinically apparent (William, 2018). Infection control, on the other hand, means to prevent or stops the broadcast of infections in a healthcare environment (CDC, 2020). However, according to the WHO, 2020,) Infection Prevention and Control (IPC) refers to the "scientific approach and practical solution designed to prevent harm caused by infection to patients and health workers ("WHO | Infection prevention and

control," n.d.). It is grounded in infectious diseases, epidemiology, social science and health system strengthening".

An effective Infection Prevention and Control (IPC) programme is essential for a quality health care service delivery system. It is so because it has the possible benefits of minimizing infection rate in patients, cost/pressure on healthcare institutions and the country at large (Ministry of Health/Ghana Health Service, 2009). In the last two decades, healthcare-related diseases have posed a substantial problem in the area of excellent health care delivery and the financial burden on the patients, health institutions and the state/nation This are because of the cumulative recognition of healthcare-related infectious diseases as a possible indicator of quality health care to the sick people (MOH/GHS, 2009).

The knowledge and compliance levels of health professionals and nurses in particular to IPC cannot be overemphasized. Nurses are health care workers whose primary role is to guard patients against getting infections while on admission or when the clients are in a health centre or facility to seek health services (Chisanga, 2017). By maintaining an environment without infection, the patient's recovery will be enhanced and excellent care provided by nurses' care will be rendered. Health care workers spend majority of their time with their clients (patients). Therefore, they should possess a good level of knowledge and comply with infection prevention and control practices in health care facilities (Chisanga, 2017).

Nurses play a key role in maintaining effective disease inhibition and control, their activities may also possibly either leads to the spread of infection or prevention(Page,

Wilson, & Parkin, 2009). In a study conducted by Damani in 2012, the physical surrounding of a patient should be put in a proper condition to minimize a possible spread of infection (Damani, 2012). IPC protocols objectives are to protect the susceptible public from contracting an infection at the point of seeking health service (Damani, 2012). Deficiency in knowledge and non-compliance amongst healthcare workers in inhibition and control of infectious disease could result in nosocomial disease infections(Mukamurenzi, 2019).

Similarly, lack of or inadequate IPC information among health staff can upsurge the prevalence of nosocomial infections. A study conducted in Zimbabwe which determined the challenges of disease infection prevention and control among health staff (nurses) at the Bindura provincial hospital revealed that majority of the nurses (72%) lack knowledge on infection control principles and 42% of the nurses did not comply with infection control manuals (Tirivanhu, Ancia, & Petronella, 2014). Hayeh and Esena in 2013 explored infection inhibition and management practices among health staff at" Ridge Regional Hospital in Accra (Ghana)". The research revealed that understanding of IPC amongst health staff was little above half of the respondents (51%), convenience and access to IPC materials was (58%) however, overall obedience to IPC guidelines was revealed to be 54%(Hayeh & Kwasi Esena, 2013).

Another study that assessed the level of knowledge, attitudes and practices regarding disinfection procedures among nurses in Italian hospitals, shows the level of knowledge to be unsatisfactory particularly of the most common hospital-acquired infection and only a small percentage of nurses comply with disinfection procedures in their practical activity. However, the study showed a good positive attitude towards the use of guidelines and

protocols for disinfection (Sessa et al, 2011)

Research work conducted to assess the level of knowledge and practice on adherence of infection prevention and its associated factors among 231 nurses in Jimma University Medical Centre (Ethiopia) revealed that majority of the nurses 215 (83.08%) were knowledgeable regarding infection prevention while 16 (16.02%) were less knowledgeable. The compliance rate was 64.06% and non-compliance was 35.09% (Bekele, Yimam, & Akele, 2018). The level of nurse's knowledge on occupational post-exposure to hepatitis B infection in the Tamale metropolis, Ghana and revealed that 38.9% of the nurses' recap used needles before disposal and 30.2% do not decontaminate blood and body fluids before disposal which are cases of non-compliance (Konlan et al., 2017).

The Ministry of Health and the Ghana Health Service developed a policy framework on IPC 2009 with the ultimate goal of improving the capacity of healthcare workers in preventing and controlling infections and maintaining safety in healthcare settings (MOH, 2009). The policy stipulates "the policy framework within which infection prevention and control measures shall be practised by all health workers in all health care facilities and service delivery points, provide acceptable standards for the practice of Infection Prevention and Control and outline strategies that shall make Infection Prevention and Control practices routine in all aspects of health care" (MOH, 2009).

An infection is considered nosocomial if it becomes evident 48 hours or more after hospital admission or within 30 days of discharge following in-patient care (Bello et al., 2011). Reported cases of nosocomial infection assumed such a terrifying proportion in 2002 that WHO member states approved a World Health Assembly (WHA) resolution on patient safety (Bello et a.l, 2011). Developing countries were reported to have up to 20

times the risk of contracting a nosocomial infection compared with developed countries. Thus, source(s) of the spread of infection is a major worry for managers in healthcare practice particularly in developing countries where the healthcare system is already overstretched (Bello et al., 2011).

Nosocomial infections are caused by Candida albicans, Escherichia coli, hepatitis virus, herpes zoster virus, pseudomonas and staphylococcus (Mukwato et al., 2003). These pathogens are transmitted from one person to another through direct or indirect contact and at any time, about 10% of in-patients have Hospital Acquired Infections (HAIs) (Mukwato et al., 2003).

Although infection is most prevalent in patients upon admission, health care workers also act as potential vectors for pathogenic agents (Bello et al., 2011). Hospitals provide a favourable transmission pathway for the spread of nosocomial infections, owing partly to poor infection control practices among health workers on one hand and overcrowding of patients in most clinical settings on the other (Samuel et al., 2009). The importance of hospital-acquired infections goes beyond its impact on morbidity and mortality figures in any country and has profound economic implications. According to Robert, the acquisition of a nosocomial infection can prolong the duration of hospitalization, increase the costs of health care, and place a serious economic burden on patients and their families (Robert, 2001).

Nosocomial infection rates range from 1% in developed countries to more than 40% in some developing countries, including Sub-Sahara Africa. Some of the nosocomial

infections in developing countries are surgical site infections (SSI), urinary tract infections and lower respiratory tract infections such as pneumonia (Alvarado, 2009).

A large fraction of the world's illness and death is attributable to communicable diseases (WHO, 2009). A total of 62% and 31% of all deaths in Africa and Southeast Asia, respectively, are caused by infectious disease (Curtis et al., 2009). Inadequate sanitary conditions and poor hygiene practices play Major roles in the increased burden of communicable disease within these developing countries (Alemayehu et al., 2005). According to the Environmental Protection Agency (EPA) 3.2 million tons of infectious wastes are generated from health and health-related facilities yearly (Alemayehu et al., 2005).

Infectious waste is a major public health concern and should be addressed as effectively as possible with the widespread concern over the possible risk of deadly infectious disease like Tetanus, HIV, Hepatitis B, Hepatitis C, besides Leptospirosis, Q Fever, Hepatitis A, Salmonellosis, allergic reactions, dermatitis and skin diseases, bronchitis, influenza, trachoma/eye disease intestinal parasitic infection (Mazhindu et al., 2012), Scabies (Hunt, 1996), and Toxoplasmosis (Esquivel et al.., 2008).

In less-developed nations, health care workers engage in their daily activities without taking proper measures in the way they handle infectious waste products. They often do not have adequate personal protective equipment (Das, 2009).

The stress that these avoidable infectious diseases have kept on our health care system consists of prolonging client hospitalization, case management with expensive medication and the use of other amenities such as test site, X-rays and transfusion, which are

Incalculable (Bobadilla, Cowley, Musgrove, & Saxenian, 1994). Hitherto infectious diseases can be managed through the provision of adequate knowledge and understating of IPC protocols (Mukwato et al., 2003). It is possible to meaningfully reduce the prevalence of healthcare-related infections through active measures put in place to minimize the spread of disease infection (McDonald et al., 2018). Similarly, "infection prevention and control" measures become highly effective when Standard safety Precautions are used because undetected infections are common (Hayeh & Kwasi Esena, 2013).

Inadequate IPC related practices present Healthcare workers and their clients with infectious diseases (Houghton et al., 2020; Jacob, Herwaldt, Durso, & Program, 2018; Wilkason, Lee, Sauer, Nuzzo, & McClelland, 2020) clients their relatives equally are exposed to contagion. In line with this, the Ministry of Health has designed a policy that seeks to equip every healthcare staff with adequate knowledge of IPC standard protocols. The main aim of this is to minimize infections related to health care service delivery which will help promote quality healthcare service delivery (Okweso, 2016).

1.2 Problem Statement

The advantage of IPC in good healthcare service delivery and attainable patient fulfilment guarantees less spending on health care service in every Nation. It is a rule that each country achieves a score of at least 70% obedience with IPC protocols (WHO, 2002).

The IPC Policyis intended to give a path to healthcare staff and patients for the preclusion and control of infectious diseases within the health care system to guarantee patients protection and that of healthcare officials. The policy is grounded on scientific research findings and suggestions from professionals as well as specialised judgement indicating the

essential for approaches to dealing with infections. Standard protocols, enumerated in the strategic guidelines are founded on the belief that all "blood, body fluids, secretions, excretions, non-intact skin and mucous membranes" may well contain communicable infectious agents. These standard safety measures consist of "hand hygiene, the use of appropriate personal protective equipment (PPE), the use of an aseptic technique to reduce exposure to microorganisms and management of sharps, spills, linen, and waste to maintain a safe environment"(Agreli et al., 2019).

According to Malliarou, Sarafis, Zyga, and Constantinidis (2013), Health staff normally have an encouraging attitude towards infection prevention activities such as hand cleaning, however, compliance is often low (Malliarou, Zyga, Constantinidis, & Sarafis, 2013). Scientific works have shown that knowledge, attitude and compliance with IPC protocols among health staff including nurses are generally low. For example, a study conducted by Stein, Makarawo and Ahmed, (2003) found that in "Birmingham Teaching Hospitals", knowledge of health staff concerning blood-borne virus spread was 44% for hepatitis B virus (HBV) and 54% for HIV (Stein, Makarawo, & Ahmad, 2003). In Hong Kong, a study conducted by Tai, Mok, Ching and Pittet, (2009) reported that healthcare staff admit that 75% of HCAI can be controlled by hand hygiene (Tai, Mok, Ching, Seto, & Pittet, 2009)

The burden of healthcare-related disease in Africa is up to twenty times higher than in high-income countries (Maher, Smeeth, & Sekajugo, 2010). South Africa is privileged to have robust support from the National Department of Health which is not essentially the case in many other countries in other African countries. The practice of IPC is major

healthcare concern but it's often seen as a minor problem in the health care setting in developing country especially Africa (Mehtar, 2014).

From the abstract of the Sixth Infection Control Africa Network Congress in 2016 held in Johannesburg, it was revealed that in low-income locations, "surgical site infections (SSI)" epitomises the commonest form of healthcare-related infection. Even though mostly avoidable, SSIs continue to occur at a higher prevalence and death and there is also an ostensible deficiency in relevant scientific research relating to this topic Sub-Sahara Africa. (Wangai et al., 2017).

But in Ghana, there is limited information on IPC compliance level and additional monitoring survey carried-out in some selected hospitals and clinics in the "Greater Accra Region (GAR) by Institutional Care Division (ICD) of the Ghana Health Service accounts for a compliance level of 43% and 18% for Ridge Hospital (GHS, 2011). These figures are below the reference point of 70% and need to be studied.

Presently, knowledge of and compliance with IPC measures in a healthcare setting is limited in the Northern Region of Ghana. Studies that have attempted to look at IPCs in Ghana have been limited to knowledge and attitudes on nosocomial infections in few areas of the country, including the Greater Accra Region (Hesse et al., 2006; Amponsah-Tawaih et al., 2016), Eastern Region (Sandra et al., 2017) and Central Region (Tagoe et al., 2014).

This makes directed interventions almost unattainable, as generalization cannot be made, recognizing the differences in organizational culture and attitudes of healthcare workers across the country. This study is therefore to provide data on knowledge of and

compliance to IPC practices by nurses at Northern regional hospital, Tamale, Ghana.

1.3 General Research Question

What are the knowledge level and compliance with infection prevention and control practices among Nurses in the Northern Regional Hospital?

1.3.1Specific Research Questions

1. What is the level of knowledge on infection prevention and control among nurses in the Northern Regional Hospital?

2. What is the compliance level of nurses to infection prevention and control measures in the Northern Regional Hospital?

3. What are the challenges faced by Nurses in adhering to infection prevention and control practice in the Northern Regional Hospital?

1.4General Objective

To assess the knowledge level and compliance with infection prevention and control practices among Nurses in the Northern Regional Hospital.

1.4.1 Specific objectives;

1. To assess the knowledge level of infection prevention and control among Nurses in the Northern Regional Hospital.

2. To investigate compliance level among Nurses to infection prevention and control measures in the Northern Regional Hospital.

3. To assess the challenges Nurses face in adhering to infection prevention and control practices in the Northern Regional Hospital.

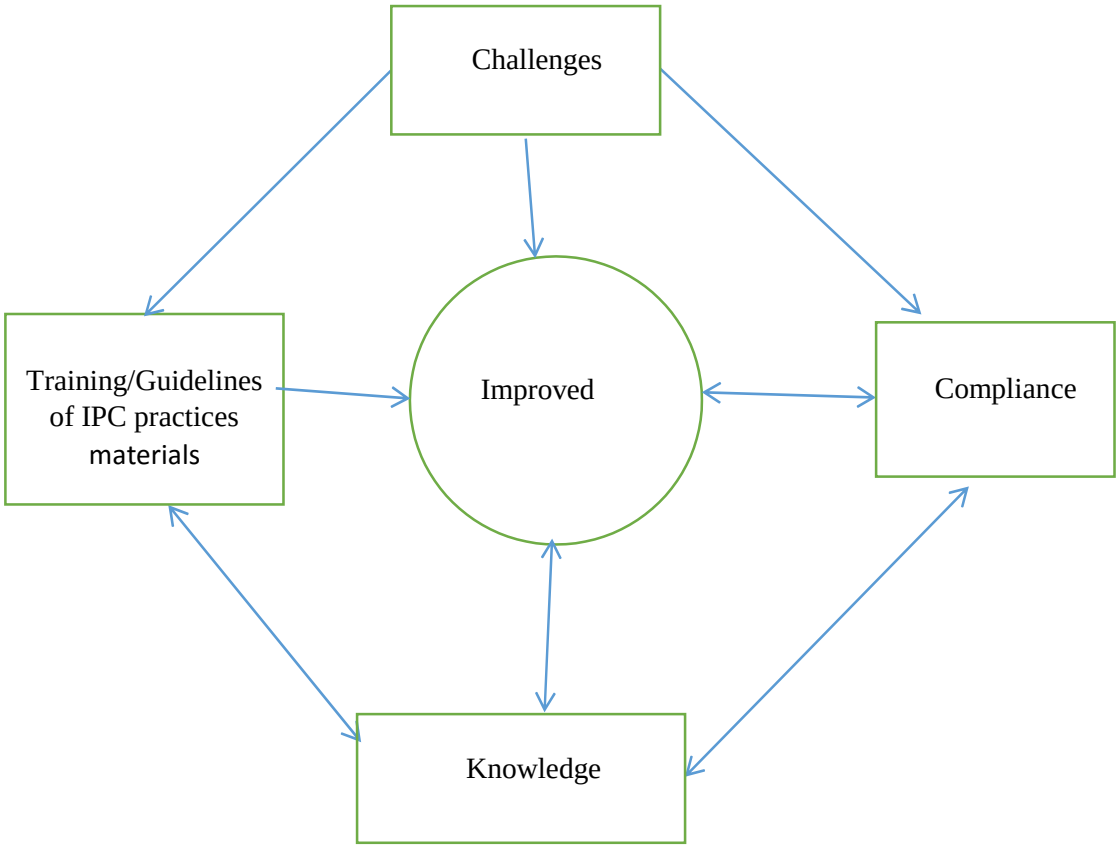


Figure 1.1 Conceptual Framework: Infection prevention and control practices

Source: Author, 2019.

As shown in (figure 1.1), improved IPC practices depend on knowledge on infection prevention control and compliance with infection prevention and control protocols. It also depends on overcoming the challenges faced by nurses while delivering services. This together with availability and accessibility to materials will ensure the much desired improve IPC practices in the facility.

Compliance with IPC guidelines depends on the knowledge that the nurses had through training and experience acquired over time. Nurses with knowledge are also more likely to comply with IPC practice. Knowledge also depends on the availability and accessibility to materials for practice. Knowledge will empower the nurse to ask for the right materials

and to be able to use them appropriately. If facility managers make materials available and accessible but the nurses have no knowledge, they cannot use them.

1.5 Significance of the study

The outcome of this project will be shared with managers and policymakers with information on IPC practices and compliance level at the Northern Regional Hospital Tamale.

