UNIVERSITY OF CAPE COAST

HEALTHCARE WORKER COMPLIANCE WITH INFECTION PREVENTION AND CONTROL: A CASE STUDY OF SUNYANI REGIONAL HOSPITAL, GHANA

BENJAMIN LIRIBU

2024

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BY

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The thesis was submitted to the Department of Health, Physical Education and Recreation of the Faculty of Science and Technology Education, College of Education Studies, University of Cape Coast, in partial fulfilment of the requirements for the award of a Master of Philosophy Degree in Health Education.

MARCH 2024

DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature: …… Date: …….

Name: Benjamin Liribu

Supervisors' Declaration

I hereby declare that the thesis's preparation and presentation were supervised per the University of Cape Coast's guidelines on thesis supervision.

Supervisor's Signature: ……..… Date: ……..……..……

Name: Dr. (Mrs.) Salome Amissah-Essel

ABSTRACT

In recent times, hospital-related infection has become a meaningful threat to the lives of both clients and ordinary healthcare workers (HCWs). This study identified factors influencing clinical and non-clinical healthcare worker compliance with infection prevention and control (IPC) at a regional hospital in Ghana. The study, guided by Cooper's Reciprocal Safety Culture Model, adopted a quantitative approach, and a cross-sectional design. With confidence level of 95%, a predetermined sample size of 550 participants was randomly selected from a sample frame of 1400 HCWs. Data was collected with a questionnaire and analysed by Statistical Package for Social Sciences (SPSS). Using frequency tables and percentages, descriptive statistics were used to examine research questions 1, 2, 3, 4, and 5. Mann Whitney U was used to determine gender differences among the categories (objective 6). The study found that Clinical HCWs with IPC were highly compliant (mean score = 3.23, SD 0.95). Barriers to IPC compliance among clinical and non-clinical HCWs included inadequate logistics, staff shortage, time constraints, and difficulty reporting safety concerns to management. In conclusion, it was realized that male and female clinical HCWs were not statistically different regarding IPC compliance; hence, continuous and regular training in IPC is recommended for all cadres of clinical HCWs, regardless of their gender.

OPERATIONAL DEFINITION OF TERMS

Infection Prevention and Control

Healthcare Worker

Compliance

Occupational Exposure

Personal Protective Equipment

ACKNOWLEDGEMENTS

I sincerely acknowledge the contribution of my supervisor, Dr. (Mrs.) Salome Amissah-Essel from the Department of Health Physical Education and Recreation (HPER) for her continuous guidance and relentless efforts in supervising this thesis to completion. I am indeed grateful to her. I am also indebted to all my colleagues and classmates whose continuous encouragement brought this work to fruition.

Again, I thank my immediate family and friends for their support and advice throughout this academic journey. I also express my gratitude to all others who contributed to this work.

DEDICATION

To my wife, Alice Gariba and my children, Mabilia, Vanessa, Jason, and Michelle.

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CHAPTER ONE

INTRODUCTION

One significant global public health challenge is infection prevention and control among healthcare providers, as hospitals remain a breeding ground for various microorganisms (Desta et al., 2018). Hospital-acquired infections (HAIs), also known as nosocomial infections, are defined as any infections experienced by patients or healthcare workers (HCWs) within the hospital setting during providing care (He, Lingbo, & Wang, 2015). According to Bandyopadhyay, Baticulon, and Kadhum (2020), the World Health OrganiSation (WHO) defines healthcare workers as all people engaged in actions whose intent is to enhance health," including both clinical and non-clinical staff, all of whom are at risk of being infected or dying from infections. Infection Prevention and Control (IPC) is a practical scientific approach to prevent or reduce the harm caused by infections to patients and HCWs. IPC is fundamental in infectious diseases, epidemiology, social science, and health system strengthening (Ministry of Health, Ghana, 2015; WHO, 2020).

HAIs directly impact patient safety, universal healthcare coverage, and the achievement of Sustainable Development Goal 3 (Promoting good health and well-being). In Ghana, it was estimated that approximately 152,000 out of 20.7 million people suffer from HAIs annually (Tagoe et al., 2011). Despite the significant health risks and financial implications, limited efforts have been made by governments and hospital authorities to address the situation (Ministry of Health, Ghana, 2015; WHO, 2020).