1.6 Limitations of the study

Ideally, the study should have been carry-out in the entire health facilities of the region, but resource and time constraints make it impossible. The coronavirus (COVID-19) pandemic also posed a big challenge. It was difficult accessing the respondents amid the coronavirus protocols of staying at home, wearing a face mask, social distancing and some of the respondents being asked to stay at home because of their underlining conditions, pregnancies and those with babies.

These limitations notwithstanding, the careful selection of the sample size and the Tamale Regional Hospital as they cite, it was possible for the researcher to deal with these particular challenges and contribute to theory and recommendations in solving IPC challenges in the region and Ghana as a whole.

1.7 Organization of the study

The study is organized into six chapters.

Chapter one gives the background of the study, the problem statement, the research questions as well as the study objectives. The chapter also came out with the conceptual framework that guides the study. The chapter concludes by looking at the significance of the study.

Chapter two of the study was devoted to the review of relevant literature.

Chapter three give a brief profile of the study settings and the methodology employed in conducting the study.

Chapter four focuses on the presentation of the results of the study. Chapter five was devoted to the discussing of the results in line with existing literature on the subject under investigation.

Finally, chapter six gives a conclusion and recommendation of the study.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter is dedicated to the review of the literature on the knowledge level and compliance with Infection Prevention and Control in the health and medical sciences. The review of the relevant literature was based on these main themes: Definition of Terminologies, Concept of Infection Prevention and Control, Burden of Hospital Acquired Infections, Knowledge of Infection Prevention and Control among health-workers, Compliance to Infection Prevention and Control Standards and Challenges associated with adherence to Infection Prevention and Control Standards among health-workers.

The literature was searched by going through a host of databases and journals including Pubmed, Google Scholar, Cochrane, Researchgate, BiomedCentral, and Nature. First, the search was made general and narrowed down to include peer-reviewed articles from the global, regional (national) and local (Ghana) perspectives. The key search terms for this study included Knowledge, Attitudes, Practices and Compliance to Infection Prevention Protocols, Healthcare workers, Nurses, Hospital Acquired Infections (HAIs), "Health Care related Urinary Tract Infection (UTI), Surgical Site Infection (SSI), hospital-acquired pneumonia (HAP), ventilator-associated infection (VAP), and healthcare-associated bloodstream infection" (BSI) (WHO, 2011).

2.1 Infection

The term infection as used in medicine and health describe the capability of microorganisms to enter or invade the underlying tissues of the human body and discover conducive conditions that can facilitate its growth, survival and replication (http://www.columbia.edu/itc/hs/medical/pathophys/id/2009/conceptsNotes.pdf).

Explaining further, infection ensues when a microorganism (agent) including viruses, bacteria, parasite and fungi invade an individual's body (host) and eventually causes harm to the host's body (https://www.medicalnewstoday. com/articles/196271). It is also important to underscore that in the concept of infection, it is not in the best interest of the agent to harm its host as it uses the host to meet its ecological function including survival and replication. However, with modifications at the site of the invasion, high agent load, and host immunocompetence, an infection is likely to be established. Equally, an infection may arise as a result of the host's immunological reactions to the agent and its toxic products resulting in either clinical or subclinical illness (http:// www. Columbia. edu/itc/hs/medical/pathophys/id/2009/conceptsNotes.pdf).

An infection can be localized or spread throughout the blood or lymphatic vessels to become systemic. The spread of the infections from one person to the other has been acknowledged to include the following in the hospital set-up (https://www.medicalnewstoday. com/articles/196271).

- Direct skin contacts with an infected person
- Through contaminated fomites
- The transfer of contaminated bodily fluids
- Contact with faeces and urine
- Contact with blood
- Ingesting contaminated food or water
- Inhaling airborne particles or droplets
- Touching an object that a person carrying the pathogen has also touched

2.1.1. Nosocomial Infections/ Hospital Acquired Infections

Nosocomial Infections or Hospital Acquired Infections (HAIs) are terms used interchangeably to refer to infections acquired or developed in a healthcare facility by a patient, a healthcare worker or any other visitor in the period of hospitalization, hospital visit and or the course of duty one's duty at the hospital (Gertrude, 2013). The HAIs can also be defined as an infection that normally ensues within 48 hours of hospital admittance or three days post-discharge or thirty days of post-surgical operation (WHO, 2002). The common sources of HAIs transmission in the hospital settings include the use of non-sterilized instruments, untrained health care staff or lack of awareness on HAIs and infection prevention protocols (Zaidi, Javed, Naz, & Mumtaz, 2016). Equally, the weak immune system of patients who visit the hospital increases their risk of acquiring HAIs as well as the direct contact with patients by healthcare workers also increases their risk of contracting HAIs (Revelas, 2012).

2.1.2 Prevention

The term prevention in healthcare refers to general measures and actions taken by individuals (both health workers and non-health workers) to prevent the contraction and establishment of diseases. The concept of prevention in healthcare is further categorized into three main levels including primary prevention, secondary prevention and tertiary prevention.

2.1.2.a Primary Prevention

In preventive medicine, the primary prevention is directed at avoiding the development of a disease (infection) among persons presumed to be healthy but may have the risk factors. Prevention aims to avoid the development of a disease or disability in healthy individuals (Last, 2001). In the healthcare setup health promotion activities such

as health education to increase the knowledge of individuals (health-workers) on hospital-acquired infections (HAIs) to reduce their risk can be regarded as a primary preventive measure. Therefore, for this study, much emphasis is placed on the knowledge of nurses towards the prevention of HAIs through the practice of IPCs.

2.1.3 The Concept of Control.

In the medical field, the concept of control may consist of several guidelines and principles adopted by healthcare facilities to deliberately prevent the spread of infectious agents and diseases among staff, patients and other visitors or users of the facility (https://centrak. com/solutions/infection-control/). To deliberately prevent the spread of infectious agents and diseases in the healthcare system steps that many facilities adopt include the development of Infection Prevention and Control Standards which is a requirement for health-workers to have adequate knowledge of and put into practice.

2.1.4 Infection Prevention and Control Standards

Infection Prevention and Control Standards as the Ghana Health Service (GHS) articulates:

"*Are work practices required for basic level IPC, and are based on the principle that all blood, body fluids, secretions, excretions (except sweat), non-intact skin and mucous membranes may contain transmissible infectious agents"*

Infection prevention and control standards direct healthcare professionals to engage in regular practices as hand hygiene, use personal protective equipment (PPE) such as gloves, masks, eye protection, face shield and gowns when contact with mucus membranes, blood and body fluids of patients is anticipated (Yohannes, Kassa, Laelago,

& Guracha, 2019). They also recommend the correct disposal of sharps and other clinical waste (CDC, 2010).

2.2 The Concept of Infection Prevention and Control

Now, from the above definitions of the concepts of Infection, Prevention, Control and Infection Prevention and Control Standards, the argument can be made that Infection Prevention and Control (IPC) refers to the measures carefully designed to the controlling and prevention of the spread and contraction of infectious agents and diseases as well as reducing the rate of HAIs among health workers and the general public (patients and visitors to a health facility).

Affirming the definition given above, the Ghana Ministry of Health (2015) expressed that IPC refers to measures and actions targeted at controlling and preventing infectious agents and related diseases in general together with the spread of these infectious agents and related diseases in healthcare settings. There is enough evidence that the infections agents and their diseases may be existing on admission or may be established in the clinical settings (MOH, 2015; Ampadu et al., 2019). Ampadu et al. (2019) equally asserted that IPC practices are an important factor in the healthcare system and is implicated in key areas including epidemiology, infectious diseases, health system strengthening as well as social sciences. Furtherance that, IPC constitutes a practical-oriented and standard resolution meant to protect not only patients but the healthcare workers and the general public from the risk of contracting infections from the healthcare settings (WHO, 2018).

The transmission of an infectious agent, its product or diseases in the healthcare setting could be thought of as a cyclical process where a patient can transmit the infection to a healthcare worker and vice-versa. This stresses the importance of IPC knowledge and

practices in healthcare settings to reduce the rate and spread of infections among patients and healthcare workers and other users. According to Ampadu (2019) and Collins (2008), the sources of infections in the healthcare settings comprise patients, staff, or visitors. Accentuating further, carriers of infectious agents, persons in the active phase of the disease in addition to persons in the incubation phase of the disease are possible sources of spread of the disease and its agents or toxic products (Ampadu, 2019). Again, Collins (2008) added that a patient's microbiota could be a cause of infection for other individuals including healthcare workers.

The transmission and spread of infectious agents in healthcare facilities would require three main factors coming together (Fashafsheh, 2015). These factors include a reservoir, a susceptible host, and a mode of transmission (Fashafsheh, 2015). Basing on these three factors, patients, healthcare workers and other visitors to a health facility constitutes the susceptible host; the reservoir in the hospital environment would also constitute the potential source of the microbial agents including fomites and patients and nurses and doctors; and the mode of transmission of the microbial agents would also involve direct contacts, airborne, and through bodily fluids. The complex interrelationship between a potential host and an infectious agent produces infection. The mode of transmission may vary by type of organism as some types of an organism may be transmitted more than one route. There exists a compound interrelationship between a susceptible host, a potentially infectious agent, and the mode of transmission (Siegel et al., 2007). Observing IPC standards and protocols on the part of healthcare workers are known to eliminate or reduce and control the spread of HAIs among patients and healthcare workers (Siegel et al., 2007). The MOH (2015) stipulates that IPC practices consist of

measures including the practice of hand hygiene, use of personal protective equipment (PPE), sterilization and disinfection, proper management of waste and disposal, vaccination, post-exposure prophylaxis, active surveillance of suspected infections and outbreak investigation and management.

2.3 The Burden of Hospital Acquired Infections

The spread of hospital-acquired infections (HAIs) has been a major concern in many healthcare settings globally, especially among developing countries that are most affected considering the limited and poor healthcare systems (Bello et al., 2011). Even though studies have suggested that HAIs are mostly associated with patients on admission, nonetheless, healthcare workers are also at risk and a potential source for these pathogenic agents (Samuel, Benjamin, Anna, Loretta, & Justice, 2018). It is also maintained the hospital set-up equally provides a conducive environment for the transmission and the spread of HAIs, resulting from inadequate infection control practices among healthcare workers, combined with congestion of patients in most healthcare facilities (Samuel et al., 2010). Currently, studies on HAIs have established that several HAIs are caused by microorganisms that are shared in the general population (Samuel et al., 2018). These microorganisms have been found to include Staphylococcus aureus and E. coli, Bacillus spp. Coagulase-negative Staphylococci, Enterococci, and Enterobacteriaceae (Tagoe et al., 2011; Brooks et al., 2007). Corroborating the findings of Zaidi et al. (2016) on the prevalence and risk factor of HAIs among four university hospitals in Switzerland involving 300 healthcare workers, it was acknowledged that about 176 different kinds of HAIs (nosocomial infections) were noted among 156 patients out of the 1349 patients screened. The common nosocomial infections observed by Zaidi et al. (2016) included surgical site infection (30%), urinary tract infection (22%), lower

respiratory tract infection (15%) and bloodstream infection (13%). Zaidi et al. (2016) equally emphasized that the prevalence of HAIs was noted to be high in critical care units (25%) compared to the medical (9%) and surgical wards (12%).

Globally, Healthcare-associated infections (HAIs) are commonly described as a major public health challenge and a threat to patient's safety (Holmen et al., 2016; Bates et al., 2009; Pittet et al., 2005; Burke, 2003). The burden of HAIs is noted to be unevenly distributed globally (Holmen et al., 2016). As an illustration, studies between 2002 to 2009 demonstrated that the prevalence rate of HAIs increased by 11.7 % in major Canadian hospitals (Taylor et al., 2016). Statistics from major American based hospitals also showed that HAIs accounted for about 1.7 million infections annually with about 98,987 HAIs related deaths out of which about 36.3% were associated with pneumonia, 31% associated with bloodstream infections, 13.2% associated urinary tract infections, 8.3% associated surgical site infections and about 11.2% associated with infections of other sites (Yohannes et al., 2019; Klevens et al., 2007). The prevalence of HAIs in low and middle-income countries (LMICs) are acknowledged to affect an average of 15.5% to 25% of hospitalized patients and relatively higher than the rates reported in developed countries (Desta et al., 2018; Holmen et al., 2016; Suetens et al., 2013; Allegranzi et al., 2011; Klevens et al., 2007). The increasing rates of HAIs in LMICs consequently results in increased hospital stay, economic burden, increased morbidity, and mortality (Desta et al., 2018). The increasing burden of HAIs in LMICs is associated with the absence of a standardized infection prevention program across the board, non-compliance, limited resources, poor sanitary conditions and hygiene practices (Alemayehu et al., 2017; Yallew et al., 2017; Borg, 2010; Curtis et al., 2009).

The burden and impact of HAIs according to the WHO (2011) range from a lengthy hospital stay, long-term disability, increased antimicrobial resistance, huge healthcare expenditure from both central government and households, increased mortalities, and morbidities globally. The financial cost associated with HAIs in European countries stands at about €16 million extra-days of hospital stay with 37 000 attributable mortalities (WHO, 2011). Similarly, the yearly direct financial losses in the European countries due to HAIs are valued at about € 7 billion. Subsequently, in the United States of America, it is acknowledged that about 99 000 mortalities are as a result of HAIs in the year 2002 and an estimated economic impact at about US$ 6 5 billion in the year 2004 (WHO, 2011). Estimating the burden and impact of HAIs in developing countries is challenged with little or no data (WHO, 2011), however, a report on fomite-associated infections in about 173 intensive care units in 25 countries from Latin America, Asia, Africa, and Europe, indicated that the overall associated mortality among adult patients were 5%(18), 6% (23), and 3% (29) for CR-UTI, CR-BSI, and ventilator-associated pneumonia, respectively (WHO, 2011).

Even though the WHO (WHO, 2011) concedes that global estimates of HAIs are readily available, nonetheless, available peered-reviewed articles across the globe, demonstrates that hundreds of millions of patients and healthcare workers are affected yearly, with developing countries overly burdened. This highlights the increasing call for the establishment of dependable systems for HAIs surveillance to systematically collect data on the real impact of HAIs and compliance to standards and protocols aimed at reducing the impact (WHO, 2011; Safdar et al., 2005). More importantly, assessment of the key determining factors of HAIs constitutes a major boost in identifying workable

approaches for improvements in the healthcare care enterprise. Strong suggestions exist that HAIs can effectively be disallowed in the healthcare system and the burden consequently be halved or more (Kothari et al., 2009). Owing to this, most international organizations in the healthcare enterprise and national governments have developed IPC standards and protocols to tackle the issues of HAIs, however, the use of these standards and protocols remains a challenge and needs to be strengthened combined with monitoring to achieve a hospital free HAIs across the globe (WHO, 2011). It was also important to stress that HAIs ought to be accorded the topmost priority for patients and healthcare workers occupational safety considerations (WHO, 2011; Sanchez-Arenas et al., 2009).

To effectively prevent and cut the transmission of infection, places a key responsibility on healthcare workers through the recognition of adequate knowledge, awareness and compliance to precautionary measures towards HAIs.

2.3.1. The Burden of Hospital Acquired Infections in Ghana

In Ghana, the findings by Labi et al. (2019) in a study that looked at a multi-centre point-prevalence survey of HAIs in ten healthcare facilities involving 2107 inpatients participants, about 184 HAIs were observed among 172 participants, representing an overall prevalence of 8.2%. Additionally, the range of HAIs prevalence among the ten healthcare facilities was between 3.5% to 14.4%, with an observed increased magnitude of infections in secondary and tertiary care facilities. The findings of Labi et al. (2019) study also revealed that the common HAIs noted included surgical site infections (32.6%), bloodstream infections (19.5%), urinary tract infections (18.5%) and respiratory tract infections (16.3%). Equally, device-associated infections also contributed to about 7.1% of HAIs (Labi et al., 2019).

Extrapolated data on the prevalence rate of HAIs in Ghana stood around 152 000 in the year 2004 (Ocran et al., 2014; US Census Bureau, 2004). Subsequently, Tagoe et al. (2011) observed in a study on HAIs at the Volta Regional Hospital (now Ho Teaching Hospital), Ghana a total of 187 (85.8%) bacteria, comprising 55.5% non-pathogenic and 30.3% pathogenic microbes from fomites in the hospital. Corroborating this study, another study by Tagoe et al. (2012) on HAIs demonstrated extremely high bacterial isolates on the potential sources of HAIs with a mean count of $1x10^{11}$. Again, Tagoe et al. (2012) observed that the overall sampled surfaces included in the study, about 46.1% pathogenic bacterial isolates exhibited a strong resistance profile to frequently prescribed antibiotics. These observations re-enforce the high risk of HAIs and accordingly highlights the significance of assessing the knowledge level and compliance of healthcare workers as well as users of the health facilities across the country on HAIs.

In the Northern Region of Ghana, Apanga et al. (2014) described in a retrospective cross-sectional study on surgical sites infections (SSIs), which is a known cause of HAIs at the Tamale Teaching Hospital that the prevalence of SSIs was 39% (136/349). The study also indicated that around 35% (43) of SSIs were documented among patients who received emergency surgery and about 65% (80) of the patients who also underwent elective surgical cases. Describing the determining factor of SSIs Apanga et al. (2014) noted that there was no significant association between surgical site wound infection and gender (X2=0.05, p=0.82) and patient location (X2=0.89, p=0.34). This observation may suggest that one's gender will influence the contraction of SSIs or otherwise HAIs together with here the patient is kept in the hospital if the environment is free from microbes. However, Apanga et al. (2014) again asserted that having a longer stay (such as weeks and months)

in the ward ($p<0.001$) and undergoing emergency or elective surgeries ($p<0.001$) were risk factors of SSIs. Likening this observation to HAIs longer admissions at the hospital, going through elective and emergencies would likely increase the risk of HAIs among patients. This can be partly attributed to the ill-preparedness of healthcare workers in emergencies to practice good IPC standards and protocols including hand hygiene.

In another study by Yenli et al. (2019) in the Tamale Teaching Hospital (Northern Region), on catheter-associated bacteria urinary tract infections, a source of HAIs to patients receiving catheterization, it was acknowledged that about 72.1% (88 out of 122 participants) of patients had urinary tract infection with males constituting about 54.5% (48) and females 45.5% (40). The bacterial isolates of Yenli et al. (2019) are consistent with studies including Samuel et al. (2018), Tagoe et al. (2011) and Brooks et al. (2007) as major associated microbes of HAIs. The bacterial isolates found by Yenli et al. (2019) includes Escherichia coli 41 (46.6%), Klebsiella spp. 18 (20.6%), Pseudomonas aeruginosa 10 (11.4%), Enterobacter spp. 6 (6.8%) and Staphylococcus aureus 5 (5.8%). In other previous findings at the Tamale Teaching Hospital on SSIs in emergency abdominal surgery Tabiri et al., (2018) observed that the total clinically diagnosed SSIs was 11.5% (116 out of 1011 patients) with patients having longer stay at the hospital (four times) compared to patients without SSIs and mortality rate among patients with SSI being as twice as high as that for patients without SSI.

Accordingly, the potential risk factors for SSIs and HAIs in healthcare facilities especially in the Northern Region could be eliminated or reduced with adequate practice and adherence to IPC standards and protocols. The practice and adherence to IPC standards

and protocols would equally reduce the burden of contaminated wounds, long hospital stays comorbidities and cost of treatment in general (Tabiri et al., 2018).

2.4 Knowledge of Hospital Acquired Infections

Globally, the knowledge of IPC standards is considered essential towards the prevention and control of HAIs among practitioners and patients as a whole. Recent studies globally have demonstrated substantial knowledge of IPCs among healthcare workers with regional or national variations. According to a study by Alrubaiee et al. (2017) in Yemen involving 100 nurses regarding the knowledge and practices of HAIs control measures showed that most of the participants (72.9%) possessed a fair level of knowledge on hand hygiene practices with about 35.3% also possessing a good level of knowledge on personal protective equipment and another 67.1% also having a poor level of knowledge concerning safe injection practices. To assess the level of health professionals' knowledge HAIs and their related preventive measures among 660 private and government healthcare workers in Nigeria, Oli et al. (2016) indicated that the knowledge of preventive measures to HAIs on key IPCs was as follows; knowledge on hand hygiene 94.84%(313) among government healthcare workers and 75.15% (248) among private healthcare workers; personal protective equipment usage among government 98.18% (324) and private 90.30% (298) healthcare workers; Proper disposal

of medical waste, government 83.94% (277) and private 76.97% (254) healthcare workers; Processing of instruments, government 55.45% (183) and private 72.12% (238) healthcare workers; Isolation of Patients, government 62.12% (205) and private 37.58% (124) healthcare workers.

Considering a cross-sectional study conducted by Geberemariyam et al. (2018) in Ethiopia, it was observed out of 648 healthcare workers who partook in the study, about 53.7% (95% CI: 49.8, 57.4%) of the participants were considered knowledgeable on IPCs. Corroborating this study, Nwadike (2014) equally observed in another cross-sectional study in Nigeria involving 100 nurses that about 66% of the participants reported good knowledge of IPC. As illustrated in Gertrude (2013) cross-sectional study in Kenya, only 17.8 % (n=90) of the participants had adequate knowledge on the elements of IPC standards and another 82.2%(n=90) did not have sufficient knowledge on the elements of IPC standard. These observations are in sharp contrast with observations reported by Geberemariyam et al. (2018) and Nwadike (2014) as indicated above. The observed differences from these studies can partly be attributed to variations in training participants might have attained before these studies as was equally observed in Gertrude (2013) study that about 60 % (n=90) of the participants have gone a formal training IPC standards with another 40% (n=90) not formally trained. Geberemariyam et al. (2018) equally observed that a nurse (participant) is likely to demonstrate enough knowledge of IPCs if the practitioner had received training on IPCs (AOR = 5.31; 95% CI: 2.42,11.63) combined with IPC guidelines available (AOR = 3.34; 95% CI: 1.65, 6.76). Equally, Geberemariyam et al. (2018) asserted that healthcare workers including nurses have increased probability to adequate knowledge on IPCs with longer years of experience exceeding ten years or more (AOR = 3.41; 95% CI: 1.22, 9.55) as well as having functioned in hospital setups with IPC teams (AOR = 1.78; 95% CI: 1.01, 3.13) and had IPCs guidelines available. Taking hand hygiene as a specific component of IPC standards Holmen et al. (2016) observed in another cross-sectional study in Rwanda involving 63

participants (9 doctors and 54 nurses) only 43% had prior knowledge of the correct hand hygiene practice which improved tremendously to 78.4% after a training session on hand Hygiene (P< .001).

In Ghana, (Ampadu, 2019) observed in a cross-sectional study involving 237 nurses from three hospitals in the Greater Accra Region of Ghana, that about 83.7% of nurses had good knowledge of IPC practices in general and only 25% of the nurses demonstrating adequate knowledge on hospital-acquired infections. According to Hayeh et al. (2013) at the Ridge Hospital in Accra, the knowledge on IPC among Healthcare workers include nurses was that about 51% had fair knowledge, 29.4% indicated low knowledge and 19.6% indicated high knowledge about HAIs. Equally, Hesse et al. (2006) observed in a study to assess the knowledge, attitude and practice of universal basic precautions by health personnel in Accra (Ghana), that there was a disparity with the assumed knowledge and actual tested knowledge (92% versus 71%) among the participants. Hesse et al. (2006) further added that between 46% (23) and 96% (48) of participants understood the various constituents of universal basic precautions of IPCs.

Contemporary studies on the knowledge of HAIs in Ghana demonstrates varying knowledge levels among healthcare workers. Akagbo et al. (2017) also reported a low HAIs knowledge level in a cross-sectional study among healthcare workers including nurses (constituting majority of the study participants) Lower Manya Krobo District of the Eastern region. The study showed that approximately 37.0%(138) of the healthcare workers were aware HAIs control measures included hand washing before and after any direct contact with the patient with about 39.0%(138) also knew cough

protocols in addition to only 40.0%(138) knowing aseptic methods that are targeted at minimizing the perils of infection (Akagbo et al., 2017).

To equally assess the hand hygiene awareness and practices among healthcare workers including nurses in a Teaching Hospital in Ghana, Amissah et al. (2016) asserted in a cross-sectional study in Cape Coast that the general knowledge level on hand hygiene was 29.5% for participants with poor knowledge, 51.2%(130) reported fair knowledge and 19.3%(130) also demonstrated good knowledge. It was further noted that less than half of the participants were aware of the hand hygiene method needed before giving an injection 39.4% (130) and after making a patient's bed 20.5% (130). Emphasis must be made that Amissah et al. (2016) observed a statistically significant correlation between healthcare workers professional status and knowledge on hand hygiene (p=0.005).

A similar study conducted by Ocran et al. (2014) in the Central Regional Hospital, Cape Coast, to evaluate the knowledge and attitude of healthcare workers and patients on HAIs, showed that about 88.7% (63 out of 71) of the healthcare workers including nurses were well-informed on HAIs.

There seems limited literature on the knowledge and attitudes of healthcare workers including nurses on HAIs in the study area (Northern Region). However, a study by Konlan et al. (2017) that tend to look at the knowledge level of 108 nurses' on work-related post-exposure to hepatitis B (HBV) infection in the Tamale metropolis indicated that 94.4% of the nurses deemed themselves vulnerable to occupational infection of HBV. Again, Konlan et al. (2017) reported that only 23.4% of the nurses were able to indicate all the key elements of the post-exposure management and only 12.1% also have sufficient knowledge on post-exposure prophylactic treatment against HBV. The

observations in Konlan et al. (2017) study paints a frightening picture in the Tamale Metropolis.

2.5 Practices and Compliance to Infection Prevention and Control Measures among Healthcare Workers

To deal with the practices and compliance to IPC measures among healthcare workers including nurses, it is important to emphasize the concept of practice and compliance in the healthcare setting. The term practice is defined as "the actual application or use of an idea, belief, or method, as opposed to theories relating to it" (https://www.lexico.com/en/definition/practice). Equally, the term compliance has often been used to describe "the ability to act according to an order, set of rules or request" (https://www.int-comp.org/careers/your-career-in-compliance/what-is-compliance/). It is therefore expected that nurses and other healthcare workers would apply acquired knowledge on IPCs and comply with IPC standards as specified by health facilities and the Ghana Health Service IPC protocols. The expectation of nurses and other healthcare workers to practice and adhere to IPC standards seems not to be what is happening in health care facilities in Ghana and the subregion. For example, in Ghana, the Ministry of Health indicated in a report that there exist poor infection prevention practices and a lack of observance of IPC guidelines by health professionals (MOH, 2015). The low level of practices and adherence to IPC standards have been associated with the increasing rates of HAIs especially in developing countries (Geberemariyam et al., 2018).

Contemporary studies have continually suggested that the strict observance of infection prevention standards is vital to preventing the spread of infection among hospitalized patients and healthcare workers (Geberemariyam et al., 2018; WHO, 2017; Tietjen et al., 2003). According to Pittet (2009), infection prevention programs, involving education

to enhance hand hygiene practices, are efficient in decreasing HAIs. Sickbert-Bennett et al. (2016) equally assert that a little improvement in hand hygiene compliance by 10% among nurses and other healthcare workers is likely to reduce HAIs by about 6% and about 14% reduction in healthcare-associated Clostridium difficile infection. Concerning compliance scores in a study involving healthcare workers including nurses, Nofal et al. (2017) indicated that nurses scored higher compliance to IPC measures paralleled with physicians (P = 0.04), even though both showed a high level of observance based on their scores which were greater than a score of 45. Nevertheless, the observed differences in adherence amongst the physicians and nurses can be confounded by gender, as women are more likely to observe infection control protocols more than male participants (Gammon et al., 2008). From the findings of Russell et al. (2018), there was a high adherence to numerous IPC practices, such as wearing of gloves especially when foreseeing exposure to bodily fluid or blood (100.0%); execution hand hygiene before and after patient care activities (99.4%); dumping of needles in a sharps container (96.4%); performing hand hygiene immediately after removing gloves (95.5%), and properly disposing of contaminated materials (91.9%). Additionally, Russell et al. (2018) maintained that there was lesser adherence to IPC practices relating to wearing of goggles or eye shields when exposed to bodily fluids (69.6%); wearing a gown when anticipating exposure to bodily fluids (78.8%); and wearing a disposable face mask when anticipating exposure to splash or splatter (81.9%).

The findings of Shrestha and Thapa (2018) in a study on the knowledge and practice of IPCs among 178 Nurses of Bir Hospital, Kathmandu-Nepal showed that about 48.2% (41) practised good infection prevention procedures through hand hygiene, usage of

acceptable personal protective equipment, decontamination, cleaning of instruments, sterilization, and use of antiseptics, disposal of sharps and waste disposal. Equally, it was observed that majority 51.8% (44) of the participants had a poor practice of IPC. Also, Shrestha et al. (2018) stressed that among participants with inadequate knowledge, about 53.8% were noted to have poor practice whereas participants with adequate knowledge about 50% had a poor practice of IPCs, indicating that there is no statistical association between knowledge level and practice level.

Considering the practice and compliance to IPC standards in Ethiopia, Geberemariyam et al. (2018) observed in a cross-sectional study among 648 healthcare workers including nurses that the self-reported infection prevention practices and compliance were concerning safe infection prevention practice was found to be 36.3% (235) [95%CI: 32.4,40.1%]. Similarly, Geberemariyam et al. (2018) indicated that 69.4% (450) indicated that they regularly wash their hands after attending to a patient, 56.1% (364) before patient care, 64.2% (416) after removing gloves and 63.6% (412) before care of wounds. According to another study by Abdelatiet al. (2018) in Egypt involving 51 nurses, it was reported that majority of the participants did not observe hand hygiene practices with nearly 98% (49) of the nurses not use foot faucet to turn on the water, 92.2% (47) also do not thoroughly clean under fingernails. Corroborating a study from Nigeria on the level of knowledge on HAIs and control measures among 660 nurses, Oli et al. (2016) observed the compliance of the IPC measures among government and private healthcare workers as follows; use of hand gloves 100% (330) among government and private 100% (300) healthcare workers; use of laboratory/clinical coat government 99.39% (328) andprivate 89.70% (296) healthcare workers; usage of cover shoe government 46.8% (154) and

private 37.6%(124) healthcare workers; usage of face mask, government 61.10% (202) and private 43.0% (142) healthcare workers; usage of goggles, among government 15.8% (52) and 6.1% (20) among private healthcare workers and use of cap among government 7.2% (24) and 3.6%(12) among private healthcare workers respectively. The observations in Oli et al. (2016) study depicts the variations in the compliance to IPCs measures in government-owned health facilities and private health facilities and may be attributed to the levels of supervision accorded IPC in both government and private health facilities. The compliance with the IPC measures in these facilities may also be affected by the availability of the needed materials to practice good IPC measures. In another related study among 332 healthcare workers including nurses, Esu et al. (2019) indicated that the majority of participants (61.4%) reported an average level of adherence to IPC standards and protocols with a few reporting a low level of adherence to IPC standards and protocols. Additionally, Esu et al. (2019) maintained that the mean adherence score of all the participants was 2.89 (SD=0.54). Likewise, it was acknowledged that adherence to IPC standard and protocols was not significantly associated with factors including age (p value=0.139), sex (p value=0.401), marital status (0.384) and (p value= 0.813) (Esu et al., 2019). Additionally, adherence to IPC standards and protocols was not also significantly associated with IPC training (0.167), obtainability of PPE (0.563), health facility's policy (0.872), availability of water, soap and hand sanitisers (0.836), skin irritation (0.526), interference with work (0.295) and knowledge of SPs (0.176) (Esu et al., 2019). The findings of Esu et al. (2019) further showed that with a 5% level of significance, adherence to IPC standards and protocols was noted to be significant with healthcare worker's years of working experience (0.040) as well as the type of health facility (0.022).

An indication that healthcare workers having 10 or more working experiences are known to have a significantly higher proportion (85.5%) of adherence to IPC standards and protocols paralleled with healthcare workers with less than 10 years' work experience in a health facility (Esu et al., 2019).

In Ghana, Hesse et al. (2006) admitted in a study that among healthcare workers including nurses on practice and compliance to IPC standards that the actual practice reported by participants was 88% (42 out of the 50 participants)indicated the use of hand gloves all the time to perform invasive procedures whereas only 16%(8) did not use hand gloves. Hesse et al. (2006) further added that reasons were given by participants for not using hand gloves included; "they are careful when performing invasive procedures," "there is no time to look for gloves in emergencies" "that sometimes gloves are not readily availed-able" "they have better control over the IV cannula without gloves" and "they can set intravenous lines without soiling themselves." It was again noted from Hesse et al. (2006) study that precautionary measures were not often practised by the participants in surgical procedures as most participants indicated the non-use of protective gadgets including goggles and aprons. There exist inconsistencies in the practice and compliance to IPC standards in Ghana, as Yawson et a. (2009) also found that adherence to hand hygiene practices among doctors and nurses was generally low. Yawson et al. (2009) indicated that generally there exist high patient density areas in areas such as the emergency rooms, treatment rooms, and labour wards which are often associated with high-risk patient contact areas provide fairly hand hygiene prospects for doctors and nurses; hitherto, hand hygiene adherence was poor, particularly amongst nurses. Expressing further, Yawson et al. (2009), added that the proportion of hand hygiene

activities carried out was high after examining a patient compared to before examining a patient among both doctors and nurses respectively. The study further observed that, before examining patients, about 9.2% of doctors complied with hand hygiene activities in a medium-risk centre (thus on a Child Health ward) paralleled with about 21.7% of compliance after examining a patient. Likewise, for nurses, about 9.7% complied with hand hygiene activities in a high-risk centre, (the Surgical Medical Emergency) paralleled with about 22% of compliance in the Children's Emergency Room (Yawson & Hesse, 2009). According to Amissah et al. (2016), in a study on hand hygiene knowledge and practices among healthcare workers including nurses in Cape Coast Teaching Hospital; it was noted that the common compliance and practices of hand hygiene were 18 (5.3%) used warm running water, usage of cold running water (27.3%) and usage of alcohol-based hand rub (22.9%).