Background to the Study

Non-compliance with Infection Prevention and Control (IPC) protocols leads to Hospital-Acquired Infections (HAIs), which present common complications affecting both patients and Healthcare Workers (HCWs). In the United States, the Centers for Disease Control and Prevention reported that nearly 1.7 million people were infected in hospitals annually, with approximately 99,000 deaths due to various bacterial infections (WHO, 2020). Among the tens of millions of hospitalised patients each year in China, about 10% incur additional medical expenses, amounting to billions of dollars, due to exposure to hospital infections (Akagbo et al., 2017). This life-threatening situation poses a significant economic burden on both patients and HCWs. A retrospective study in China revealed that hospital infection outbreaks from 1980 to 2009 were mainly caused by medical staff hand cross-infection, blood product contamination, lack of disinfection and quarantine measures, and violations of operating procedures (He, Lingbo, & Wang, 2015). Central line-associated bloodstream infections, catheter-associated urinary tract infections, ventilator-associated pneumonia, and surgical site infections were notable opportunistic infections caused by bacteria, which can survive on fomites for months in hospital environments (CDC, 2014; Tagoe & Desbordes, 2012).

Given that very little research has been conducted in this area, it was reported that about 2.6 million new HAIs occur every year in Europe, with the average rate of HAIs estimated at 5.7–19.1% in low-and-middle-income countries (Kim & Hwang, 2020). The impact of HAIs is detrimental and often associated with increased morbidity and mortality, prolonged hospitalisation, and increased healthcare expenditure. Although nosocomial infections are a

significant cause of hospital deaths, they can be effectively reduced through appropriate IPC measures, intensive research, and active surveillance. The introduction of IPC guidelines by the CDC to prevent the transmission of microorganisms among patients and healthcare providers has faced setbacks due to noncompliance by HCWs. These IPC guidelines or universal precautions were designed to apply blood and body fluid precautions to all individuals, regardless of their status or background (Kim & Hwang, 2019).

For Hepatitis B and Human Immunodeficiency Virus (HIV) infections globally, it is estimated that 21 million people and 200,000 cases, respectively, result from unsafe injection practices each year (Bedoya et al., 2020). Moreover, the recurrence of multidrug-resistant organisms such as Ebola, Coronavirus, Yellow Fever, and Influenza has increased human and financial costs. While proven and cost-effective infection prevention measures exist, HCWs' noncompliance has made these approaches unsuccessful. The extent of the problem remains unknown mainly due to inadequate research on Infection Prevention and Control, especially in low- and middle-income countries. Few studies in this area have faced limitations, such as involving very small sample sizes, relying on self-reported data, or focusing on a single domain like hand hygiene (Bedoya et al., 2020).

The burden of HAIs on both patients and HCWs in Africa cannot be understated. In developing countries, the magnitude of the problem remains underestimated or even unknown. This is mainly because the diagnosis of HAIs is complex and expensive, requiring high-level proficiency and active surveillance by well-trained professionals. This is supported by findings from a study revealing that hospitalised patients in Intensive Care Units are 5 to 10

times more likely to acquire nosocomial infections than those in general wards (Vinodhini & Devi, 2016).

In Zambia, attitudes and behaviours are reported to be significant factors fueling the transmission of Healthcare-Associated Infections (HCAIs) in Africa. This was demonstrated by the increase in wound infections among patients who underwent cesarean sections (30%), with infections primarily caused by contact with contaminated hands of nurses, equipment (such as stethoscopes and blood pressure machines), healthcare interventions (such as surgery), and the environment (Njovu, 2012).

Reports from Ghana indicate that the rate of HAIs is approximately 152,000 cases annually among a population of 20.7 million people (Afriyie et al., 2020; Tagoe & Desbordes, 2012; WHO, 2011). In a separate study at a regional hospital in Ghana, it was found that a total of 187 (85.8%) bacteria, comprising 55.5% non-pathogenic and 30.3% pathogenic organisms, survived on inanimate objects for several months within the hospital environment (Tagoe & Desbordes, 2012). While this study quantified and established the presence of microorganisms in the hospital environment, it failed to identify factors influencing their proliferation or determine their impact on health and costs.