The findings of Hayeh et al. (2013) in the Greater Accra Regional also demonstrated that the total level of compliance with IPC guidelines and protocol showed that about 54.9% had a low adherence level with about 45.1% had a high level of adherence. Considering some specifics, Hayeh et al. (2013) indicated that the adherence to IPC standards and protocols on handwashing was about 76.5% for participants who wash their hands, before and after contact with patients with only 1.0% indicating that they rarely washed their hands. Hayeh et al. (2013) equally added that most of the participants (76.5%) indicated their usage of PPE while conducting medical procedures. Some of the specific PPE used included hand gloves with (82.4%) whereas the least used were boots (2.9%). Compliance to waste management practices shows that on the discarding of used syringes and needles about 57.4% indicated that they discard used syringes and needles instantly into safety

boxes and about 42.6% also indicated that they discard them into receivers before finally discarding them into safety boxes Hayeh et al. (2013).

2.6 Associated Challenges to the Practice and Adherence to Infection Prevention and Control Standards

The term compliance as used in this study is defined as a state of being following established protocols or guidelines specified for the prevention and control of HAIs (https://searchdatamanagement.techtarget.com/definition/compliance). Despite the many prospects offered by the introduction of IPC standards and protocols in decreasing the rate of HAIs among patients and healthcare professionals, contemporary studies have shown that full observance constitutes major challenge in most healthcare facilities in both developing and developed countries (Oosthuysen et al., 2014). The non-adherence to the IPC standards and protocols has been associated with factors including inadequate knowledge of IPC standards and protocols, inadequate or unavailability of personal protective equipment (PPE), low-risk perception and poor awareness of the institutional safety environment (Haridi, 2018; Gammon et al., 2008). Several infections can be prevented by complying with evidence-based infection preventions control measures (Umscheid et al., 2011). As explained by Kenneley et al. (2012) and Kenneley et al. (2007) the adherence to basic standard guidelines, such as hand hygiene, aseptic practices, combined with the use of PPE (such as gloves, gowns, masks, eye protection, and face shields) are very essential in avoiding the spread of infections among patients and healthcare professional.

According to Atalla et al. (2016) in a study to look at the effect of nursing guidelines adherence to infection control, it found that the mitigating factors to the adherence to IPC standards and protocols included inadequate training on infection prevention

guidelines, poor knowledge of infection prevention control, unavailability of PPE. Similarly, Atalla et al. (2016) added that there is the existence of limited research that is targeted at the education of nurses concerning infection prevention precautions. It is acknowledged that at the nursing training institutions, there is limited attention to teaching on infection prevention standards and protocols and usually allotted with limited lesson time (Atalla et al., 2016).

In another related study Mukwato et al. (2007) on the challenges to IPC standards and protocols, it was also recognized that the availability of IPC resources is important determinants of compliance (Mukwato et al., 2007; Russell et al., 1982). As an illustration, Mukwato et al. (2007) confirmed that insufficient supply of hand gloves in southern province-based hospitals in Zambia is associated with inappropriate procedures, citing that the typical number of vaginal examinations for a woman at a University Teaching Hospital where the supply of gloves was adequate was about 3.5 paralleled with about 2 in the Southern Province based hospitals. There exists enough evidence that suggests that the availability of materials to practice IPC measures are important determinates. Mukwato et al. (2007) established that about 11.7% of participants indicated that materials for IPC practices were always available. Equally, about 47% specified that the materials were not easily accessible from the medical stores and another 45.5% specified that materials were not easily accessible at the ward or departmental level. Conversely, on the issue of access to IPC protocols at the hospital about 84.4% specified that they were exhibited at the hospital. Likewise, Mukwato et al. (2007) asserted that there was a significant association between the availability of IPC materials and compliance. In a similar study, Siziya et al. (2002) indicated that the general hygienic procedures employed in

healthcare facilities to lessen the risk of infections were woefully inadequate and contributed to the lack of supplies. Hamomba (2006) stressed that an additional influence with compliance to IPC standards and protocols is the seemly lack of integration of IPC standards and protocols in the healthcare workers' curricular and in-service training.

In other related studies, it was acknowledged that the factors that affect compliance to IPC standards and protocols include lack of knowledge of IPC policy and guidelines and its content (Oliveira et al., 2010). Equally, inadequate time to follow standard operating procedures by healthcare workers have also been noted to affect the compliance to IPC standards and protocols (Raafat et al., 2002) together with a limited supply of resources for healthcare workers to work with, examples lack of PPE, disinfectant, soap and others (Madan et al., 2010). Similarly, it has also been documented that the failure of health institutions to provide in-service training on IPC practices and inadequate water supply are all factors reported to affect adherence to IPC standards and protocols (Madan et al., 2010). In a qualitative study on factors that affect adherence to IPC standards and protocols, Moyo (2013) indicated that workload was reported by nurses as a factor for non-compliance with IPC standards and protocols. Other factors indicated from other studies include forgetfulness to comply with standard precautions, uncomfortable equipment and skin irritation resulting from PPE use. Furtherance that, some other studies explained that sociodemographic factors including work experience, sex, marital status, age, hospital working site and job category have been associated with compliance with IPC practices (Najeeb et al., 2008). Nofal et al. (2017) observations were consistent

with other studies that reported a positive correlation of age and work experience with compliance with IPC practices.

In Ghana Amissah et al. (2016) indicated that factors affecting hand hygiene practices among 130 healthcare workers including nurses in Cape Coast were found to include; insufficient water 21.9(86), absence of detergent 13.0% (51), unavailability of sinks 6.4% (25), sink leakage 7.9% (31), sink too far 8.2% (32); absence of clean towels 15.1% (59), absence of hand lotion 11.5% (45) and absence of air dryer 14.0% (55). Likewise, Amissah et al. (2016) observed that explanations to non-adherence to hand hygiene practices among the healthcare workers were as follows; limited time 17.9% (38), forgetfulness 23.6% (50), substantial patient load 33.5% (71), non-conducive environment 14.6% (31) and lack of knowledge in hand washing practices 8.0% (17).

CHAPTER THREE

STUDY AREA AND RESEARCH METHODOLOGY

3.0 Introduction

This chapter of the study is divided into two main sections. Section A is devoted to the geography of the study area and section B focuses on the methodology adopted for the study.

3.1 Study Area

3.1.1 Location

The Tamale Metropolis is one of the 16 districts in the Northern Region. It is sited in the central part of the region and shares boundaries with the Sagnarigu Municipal to the west and north, Mion district to the east, Tolon district to the west, Savelugu municipal to North-east, Kumbungu to North-west, Naton district to the east, north-east Gonja districts to the south and Central Gonja district to the south-west. The Metropolis has a total projected land size of 646.90180sqkm (Ghana Statistical Service, 2014). Geographically, the Metropolis lies between latitude 9º16 and 9º 34 North and longitudes 0º 36 and 0º 57 West. Tamale is strategically located in the Northern Region and b this strategic location; the Metropolis has a market potential for local goods from the agricultural and commerce sectors from the other districts in the region.

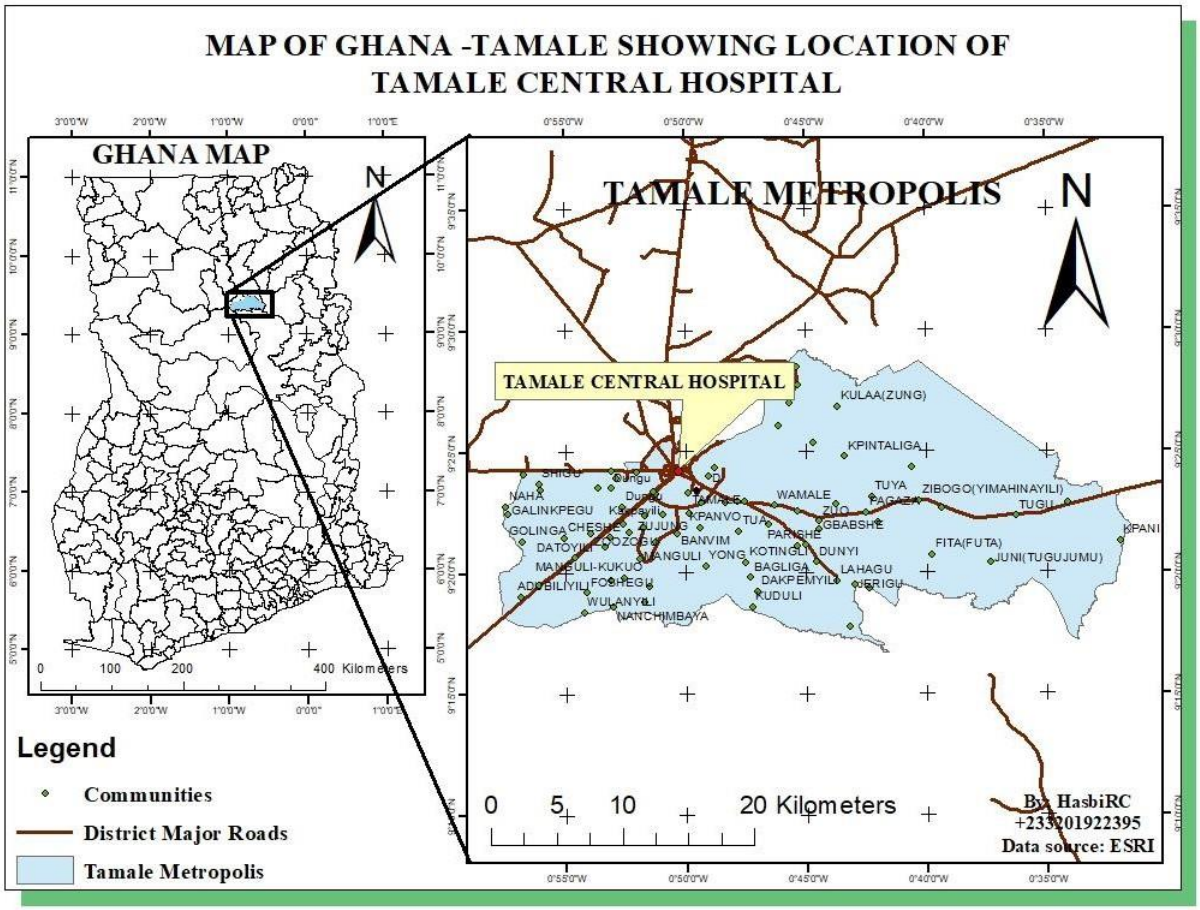


Figure 3.1: Map of Central Hospital

3.1.2 Population

The population of Tamale Metropolis is 233,252 representing 9.4 per cent of the region's population. Males constitute 49.7 per cent and females represent 50.3 per cent (Ghana Statistical Service, 2014). With 80.8% of the population living in urban localities. The population of the metropolis is youthful that is almost 36.4% of the population is below 15 years depicting a broad base population pyramid that tapers off with a small number of elderly persons (60 years and older) representing 5.1 per cent (Ghana Statistical Service, 2014).

3.1.3 Road Network

The roads in the Metropolis are impartially good most especially those that connect the Metropolis to other nearby district capitals. The tarred roads in the area facilitate easy movement from one community to the other. There is minimal traffic congestion in

the central business district. Most of the rural communities and the peri-urban communities are linked to the marketing centres by feeder roads. The availability of access roads linking farming communities to marketing centres enables farmers to transport their farm produce to the central business district with ease (Ghana Statistical Service, 2014).

3.1.4 Water and Sanitation

The Metropolis enjoys frequent water supply from the Dalun and the Nawuni Water Treatment Plants. The main source of water in the Metropolis is pipe borne water which is rationed and managed by the Ghana Water Company Limited in urban Tamale. The Ghana Water Company Limited supplies 45,000 cubic meters daily. Reports from the company indicate that there is a surplus in treated water supply in the Metropolis. This implies there is enough water in the metropolis and water and ministry of Health/Ghana Health Service should take this opportunity to connect all their health institutions to the water system to control WASH-related infections.

3.1.5 Economic Activities

According to the Ghana Statistical Service, (2014), 63.3 per cent of the population of the metropolis are economically active and 36.7 per cent are economically not active. Of the economically active population, 92.6 per cent are employed while 7.4 per cent are unemployed. For those who are economically not active, a larger percentage of them are students (56.0%), 20.9 per cent perform household duties and 12.4 per cent are either too young or old to work. About five out of ten (52.9) of unemployed persons in the metropolis are seeking work for the first time. Those who are economically inactive posed a challenge in dealing with Infection Prevention and Control as they are likely not able to have the needed resources in dealing with IPC.

3.1.6 Education

In the Tamale Metropolis, 60.1 per cent of the population are literates whilst 39.9 per cent are non-literates. The proportion of literate males (69.2%) is higher than that of females (51.1%)(Ghana Statistical Service, 2014). The population aged 3 years and older (84,897) currently attending school in the metropolis 52.9 per cent are males and the remaining 45.1 per cent are females. Among those who have attended school in the past, males constitute 58.6 per cent and females represent 41.4. The metropolis has several

educational institutions ranging from second cycle institutions to tertiary institutions including two universities; University for Development Studies UDS and the Tamale Technical University TaTu.

3.1.6 Health Infrastructure

The Tamale Metropolis is home to many health institutions including the referral hospital in the north (Tamale Teaching Hospital), West Hospital, several private health facilities and the Northern Regional Hospital (Tamale Central Hospital) where this study was carried out

Tamale Central Hospital (TCH) is the Regional Hospital of the Northern Region and it is located in the Tamale Central Sub-Metro. It shares boundaries with Dagomba road to the North, Police barracks primary school to the West, Regional health directorate to the South, and Louisville road to the East. Being a regional hospital, the clinical environment of the hospital consists of General wards, Gynaecology, Maternity, Special baby care, Emergency ward, Theatre, Postnatal care, Laboratory, and Psychiatry unit. It also has a Fistula Center that receives and repair fistula cases for the Northern, Upper East and Upper West regions.

The hospital has a staff strength of 495 comprising Doctors, Nurses, Laboratory technicians, Pharmacists, and other health care workers. The Nurses of all types are 331. The hospital is chosen for this study because it is a regional hospital with a larger number of all category of nurses and also serves as the referral point for other health facilities within the region.

3.2 Study design

The study adopted a facility-based descriptive cross-sectional study. Data will be collected from staff nurses at Central Hospital, Tamale. A mixed-method (Quantitative

and Qualitative) the approach was employed for the data collection in the study. This will provide a more holistic approach to the study, whereby the weaknesses of one method will be compensated for the strengths of the other instruments and vice-versa as well as providing a multi-perspectival approach to the study. The researcher will collect basic characteristics including socio-demographic data, training on IPC, knowledge of IPC, availability of IPC protocols, barriers to use of IPC, and practice of IPC.

3.2.1 Tools for Data Collection

Qualitative Tool: The qualitative approach of this study employed key informants interview. The key informant interview guide was used to guide the researcher to ask appropriate questions that are in line with the objectives of the study.

Key informant interview guide: This was used to further gather in-depth information from people with a vast knowledge of the topic under review. The data collected fromthe key informants were used to complement the Quantitative data gathered using the questionnaire. The researcher, assisted by one health staff of the facility conducted the interviews. The discussions were moderated by the researcher whilst the nurse serves as a note-taker. The key informant interview guide was designed in line with the study objectives. A total of 8 key informants of the facility were interviewed using this instrument, they included; the Quality Assurance Coordinator, injection and dressing room in charge, paediatric ward in-charge, Female ward in-charge, Labour ward in-charge, Male ward in-charge, Maternity ward in-charge and the Theater in-charge.

3.2.2 Quantitative Tool: The quantitative approach used a structured closed-ended questionnaire to collect data on infection prevention and control and employed the use of a simple random technique in the selection of the nurses.

Questionnaire: Questionnaire was the data collection instrument employ to gather the quantitative data. A closed-ended questionnaire was designed in line with the study objectives. The questionnaire was distributed among respondents and was later entered into KoboCollect. This was necessary because all the respondents could read and write in the English language coupled with COVID-19 safety protocols. In all, two hundred and sixty-eight (268) nurses were interviewed using the closed-ended questionnaire from selected departments in the Hospital. The questionnaire was adopted for this study because it is capable of gathering data from a larger population within a limited period.

3.3 Study Population

The study population included all staff nurses at the Tamale Central Hospital.

3.4 Sample Size

The Northern Regional Hospital has a nurse population of 331. To ensure a good representation, 268 nurses were interviewed representing 80% coverage. This was necessary due to the limited time within which the study was carried out and the shift system run by nurses in the hospital. It was also to take care of those who were on leave and those who could not consent to take part in the study.

3.5 Sampling Method

A multistage sampling method was employed. The hospital was put into 18 clusters (as they have 18 wards) followed by proportionate sampling to calculate the number of respondents to be interviewed in each cluster (ward). Finally, convenient sampling was then used to interview the require number in each ward to get 268 nurses for the study.

Table 3.1: Sample framework of nurses who participated from each ward in the study

NO	Cluster (ward)	Total No per Cluster (ward)	No interviewed in each Cluster (ward)
1	Male ward	26	21
2	Female ward	26	21
3	Paediatric ward	30	24
4	Blood bank	6	5
5	Antiretroviral ward	5	4
6	Eye clinic	5	4
7	Fistula ward	21	17
8	Theatre	20	16
9	Nicu	22	18
10	Emergency ward	27	22
11	OPD	40	33
12	ENT	4	3
13	Psychiatric ward	12	10
14	Labour ward	24	19
15	Maternity ward	22	18
16	Child welfare	16	13
17	ANC	21	17
18	Quality improvement	4	3
	Total	**331**	**268**

3.6 Sources of data

Data for this study was sourced from both primary and secondary.

3.6.1 Primary data

Primary data was collected from the subjects of the study using questionnaires and a key informant interview guide.

The questionnaire was employed to gather the quantitative data whiles the key informant interview guide was employed to collect the qualitative data.

3.6.2 Secondary data

Secondary data was sourced from journals, reports from the regional hospital, and reports from Ghana Health Service and existing thesis on the topic.

Information was also sourced from the internet and some from the periodical of the World Health Organization.

3.7 Study Variables

The dependent variable in this study was compliance with IPC practices by the nurses and the independent variable was the knowledge, availability and access to materials for IPC.

3.8 Data Quality Control Measures

The tools for this study was pretested in the Savelugu Municipal Hospital which has the same features as the Northern Regional Hospital using a sample of 5% to 10% to test respondents understanding of the tools and increase subsequently the validity and reliability of the results.

3.9 Methods of data analysis

The Statistical Package for Social Sciences (IBM SPSS v.21 on window 10) was used for

the quantitative analysis. The survey quantitative data was analyzed and presented in two parts; descriptive and analytic. The result was presented in the form of frequency tables, bar charts, and pie charts. The descriptive aspect covered the demographic characteristics of the respondents', respondents' knowledge and compliance on IPC, and IPC material availability level.

The analytic aspect covered the association between demographic characteristics and knowledge on IPC, and IPC compliance. This was done using Chi-square for categorical variables. P-value equal to 0.05 or above was regarded as not statistically significant (NS).

For the qualitative part of the study, transcripts obtained from the study were analyzed using content analysis employing a set of approaches.

3.10 Ethical Issues

Ethical approval for the study was obtained from the Internal Review Board (IRB) of the University for Development Studies (UDS) and the Tamale Central Hospital. Permissions were also obtained from the various Heads of departments/units in the Tamale Central Hospital where data was collected.

Participating in this study was voluntary. Informed consent was obtained from the study participants with an assurance of confidentiality. Again, data obtained from the study was coded and did not bear the names of the study participants

Selection and Rejection

Inclusion Criteria

Participants would include both male and female staff nurses of the hospital that would consent to take part in the study.

Exclusion criteria

The study excluded staff nurses who do not consent to partake in the study.

CHAPTER FOUR

RESULTS

4.0 Introduction

This section presents the findings of the study, data were collected from 268 nurses at various departments of the Tamale Central Hospital. The quantitative instrument was administered on 268 respondents(nurses) whilst 8 nurses (Unit-heads) out of the 268 were again interviewed as key informants using a key informant interview guide.

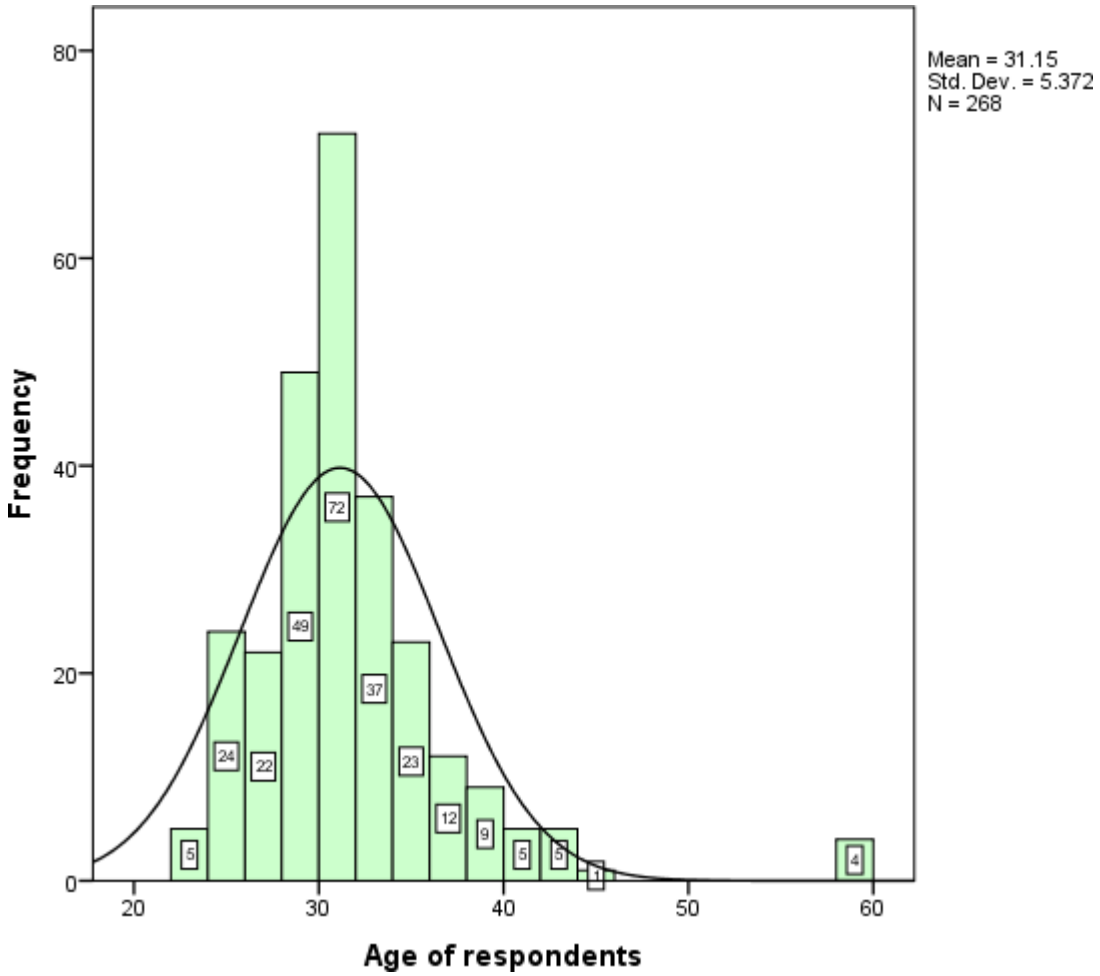
The survey quantitative data was analyzed and presented in two parts; descriptive and inferential. The descriptive aspect covered the demographic characteristics of the respondents', respondents' knowledge and compliance on IPC, and IPC material availability level.

The inferential aspect covered the association between demographic characteristics and knowledge on IPC, and IPC compliance. It also covered the association between respondents Knowledge of IPC, availability of IPC materials and compliance to IPC. This was done using Chi-square for categorical variables, variables were further modelled with multiple regressions to identify predictors.

The study qualitative data was analyzed and organized according to the study objectives using thematic content analysis. The results were presented in the form of a verbatim quotation from study participants.

4.1 Demographic characteristics

The mean age of 268 respondents was 31.2 ±5.4, with a minimum age of 23 years and maximum age of 59 years. The modal age was 30 years (Figure 4.1).



Source: field survey, 2020

Figure 4.1: Age distribution of respondents

Majority (54.5%) of the respondents were within the age group of 21 – 30 years. With the sex of respondents' majority (69.8%) of the respondents were females. Most (48.1%) of the nurses were registered general nurses and majority (76.9%) of them had the highest education limited to college education (Table 4.1).

Table 4.1: Demographic characteristics of respondents

Frequency (n = 268)			Percentage
	21 - 30 years	146	54.5%
	31 - 40 years	109	40.6%
Age group			
	41 - 50 years	9	3.4%
	51 - 59 years	4	1.5%
Sex of the respondent	Male	81	30.2%
	Female	187	69.8%
Highest level of	University	62	23.1%
education/training	College	206	76.9%
Source: field survey, 2020.			

4.1.1Category of nursing and years of experience

The average years of occupational experience were 6.0 ±5.0 and most of them had occupational experience 10 years and below. That of departmental or unit years of work experience was 2.1 ±2.2 and majority had years of departmental experience of 3 years and below. Most (48.1%) of the nurses were registered general nurses and majority (76.9%) of them had highest education limited to college education (Table 4.2).

Table 4.2: Category of nursing and years of experience

Frequency (n = 268)			Percentage
Category of nursing	Registered nurse	129	48.1%
	Enrolled nurse	81	30.2%
	Enrolled midwife	1	0.4%
	Staff midwife	44	16.4%
	Community health nurse	13	4.9%
Years of work experience	0 - 10 years	232	86.6%
	11 - 20 years	29	10.8%
	21 - 30 years	7	2.6%
Years of departmental Experience	0 -3 years	226	84.3%
	4 - 6 years	27	10.1%
	7 - 10 years	15	5.6%

Source: field survey, 2020.

4.2 Respondents knowledge of IPC

Most (94.0%) of the respondents knew that hospital-acquired infections can be transmitted through medical equipment such as syringes, needles, catheters, stethoscope, thermometers etc. Many (206) of them disagreed that nosocomial infections are infection from home. About 65.3% of the respondents agreed to know WHO five moments of hand hygiene. 90.3% of the respondents agreed that standard precautions apply to all patients regardless of their diagnosis and 87.3% of them knew that all staff and patient should be considered potentially infectious. With glove use, 89.6% of them knew that one cannot handle body fluids with bare hands if gloves are not available (Table 4.2).

The above findings were supported by the qualitative data. Almost all the key informants have adequate knowledge of IPC. In an interview with the Quality assurance Coordinator of the Hospital, he stated that;

"IPC involves taking steps to prevent us from coming in to contact with microbes or infections in the hospital. It also involves preventing patients and their relatives from bringing microbes or infections from their homes to infect health care workers or other patients" (Quality assurance Coordinator)

A female participant during the interview describes IPC as;

*"IPC stands for infection prevention and control and has to do with measures that should be adhered to in order to shield oneself from getting infected or passing infection from oneself to another or cross infection among patients" (*Female Ward In-charge)

"It is a measure and practice that are put in place to prevent the spread of infection from patient to patient, patient to nurse, nurse to patient, nurse to patient's relative e.t.c." (Injection and dressing room in-charge)

The qualitative interviews equally looked at the knowledge level of hospital staff with regards to WASH-related issues.

"The staff in the hospital are very knowledgeable about WASH-related issues in this Hospital. They have all been trained on IPC. On a scale of 10, I will score them 9. All staff are knowledgeable. New entrants are being coached on the job. I was personally involved in the training of new staff. As a quality assurance coordinator, I am personally involved in the monitoring of staff on IPC and WASH-related programs" (Quality assurance coordinator)

However, another respondent disagreed with the first respondent that all staff are knowledgeable about WASH.

"It is the theoretical knowledge that they are much equipped as a result of workshops and In-service training but due to lack of practice, it becomes difficult to keep." (Female Ward In-charge)

An interview with the quality assurance coordinator revealed that the facility often organizes in-service on WASH-related issues to staff. This claim was confirmed by a participant.

"Even though the facility organizes the training on WASH for us but it is not very often and I believe it is because of lack funds to support these training programs" (Labour Ward In-charge).

"……Yes. In-service training and updates of staff on health knowledge are held in place in the facility every Wednesday. Therefore, WASH-related issues are discussed and updated to all staff when it is due for public health unit to present in a particular week." (Injection and Dressing Room In-charge)

This demonstrated strong knowledge and understanding of IPC among health staff in the Hospital.

Table 4.3: Respondents IPC knowledge variables

Frequency (n = 268)			Percentage
Hospital-acquired infections (HAI's) can be transmitted by medical equipment such as syringes, needles, catheters, stethoscope, thermometers	True	252	94.0%
	False	16	6.0%
	Not applicable	0	0.0%
Nosocomial infection is an infection that the patient brings from the house to the hospital	True	56	20.9%
	False	206	76.9%
	Not applicable	6	2.2%
I know the World Health Organization's5 moments of hand hygiene.'	True	175	65.3%
	False	65	24.3%
	Not applicable	28	10.4%
Some instruments can be stored in an antiseptic solution for up to 36 hours	True	52	19.4%
	False	202	75.4%
	Not applicable	14	5.2%
If there are limited beds available, patients with a communicable disease may be admitted to the same ward with other patients	True	50	18.7%
	False	202	75.4%
	Not applicable	16	6.0%
Micro-organisms are destroyed by using clean water	True	54	20.1%
	False	211	78.7%
	Not applicable	3	1.1%

Source: field survey, 2020.

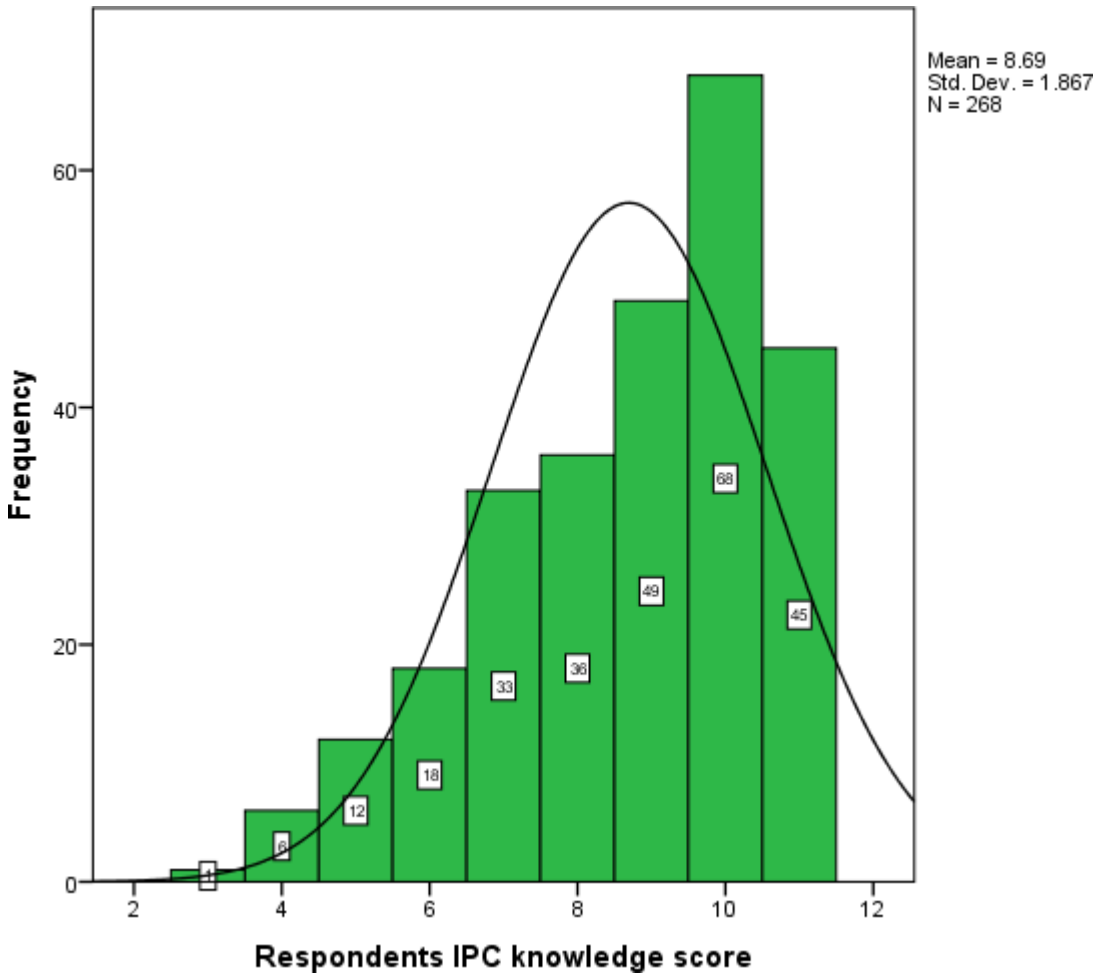
Table 4.4: Respondents IPC knowledge variables

Frequency (n = 268)			Percentage
Standard precautions apply to all Patients regardless of their diagnosis.	True	242	90.3%
	False	19	7.1%
	Not applicable	7	2.6%
I am familiar with hospital-acquired infection guidelines.	True	212	79.1%
	False	46	17.2%
	Not applicable	10	3.7%
All staff and patient should be Considered potentially infectious.	True	234	87.3%
	False	33	12.3%
	Not applicable	1	0.4%
You can handle body fluids with bare hands if gloves are not available.	True	19	7.1%
	False	240	89.6%
	Not applicable	9	3.4%
Used needles can be recapped after use and before disposal	True	107	39.9%
	False	154	57.5%
	Not applicable	7	2.6%

Source: field survey, 2020.

4.2.1 Respondents IPC knowledge score

Respondent IPC knowledge mean score was 8.7 ±1.9 out of 11 (79.1% knowledge score for all respondents) with minimum and a maximum score of 3 and 11 respectively, and a modal score of 10 (Figure 4.1).

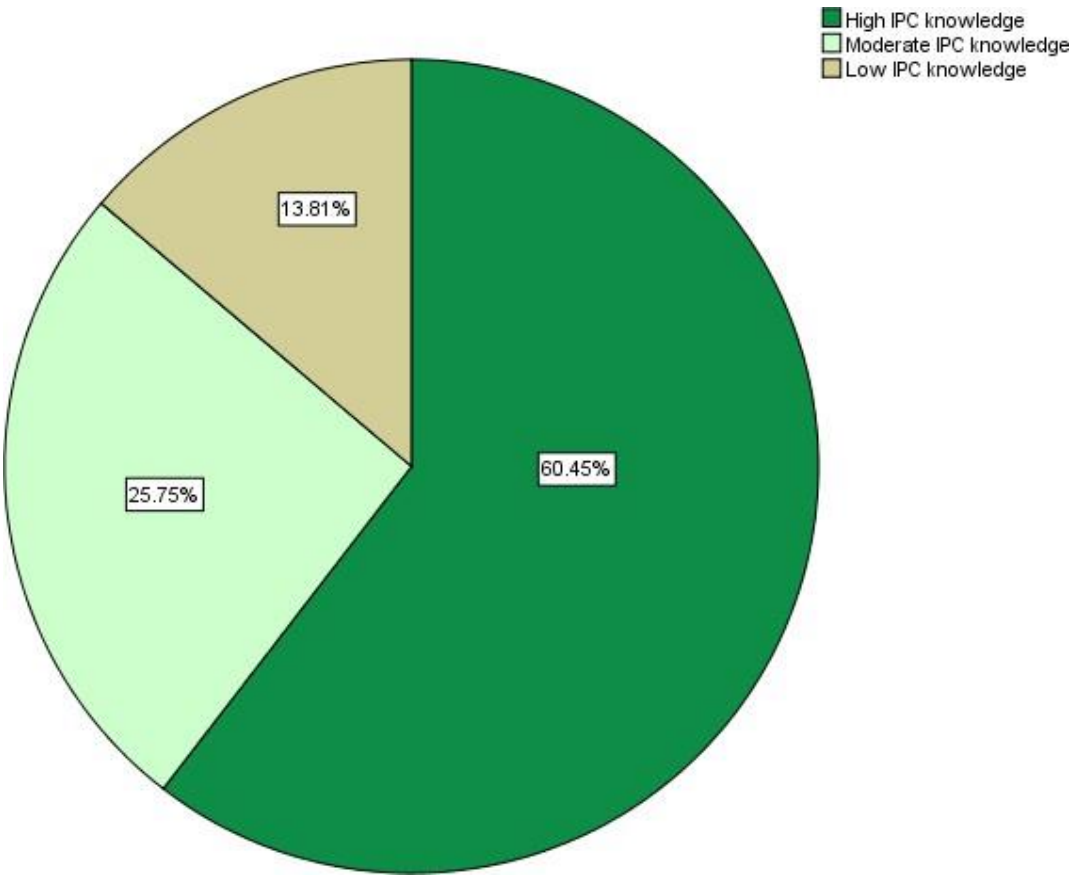


Source: field survey, 2020.

Figure 4.2: IPC knowledge score distribution among respondents.

4.2.2 Respondents IPC knowledge level

Respondents IPC knowledge scores were converted to percentages and used to classify knowledge level. Those who scored below 60.0% were classified low IPC knowledge level, those with scored 60.0% but below 80.0% were classified as moderate IPC knowledge and those with a score of 80.0% and above were classified as high IPC knowledge level. Majority (60.5%) of the respondents had high IPC knowledge, 25.8% had moderate IPC knowledge level and 13.8% of had low IPC knowledge level.



Source: field survey, 2020.

Figure 4.3: Respondents IPC knowledge level

4.2.3 Demographic factors associated with respondents IPC knowledge level

From the chi-square analysis factors identified to be significantly associated with IPC knowledge level were: age group of the respondents, X^2 (2, 268) = 6.532, p = 0.038, respondents' highest educational level, X^2 (2, 268) = 8.315, p = 0.016, and nursing category of the respondents, X^2 (6, 268) = 24.824, P ≤ 0.001. However, the remaining demographic factors were not statistically associated with respondents IPC knowledge level (P > 0.05) (Table 4.3).

Table 4.5: Chi-square association of demographic factors and respondents IPC knowledge level

		IPC knowledge level					
		High	Moderate	Low	df	X^2	P-value
Sex of the respondent	Male	57	17	7	2	5.154	.076
	Female	105	52	30			
Age group	30 years and below	79	41	26	**2**	**6.532**	**.038**
	31 years and above	83	28	11			
Highest level of education/training	University	47	11	4	**2**	**8.315**	**.016**
	College	115	58	33			
Nursing category	Registered nurse	90	26	13	**6**	**24.824**	**.000**
	Enrolled nurse	38	31	12			
	Registered midwife	30	9	6			
	Community health nurse	4	3	6			
Years departmental/unit experience	Below 5 years	143	59	34	2	.951	.622
	5 years and above	19	10	3			
Years of occupational experience	Below 10 years	128	58	33	2	2.429	.297
	10 years and above	34	11	4			

Source: field survey, 2020.

4.3 Respondents IPC compliance

The study revealed that almost all (98.9%) perform hand hygiene always before and after patient contact. Most (81.0%) of them disagreed with shaking of linen to release dust. Only 51.1% of the respondents had access to guidelines/Training manuals in their unit. Also, about 58.2% of them always put on a mask and glasses when performing invasive and body fluid procedures (Table 4.4).

During the key informant interviews, it was revealed by all the respondents that the hospital staff complied with IPC Protocols and guidelines in the course of discharging their duties.

"A protocol has been designed for this purpose with a taskforce purposely designated for the monitoring purposes. They conduct intermittent spot checks. We equally supply IPC training manual and guidelines to all wards" (Quality assurance Coordinator)

Another participant during the interview claimed *"There is a committee set by management to oversee quality issues in the hospital. This committee is expected to occasionally supervise and monitor issues regarding IPC compliance in the hospital and I think all our staff are really observing these guidelines"* (Female ward in-charge)

However, one of the participants responses disagreed with what some of the Ward in-charges said with regards to IPC compliance. This view supported the quantitative data that almost half (48.9%) of the respondents do not have access to guidelines/Training manuals in their unit.

"if you come to my ward, we have not been provided with guidelines/Training manuals for some time now. But they have provided these materials to other wards. We have been

making fellow-ups for these materials because they are important to us" (Staff from the Male Ward)

The qualitative data also supported the findings from the quantitative data about 58.2% of the hospital staff always put on a mask and glasses when performing invasive and body fluid procedures.

"..... you know, because we don't know the kind of infections that our clients may be coming with, to avoid infection during patient care, we ensure that we wear protected hand gloves to avoid possible contamination from the clients. We also wear mask and glasses to prevent possible splashes of body fluids which maybe infectious" (labour ward in-charge)

With regards to shaking of linen, the qualitative data equally supported the quantitative data,

"the shaking of patients linen may result in a possible spread of infection in the ward, so we were thought right from school and other various in-service trainings that, we should not shake linen and this has been my standard practices ever since I left school. And… ; No body in this ward is allowed to shake linens here" (Pediatric Ward in-charge)

Table 4.6: Respondents IPC compliance variables

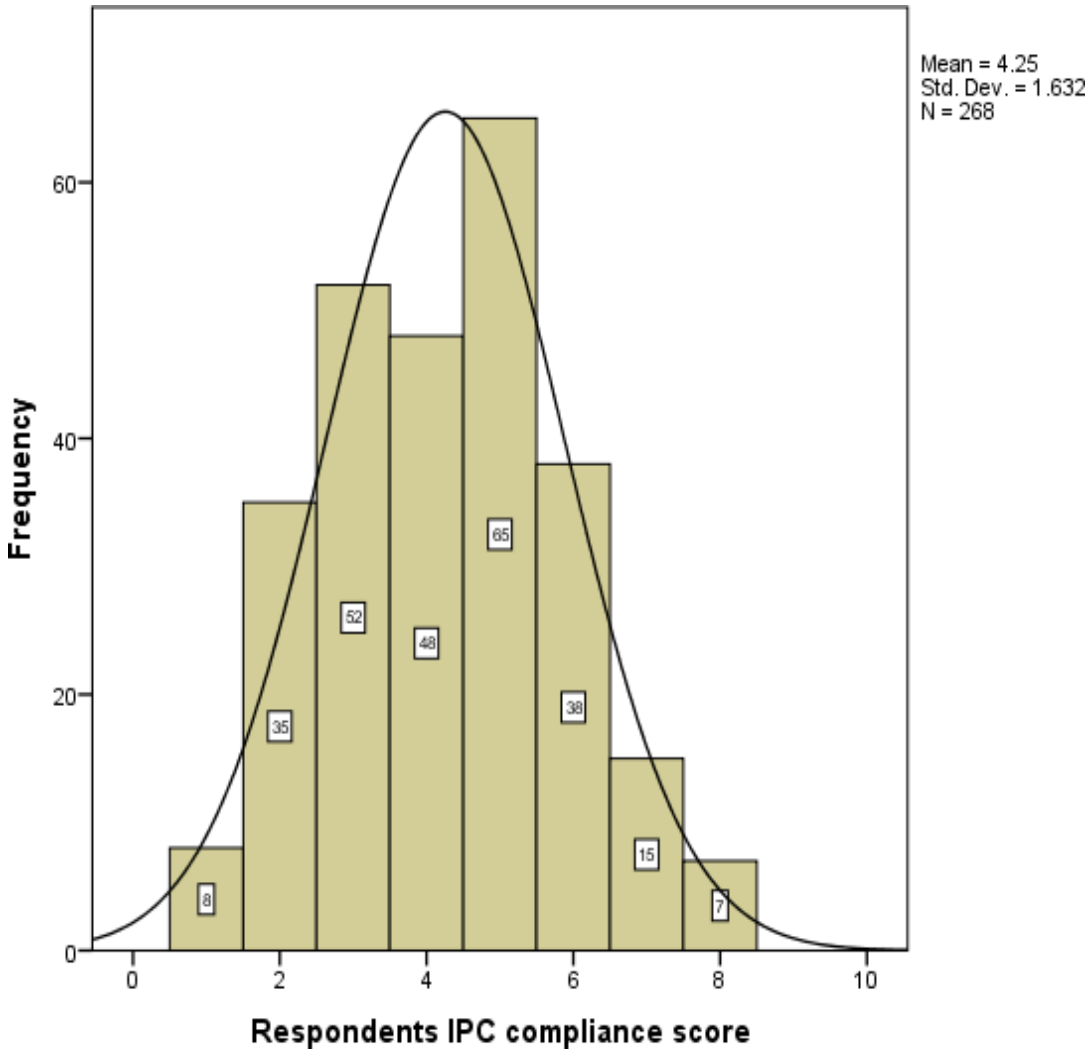
Frequency (n = 268)			Percentage
I always wash hands before and after direct contact with the patient.	Agree	265	98.9%
	Disagree	3	1.1%
	Not applicable	0	0.0%
I always put on a mask and glasses when performing invasive and body fluid Procedures	Agree	156	58.2%
	Disagree	91	34.0%
	Not applicable	21	7.8%
Knowledge of infection prevention and control are being monitored in the hospital	Agree	151	56.3%
	Disagree	107	39.9%
	Not applicable	10	3.8%
We have access to IPC Guidelines/Training manuals in our unit	Agree	154	57.5%
	Disagree	105	39.1%
	Not applicable	9	3.4%
Our hospital has an IPC committee in a place to monitor IPC activities	Agree	137	51.1%
	Disagree	105	39.2%
	Not applicable	26	9.7%
Screening of patients are being done to detect colonization even if no evidence of infection	Agree	101	37.7%
	Disagree	154	57.5%
	Not applicable	13	4.9%
Vaccination is provided to staff	Agree	32	11.9%
	Disagree	213	79.5%

	Not applicable	23	8.6%
We wear PPE when handling linens	Agree	123	45.9%
	Disagree	126	47.0%
	Not applicable	19	7.1%
We shake linens out to release dust from the linen	Agree	21	7.8%
	Disagree	217	81.0%
	Not applicable	***30***	***11.2%***

Source: field survey, 2020.

4.3.1 Respondents IPC compliance score

Respondent IPC compliance mean score was 4.3 ±1.6 out of 9 (47.8% compliance score for all respondents) with minimum and maximum score of 1 and 8 respectively, and modal score of 5 (Figure 4.3).



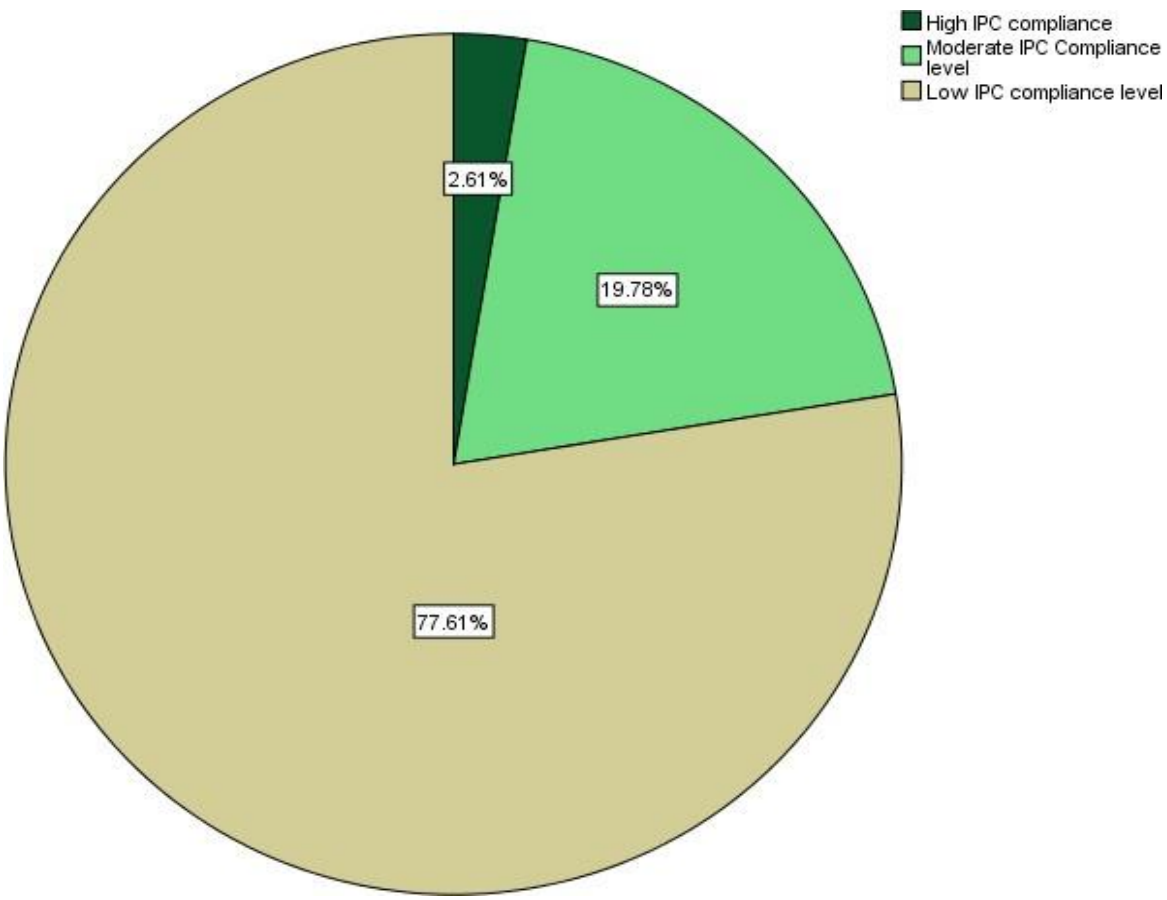
Source: field survey, 2020.

Figure 4.4: IPC compliance score distribution among respondents

4.3.2 Respondents IPC compliance level

Respondents IPC compliance scores were converted to percentages and used to categorize compliance levels. Those who scored below 60.0% were classified as low IPC compliance level, those with scored 60.0% but below 80.0% were classified as moderate IPC compliance level and those with a score of 80.0% and above were classified as high IPC compliance level. Majority (77.6%) of the respondents had a low IPC compliance level, 19.8% had a moderate IPC compliance level and only 2.6% had a high IPC

compliance level (Figure 4.4).



Source: field survey, 2020.

Figure 4.5: Respondents IPC compliance level

4.3.3 Demographic factors associated with respondents IPC compliance level

From the chi-square analysis, it was only the category of nursing that was significantly associated with IPC compliance, $X^2(2, 268) = 13.351$, P = 0.001. However, the remaining demographic characteristics were not significantly associated with IPC compliance (P > 0.05) (Table 4.5).

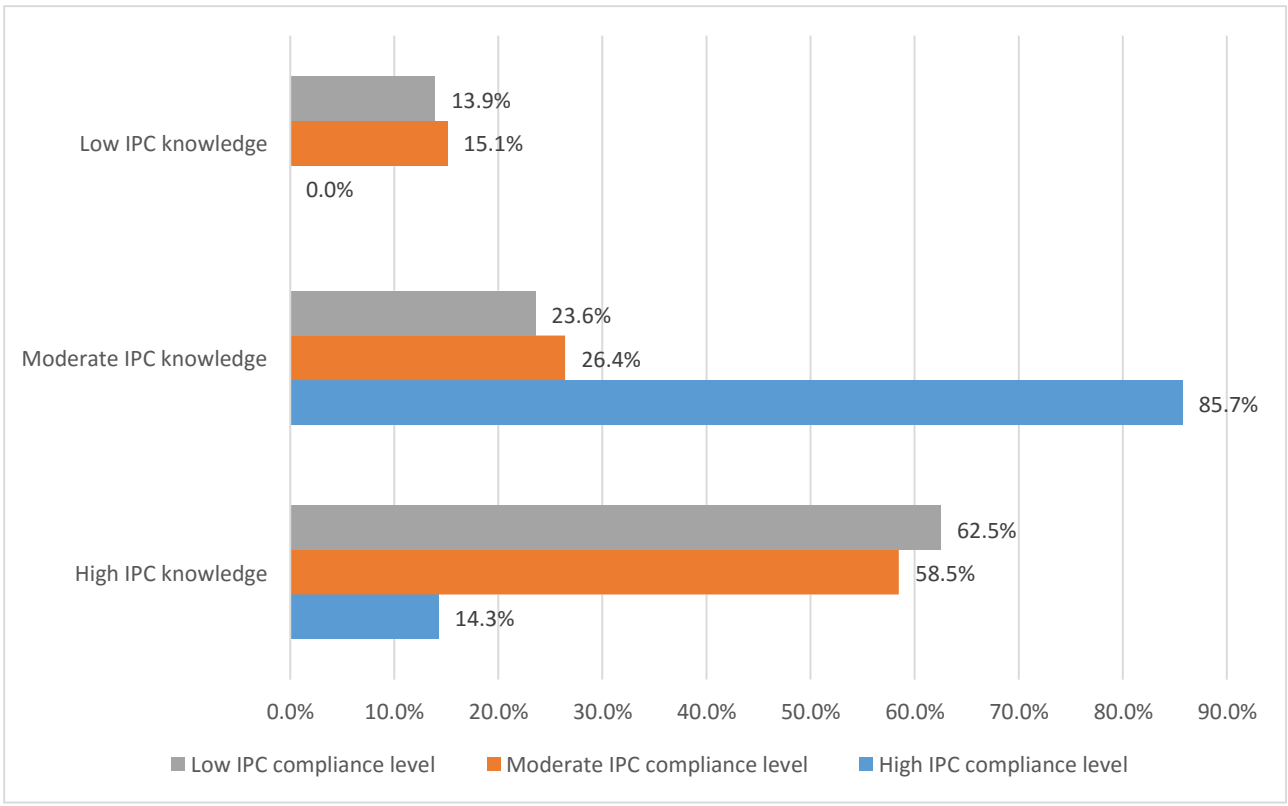
Table 4.7: Chi-square association of demographic factors and respondents IPC compliance level

		IPC compliance level					
		High	Moderate	Low	df	X^2	P - value
Age group	30 years and below	6	27	113	2	3.023	.221
	31 years and above	1	26	95			
Sex of the respondent	Male	3	14	64	2	.924	.630
	Female	4	39	144			
Highest level of education/training	University	2	12	48	2	.124	.940
	College	5	41	160			
Nursing category (Enroll/community)	Registered nurse//midwife	0	36	138	**2**	**13.351**	**.001**
	Axillary nurse	7	17	70			
Years departmental/unit experience	Below 5 years	7	43	186	2	3.736	.154
	5 years and above	0	10	22			
Years of occupational Experience	Below 10 years	7	42	170	2	1.783	.410
	10 years and above	0	11	38			

Source: field survey, 2020.

4.3.4 Relationship between IPC knowledge level and IPC compliance level

The relationship between IPC knowledge level and IPC compliance level was statistically significant, X2 (4, 268) = 13.853, P = 0.008, high IPC compliance was proportionally high among those with moderate IPC knowledge (Figure 4.4).



Source: field survey, 2020.

Figure 4.6: Association between IPC knowledge level and IPC compliance level

4.4 Challenges of IPC compliance

4.4.1 IPC material availability and accessibility

With the availability or accessibility of IPC materials, 49.6% of the respondents indicated that hand hygiene materials were not always available. 56.0% of the respondents indicated that gloves were not always available in the ward. With personal protective equipment, many (76.9%) indicated they not always available. Also, detergents for

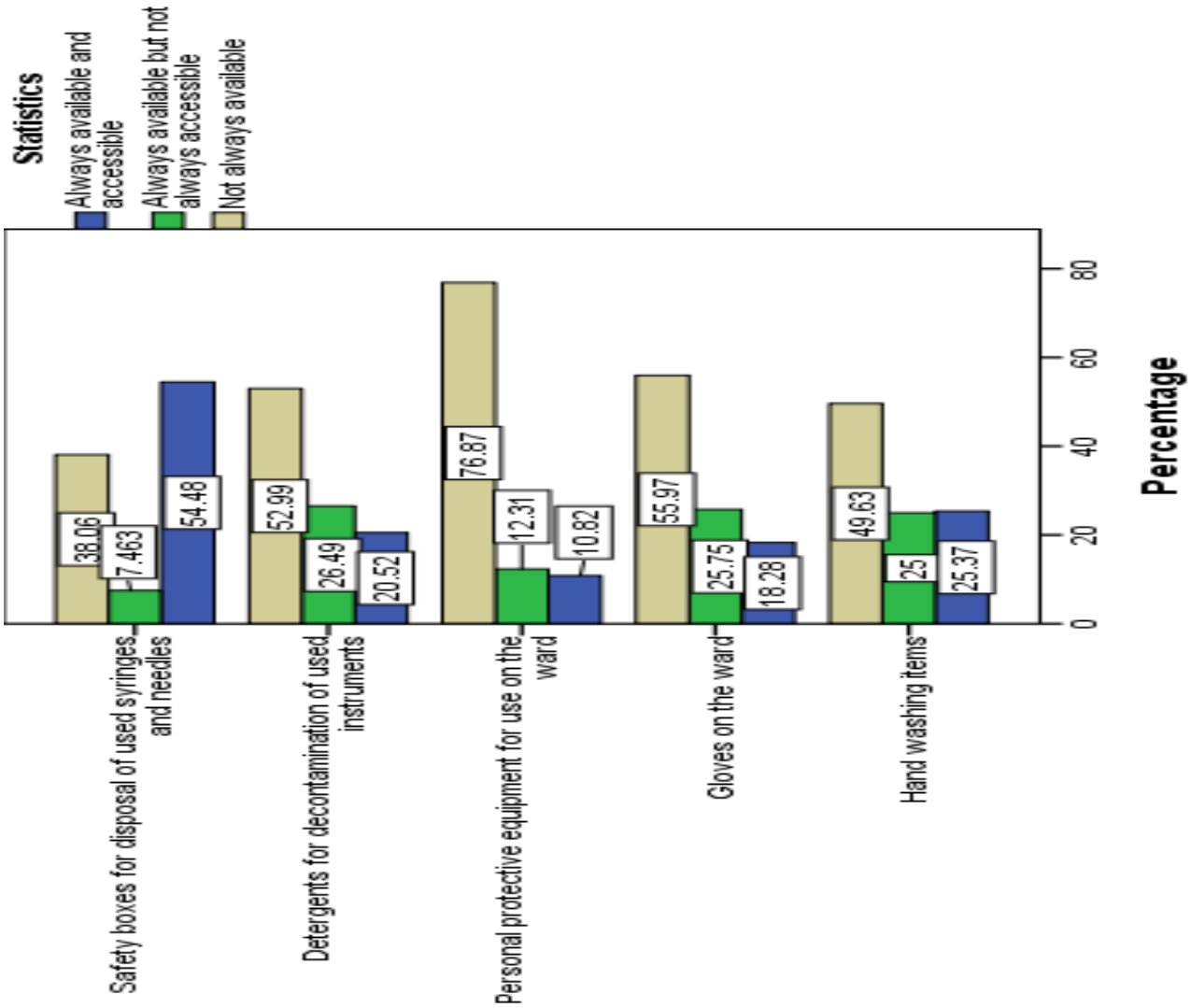
decontamination of used instruments were available and accessible according to 53.0% of the respondents. However, 55.0% of the respondents reported that safety boxes for disposal of used syringes and needles were always available and accessible (Figure 4.4).

With regards to the availability of IPC materials and challenges that the facility faces; findings from the qualitative data also revealed that IPC materials are in short supply in the Hospital.

"Soap and water and sometimes glove of all kind are a challenge in fully implementing IPC practices in the facility. Hand sanitizers are constantly in short supply and staff sometimes uses their own resources to purchase materials just to keep themselves safe" (Quality Assurance Coordinator)

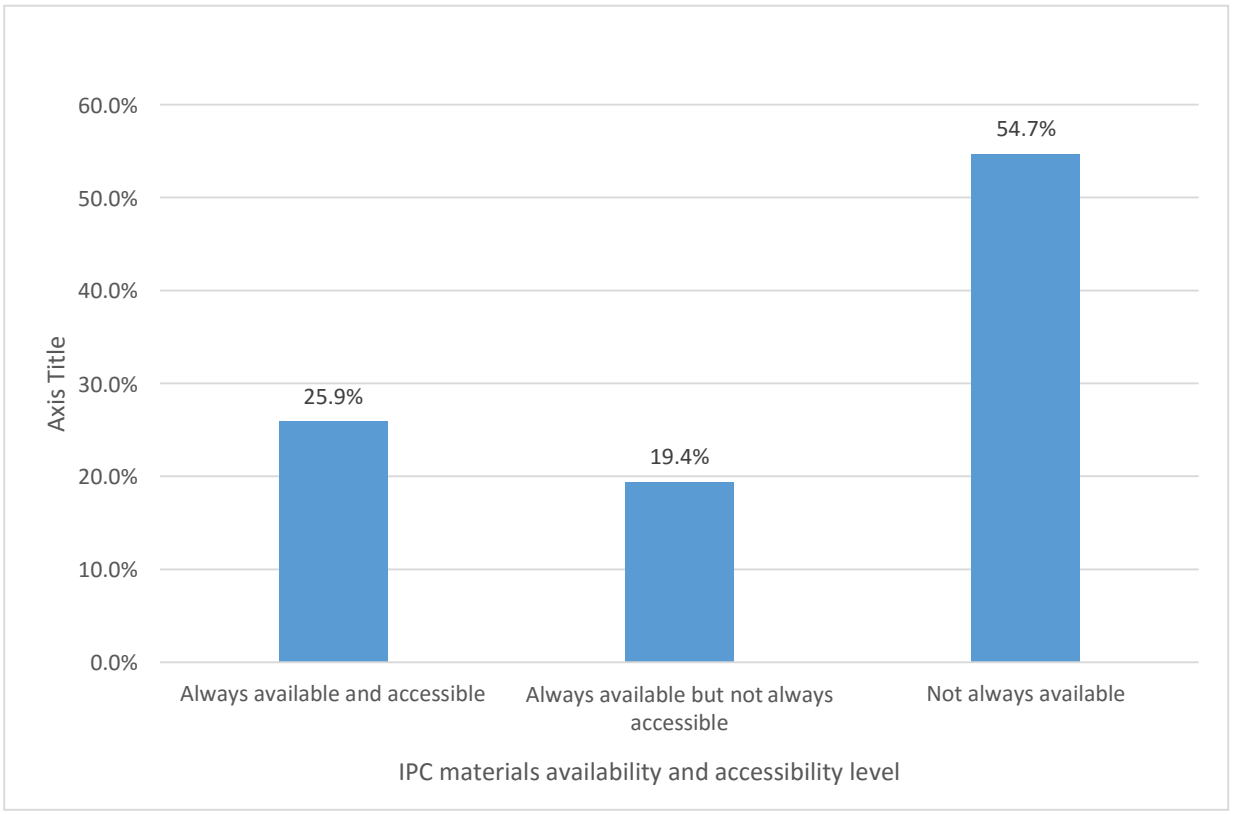
"……. Yes. there are instances that taps are not flowing, non-availability of disinfectants, Non availability of safety box and Hand washing items are sometimes not there." (labour ward in-charge).

Another key informant was quoted to have said; *"There are sometimes water, soap and PPEs shortages in the hospital. Because of the shortages of these PPEs, staff sometimes handled Linen and other potentially infectious materials without wearing gloves. Sometimes we don't also have water and soap to wash our hands after handling these potentially contaminated materials with bare hands".* (injection and Dressing Room In-charge) *''In some instances, taps to various wards that supply them water do not flow, making adherence IPC compliance very difficult." (*Female Ward In-charge)



Source: field survey, 2020.

Figure 4.7: IPC materials availability and accessibility



Source: field survey, 2020

Figure 4.8: IPC availability level

CHAPTER FIVE

DISCUSSION OF RESULTS

5.0 Introduction

This chapter covers the discussion of study findings concerning relevant literature. The discussion was organized according to the objectives of this study.

5.1 Demographic characteristics

The mean age of 268 respondents was 31.2 ±5.4, with a minimum age of 23 years and maximum age of 59 years. The modal age was 30 years. Majority (54.5%) of the respondents were within the age group of 21 – 30 years. With the sex of respondents' majority (69.8%) of the respondents were females. The most frequent age was 30 years, which is reflective of the working population in Ghana (GSS, 2014). They were also mostly females which still shows the dominance of females in the nursing and midwifery professions.

5.1.1 Category of nursing and years of experience

The average years of occupational experience were 6.0 ±5.0 and most of them had occupational experience 10 years and below. That of departmental or unit years of work experience was 2.1 ±2.2 and majority had years of departmental experience of 3 years and below. Most (48.1%) of the nurses were registered general nurses and majority (76.9%) of them had the highest education limited to a college education. Most of the nursing training institution in Ghana are nursing colleges and this accounted for the dominance of the highest educational level limited to college education in this current study.

5.2 Respondents knowledge of IPC

Most (94.0%) of the respondents knew that hospital-acquired infections can be transmitted through medical equipment such as syringes, needles, catheters, stethoscope, thermometers etc. Many (206) of them disagreed that nosocomial infections are infectionfrom home. Nosocomial infections in other word known as hospital-acquired infections imply infection acquired from the hospital and home.

About 65.3% of them agreed to know WHO five moments of hand hygiene. About 90.3% of the respondents agreed that standard precautions apply to all patients regardless of their diagnosis and 87.3% of them knew that all staff and patient should be considered potentially infectious. With glove use, 89.6% of them knew that one cannot handle body fluids with bare hands if gloves are not available. IPC compliance is influenced by good IPC knowledge, which consists of knowledge on measures including the practice of hand hygiene, use of personal protective equipment (PPE) such gloves, sterilization and disinfection, vaccination, active surveillance of suspected infections and outbreak investigation and management (MOH, 2015).

Majority (60.5%) of the respondents had high IPC knowledge, 25.8% had moderate IPC knowledge level and 13.8% of had low IPC knowledge level. This current study can be considered as high considering a cross-sectional study conducted by Geberemariyam et al. (2018) in Ethiopia, it was observed out of 648 healthcare workers who partook in the study, about 53.7% (95% CI: 49.8, 57.4%) of the participants were considered knowledgeable on IPCs. Another study Corroborating this study is Nwadike (2014), which equally observed in another cross-sectional study in Nigeria involving 100 nurses that about 66% of the participants reported good knowledge of IPC. Also, a similar study

in Ghana In by Ocran et al. (2014) in the Central Regional Hospital, Cape Coast, to evaluate the knowledge and attitude of healthcare workers and patients on HAIs, showed that about 88.7% (63 out of 71) of the healthcare workers including nurses were well-informed on HAIs.

The above findings were supported by the qualitative data. Almost all the key informants have adequate knowledge of IPC.

These definitions conform with the definition given by the Ghana Ministry of Health (2015) that IPC refers to measures and actions targeted at controlling and preventing infectious agents and related diseases in general together with the spread of these infectious agents and related diseases in healthcare settings.

The qualitative interviews equally looked at the knowledge level of hospital staff with regards to WASH-related issues. It was revealed that the staff in the hospital are very knowledgeable about WASH-related issues in this Hospital. As they have all been trained on IPC. This finding is supported by Alrubaiee et al. (2017) study in Yemen involving 100 nurses regarding the knowledge and practices of HAIs control measures showed that most of the participants (72.9%) possessed a fair level of knowledge on hand hygiene practices.

Standard precaution practice including hand hygiene was reported low in another study by Gertrude (2013) in Kenya, which reported only 17.8 % (n=90) of the participants had adequate knowledge on the elements of IPC standards and another 82.2% (n=90) did not have sufficient knowledge on the elements of IPC standard.

An interview with the quality assurance coordinator revealed that the facility often organizes in-service on WASH-related issues to staff. This claim was confirmed by a participant.

This demonstrated strong knowledge and understanding of IPC among health staff in the Hospital. According to a study by Alrubaiee et al. (2017) in Yemen involving 100

nurses regarding the knowledge and practices of HAIs control measures showed that most of the participants (72.9%) possessed a fair level of knowledge on hand hygiene practices with about 35.3% also possessing a good level of knowledge on personal protective equipment and another 67.1% also having a poor level of knowledge concerning safe injection practices.

From the chi-square analysis factors identify to be significantly associated with IPC knowledge level were: age group of the respondents, X^2 (2, 268) = 6.532, p = 0.038, low IPC knowledge was proportionally high among those age 30 years and below as compared to those aged 31 years and above. This is not in line with Iliyasu et al., (2016) study which showed no significant association between age and IPC knowledge.

Respondents' highest educational level was also associated with IPC knowledge level, X^2 (2, 268) = 8.315, p = 0.016, Low IPC knowledge was proportionally high among those with college educational level as compared with those with university educational level. This is comparable to a study in Ethiopia, which reported an education status to be associated with IPC knowledge (Desta et al., 2018). This, however, differs from a study that found no significant association between respondents' education level and IPC knowledge level (Shrestha et al., 2018).

The nursing category of the respondents was another factor associated with IPC knowledge, X^2 (6, 268) = 24.824, P ≤ 0.001, low IPC knowledge level was proportionally high among auxiliary nurses (community and enrolled) as compared to registered nurses or midwives. This was in line with Amissah et al. (2016) study, which observed a statistically significant correlation between healthcare workers professional status and knowledge on

hand hygiene (p=0.005). However, the remaining demographic factors were not statistically associated with respondents IPC knowledge level (P > 0.05).

5.3 Respondents IPC compliance

Hand hygiene was practised by majority (98.9%) who agreed to perform hand hygiene always before and after patient contact. This was consistence with Russell et al. (2018) study, where there was high adherence to numerous IPC practices, such as the execution of hand hygiene before and after patient care activities (99.4%). Another study by Geberemariyam et al. (2018) indicated that 69.4% (450) indicated that they regularly wash their hands after attending to a patient, 56.1% (364) before patient care, 64.2% (416) after removing gloves and 63.6% (412) before care of wounds.

According to Sickbert-Bennett et al. (2016), a little improvement in hand hygiene compliance by 10% among nurses and other healthcare workers is likely to reduce HAIs by about 6% and about 14% reduction in healthcare-associated Clostridium difficile infection.

Most (81.0%) of them disagreed with shaking of linen to release dust. Only 51.1% of the respondents had access to guidelines/Training manuals in their unit. Also, about 58.2% of them always put on a mask and glasses when performing invasive and body fluid procedures. This study finding is low as compared to a study by Russell et al. (2018), which reported adherence to IPC practices relating to wearing of goggles or eye shields when exposed to bodily fluids (69.6%); wearing a gown when anticipating exposure to bodily fluids (78.8%), and wearing a disposable face mask when anticipating exposure to splash or splatter (81.9%).

During the key informant interviews, it was revealed by all the respondents that the hospital staff compiled IPC Protocols and guidelines in the course of discharging their duties.

The findings of Hayeh et al. (2013) in the Greater Accra Regional also demonstrated that the total level of compliance with IPC guidelines and protocol showed that about 54.9% had a low adherence level with about 45.1% had a high level of adherence.

However, one of the participants' responses disagreed with what some of the Ward in-charges said with regards to IPC compliance. This view supported the quantitative data that almost half (48.9%) of the respondents do not have access to guidelines/Training manuals in their unit.

It has been documented that the failure of health institutions to provide in-service training on IPC practices and inadequate water supply are all factors reported to affect adherence to IPC standards and protocols (Madan et al., 2010).

The qualitative data also supported the findings from the quantitative data about 58.2% of the hospital staff always put on a mask and glasses when performing invasive and body fluid procedures.

With regards to the shaking of linen, the qualitative data equally supported the quantitative data, nobody in this ward is allowed to shake linens because they can spread infection in the ward.

Majority (77.6%) of the respondents had a low IPC compliance level, 19.8% had a moderate IPC compliance level and only 2.6% had a high IPC compliance level. This study finding is very different from a similar study in Ghana by Hesse et al. (2006) among

healthcare workers including nurses on practice and compliance to IPC standards, the actual practice reported by participants was 88% (42 out of the 50 participants) indicated the use of hand gloves all the time to perform invasive procedures whereas only 16%(8) did not use hand gloves.

This study result is good as compared to the report from the Ministry of Health Ghana, which reported that there exist poor infection prevention practices and a lack of observance of IPC guidelines by health professionals (MOH, 2015). Meanwhile, a low level of practices and adherence to IPC standards have been associated with the increasing rates of HAIs especially in developing countries such as Ghana (Geberemariyam et al., 2018).

Ampadu et al. (2019) equally asserted that IPC practices are an important factor in the healthcare system and is implicated in key areas including epidemiology, infectious diseases, health system strengthening as well as social sciences. And IPC compliance constitutes a practical-oriented and standard resolution meant to protect not only patients but the healthcare workers and the general public from the risk of contracting infections from the healthcare settings (WHO, 2018).

From the chi-square analysis, it was only the category of nursing that was significantly associated with IPC compliance, $X^2(2, 268) = 13.351$, P = 0.001, low IPC compliance was proportionally low among registered nurse or midwives as compare compared to auxiliary nurses (community or enrolled). This is in line with a study by Alice et al. (2013), in Nigeria, where IPC compliance was significantly related to the category of occupation of the healthcare worker (p =0.00). However, the remaining demographic characteristics were not significantly associated with IPC compliance (P > 0.05).

The relationship between IPC knowledge level and IPC compliance level was statistically significant, X2 (4, 268) = 13.853, P = 0.008, high IPC compliance was proportionally high among those with moderate IPC knowledge. In another related study, it was acknowledged that the factors that affect compliance to IPC standards and protocols include lack of knowledge of IPC policy and guidelines and its content (Oliveira et al., 2010).

5.4 Challenges of IPC compliance

5.4.1 IPC material availability

On the average, majority (54.7%) of the respondents indicated that IPC materials were not always available but not accessible. 25.9% of them indicated they were always available and accessible and 19.4% indicated that IPC materials were always available but not always accessible. With the availability or accessibility of IPC materials, 49.6% of the respondents indicated that hand hygiene materials were not always available. This study finding is supported by Amissah et al. (2016) study, which indicated that factors affecting hand hygiene practices among 130 healthcare workers including nurses in Cape Coast were found to include; insufficient water 21.9(86), absence of detergent 13.0% (51), unavailability of sinks 6.4% (25), sink leakage 7.9% (31), sink too far 8.2% (32); absence of clean towels 15.1% (59), absence of hand lotion 11.5% (45) and absence of air dryer 14.0% (55).

On gloves, 56.0% of the respondents indicated that gloves were not always available in the ward. With personal protective equipment, many (76.9%) indicated they were not always available. Also, detergents for decontamination of used instruments were available and accessible according to 53.0% of the respondents. As explained by Kenneley et al. (2012) and Kenneley et al. (2007) the adherence to basic standard

guidelines, such as hand hygiene, aseptic practices, combined with the use of PPE (such as gloves, gowns, masks, eye protection, and face shields) are very essential in avoiding the spread of infections among patients and healthcare professional.

However, 55.0% of the respondents reported that safety boxes for disposal of used syringes and needles were always available and accessible. Safety boxes must always be available, according to MOH (2015), needles should never be recap and bend and should be discarded into puncture-resistant sharps containers or safety box since these activities will reduce the risk of the needle stick.

With regards to the availability of IPC materials and challenges that the facility faces; findings from the qualitative data also revealed that IPC materials are in short supply in the Hospital.

Disinfectants are a fundamental essential item and lack of them in our health facility put every user and visitor at the risk of nosocomial infection.

Handling of used linen without gloves exposes the healthcare personnel to all kind of infectious diseases including HIV and hepatitis B. The non-adherence to the IPC standards and protocols has been associated with factors including inadequate knowledge of IPC standards and protocols, inadequate or unavailability of IPC materials including water and soap (Haridi, 2018; Gammon et al., 2008)

CHAPTER SIX

SUMMARY OF RESULTS, CONCLUSION AND RECOMMENDATION

6.1 Summary of Key Findings

The study presented a mean of the 268 study participants as 31.2 ±5.4, the minimum age was 23 and the maximum age of 59 years. Majority of the respondents were within the age group of 21-30 years. Again, most of the study participants were females.

The average years of experience of the respondents were 6.0 ±5.0 and most of them had occupational experience 10 years and below. Most (48.1%) of the nurses were registered general nurses and majority (76.9%) of them had their highest educational level to be a college education.

The study further shows that majority of the respondents had excellent knowledge of the equipment that transmits hospital-acquired infections (HAIs). More than half (65.3%) of the respondents knew the WHO five moments of hand hygiene. Almost all (90.3%) of the respondents agree that standard precautions apply to all clients regardless of their status of infection.

The study also revealed that more than half of the respondents had high IPC knowledge, 25.8% had moderate IPC knowledge level and only 13.8% had low IPC knowledge level.

However, on IPC compliance, the study revealed that Majority (77.6%) of the respondents had a low IPC compliance level, 19.8% had moderate IPC compliance level and only 2.6% had a high IPC compliance level.

On the challenges of IPC compliance, more than half (54.7%) of the respondents do not have access to IPC materials. 19.4% indicated that IPC materials were always available but

not accessible.

The study in the multivariate analysis revealed that the age group of the respondents, educational level, and Nursing category were statistically significant to respondents IPC knowledge level. The remaining demographic factors were not statistically associated with respondents IPC knowledge level.

6.2 Conclusion

In conclusion, although the study revealed that most of the respondents had good knowledge of the IPC. However, compliance with IPC guidelines was still very low in the hospital. It was observed from the study that, the hospital has limited access to IPC training manuals couple with inadequate IPC materials such as Hand hygiene materials and Personnel protective equipment (PPEs).

6.3 Recommendations

1. The Regional Health Directorate in collaboration with the Ministry of Health should intensify monitoring and supervision at all levels of service delivery points to ensure health care providers compiles with IPC standard protocols.

2. The Regional Medical store should ensure IPC materials are in constant supply and made available to all health care service points.

3. The Quality Assurance Department of the Hospital should regularly conduct refresher training on current IPC standards and ensure compliance through effective monitoring.

4. Health staff should make conscious efforts to protect themselves and clients against infections by ensuring that IPC standards and protocols are strictly followed in the discharge of their duties.

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APPENDICES

Appendix I: Structured Questionnaire

QUESTIONAIRE FOR QUANTITATIVE DATA

RESEARCH STUDY: KNOELEDGE OF AND COMPLIANCE TO INFECTION PREVENTION AND CONTROL AMONG NURSES AT NORTHERN REGIONAL HOSPITAL TAMALE

Dear Participant

This questionnaire will determine the knowledge, availability and accessibility of IPC materials and compliance of Nurses on infection prevention and control in the Northern Regional Hospital.

All information will be treated as confidential and the researcher undertakes not to reveal any individual information that appears in this questionnaire.

Please read the questions and tick your response in section A.

SOCIO-DEMOGRAPHIC CHARACTERISTICS

1. Sex: A) male [ ] B) female [ ]
2. How old are you ?…….
3. Highest level of education/training:

   A) Tertiary [ ] B) College[ ] C) Secondary [ ] D)Primary [ ]
4. Nursing category

   A) Registered Nurse [ ] B) Enrolled Nurse [ ] C) Enrolled midwife [ ] D) Staff midwife [ ] E) Community health nurse
5. Years of experience in this occupation……
6. Years of experience in the current department……

KNOWLEDGE ON IPC PRACTICES

Guided by World Health Organization (WHO) and Ghana guidelines for IPC

VIARABLE – KNOWLEDGE	TRUE (1)	FALSE (2)	NOT APPLICABLE (3)
7. Hospital acquired infections (HAI's) can be transmitted by medical equipment such as syringes, needles, catheters, stethoscope, thermometers, etc.			
8. Nosocomial infection is an infection that the patient brings from the house to the hospital			
9. I know the World Health Organization's '5 moments of hand hygiene.'			
10. Some instruments can be stored in an antiseptic solution for up to 36 hours			
11. If there are limited beds available, patients with communicable disease may be admitted in the same ward with other patients			
12. Micro-organisms are Destroyed By Using clean water.			
13. Standard precautions apply to all Patients regardless of their diagnosis.			
14. I am familiar with hospital acquired infection guidelines.			
15. All staff and patient should be Considered potentially infectious.			
16. You can handle body fluids with bare hands if gloves are not available.			
17 Used needles can be recapped after use and before disposal			

AVAILABILITY AND ACCESSIBILITY OF IPC MATERIALS

18. How available and accessible are hand washing items

A) Always available and accessible [ ]

B) Always available but not always accessible [ ]

C) Not always available [ ]

19. How available/accessible are gloves on the ward?

A) Always available and accessible [ ]

B) Always available but not always accessible [ ]

C) Not always available [ ]

20. Do you always have personal protective equipments for use on the ward?

A). Always available [ ]

B). Always available but not always accessible [ ]

c) Not always available [ ]

21. How available or accessible are detergents for decontamination of used instruments?

A) Always available [ ]

B) Always available but not always accessible [ ]

c) Not always available [ ]

22. . Are safety boxes always available and accessible for disposal of used syringes and needles?

A) Always available [ ]

B) Always available but not always accessible [ ]

C) Not always available [ ]

Compliance to IPC

Guided by World Health Organization (WHO) and Ghana guidelines for IPC

VIARABLE – COMPLIANCE	AGREE (1)	DISAGREE (2)	NOT APPLICABLE (3)
23. I always wash hands before and after direct contact with the patient.			
24. I always put on a mask and glasses when performing invasive and body fluid Procedures			
25. Knowledge of infection prevention and control are being monitored in the hospital			
26. We have access to IPC Guidelines/Training manuals in our unit			
27. Our hospital has IPC committee in place to monitor IPC activities			
28. Screening of patients are being done to detect colonization even if no evidence of infection			
29. Vaccination is provided to staff			
30. We wear PPE when handling linens			
31. We shake linens out to release dust from the linen			

Appendix II: KEY INFORMANT INTERVIEW GUIDE

I am Tahiru Mohammed Mutaru conducting a research on the KNOWLEDGE OF AND COMPLIANCE TO INFECTION PREVENTION AND CONTROL AMONG NURSES AT NORTHERN REGIONAL HOSPITAL TAMALE. The study is part of my master's degree in public health from the university for development studies, school of medicine and health sciences, department of community health and family medicine. I will be very grateful if you could assist me by answering the following questions:

1. Please what is your position in this department?

2. Can you share with me your understanding of IPC? Ask further to attain what you want.

3. How knowledgeable are the staff of this facility in IPC? Ask questions that will help you get more about their knowledge on IPC.

4. Do you have a department mandated to oversee the compliance of IPC? If yes can you tell me more about the activities of that department.

5. How do staff in this facility comply to IPC related issue. (Ask about the challenges with regards to material availability and water supply)

6. Can you share with me how you manage with patients who are infected? ask further on when the patient arrive, how he or she is handled with respect to knowledge of the nurses on IPC and how they comply with that're

7. What is the knowledge of your staff with regards to WASH related issues? Do you sometimes organized in- service training to staff on WASH related and if yes how often and what are the challenges in organizing such training?

8. Please can you tell me how IPC materials are obtained in this facility? Are they coming from the regional or district or national? And if any of the above please can you tell me the challenges you pass through before accessing them?

9. Do you sometimes punished staff who failed to comply with IPC rules and regulations? (people who are not wearing protective clothing, washing of their hands,) if you do what mode of punishment?

APPENDIX III: PLAYGIARISM REPORT.

KNOWLEDGE OF AND COMPLIANCE TO INFECTION PREVENTION AND CONTROL AMONG NURSES IN THE NORTHERN REGIONAL HOSPITAL

ORIGINALITY REPORT

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