Healthcare facilities congregate sick individuals, creating numerous opportunities for microorganisms to spread and infect patients, visitors, or HCWs. Medical care is increasingly complex and expensive, often involving multiple invasive procedures that raise the likelihood of contracting opportunistic infections. Research indicates that up to 70% of these infections are preventable, and IPC protocols demonstrate that healthcare can be made safer and more affordable by preventing the suffering, loss of life, and costs

caused by healthcare-related infections in developing countries like Ghana (Akagbo, Nortey, & Ackumey, 2017). Training on IPC in many countries is insufficient, particularly in professional health training colleges. Additionally, HCWs need regular refresher training, especially with the emergence of new diseases. Educating HCWs to correct misconceptions about disease transmission and prevention and providing adequate personal protective equipment (PPE) will help save lives and reduce costs (Dramowski, 2020).

A 2005 baseline assessment document from the Institutional Care Division (ICD) on infection prevention and control provided discouraging evidence of compliance with IPC guidelines by healthcare personnel. This was evident in modes of disinfection and sterilisation in healthcare settings, practices regarding cleaning, healthcare waste management, and other aseptic procedures. Similarly, the knowledge and skills of the IPC were inadequate among health personnel (Ministry of Health, Ghana, 2015).

The IPC guidelines developed by the Ministry of Health are intended to guide HCWs and patients in minimising their exposure to HAIs. To ensure patient safety and that of HCWs, it is believed that professional care providers should assume that all blood, body fluids, secretions, excretions, non-intact skin, and mucous membranes may contain transmissible infectious agents. Some basic standards outlined in the IPC protocols to maintain a safe environment include hand hygiene, appropriate use of PPE, application of aseptic techniques, and the management of sharps, spills, linen, and waste. However, limited resources, understaffing, overcrowding, poor knowledge and application of basic IPC measures, inadequate infrastructure, and the absence of

local and national guidelines and policies have been identified as factors directly affecting compliance with IPC (Kondor, 2018).

IPC is rooted in essential infectious disease prevention and health system strengthening. It is vital to guarantee patient safety and provide quality universal health coverage, as it is relevant to HCWs and patients at every encounter (WHO, 2020; Ministry of Health, Ghana, 2015). The policy guidelines also identify poor dissemination of IPC information to healthcare facilities and inadequate training (Kondor & Adoma-Afari, 2018). This phenomenon calls for active surveillance and extensive research to identify the factors influencing HCW compliance with IPC policy in Ghana, as it is a vital tool for reducing morbidity and mortality associated with communicable diseases.

Statement of the Problem

The incidence of Hospital-Associated Infections (HAIs) in Ghana is notably high. However, little has been done by the government or hospital authorities to address this issue (Tagoe et al., 2011). A study found that the prevalence of HAIs among hospitalised patients in Ghana was 8.2%, with the majority recorded in intensive care units (Sunkwa-Mills et al., 2020). Similarly, Tagoe and Desbordes (2012) isolated 187 (87.5%) different types of bacteria from surfaces and fomites in a regional hospital. Although the factors contributing to the proliferation of these organisms remain unclear, adherence to proper IPC practices can reduce their impact. Additionally, a rise in sharp-related injuries involving body-fluid-associated pathogens among HCWs in Ghana has been reported. A study conducted in a teaching hospital in the Ashanti Region showed that 28.9% of staff reported some form of sharps injury

with bloodborne origin within a year (Lori et al., 2016). Of the 42 participants in the study, 18% reported two sharp injuries, while 36.3% experienced more than four injuries during their duties over the past 12 months (Lori et al.).

On March 12, 2020, Ghana recorded its first two cases of COVID-19, and by July 2020, the situation worsened with 37,812 cases and 191 deaths recorded across many regions, including the Bono Region (Vandyck-Sey et al., 2020). To curb the problem, the government of Ghana implemented measures such as procuring Personal Protective Equipment (PPE), providing in-service training for HCWs, and offering tax exemptions and 50% salary incentives for frontline HCWs. Despite these efforts, over 2,000 cases were reported among nurses, doctors, and other HCWs across all regions by September 2020 (Ashinyo et al., 2020). This highlights the challenges and risks faced by those on the frontlines of providing care during the ongoing health crisis. The figures serve as a stark reminder of the importance of continuously improving safety measures and protective protocols to safeguard the well-being of our dedicated healthcare professionals.

A Peer Review Report from the Clinical Unit of the Bono Regional Health Directorate indicated low compliance with IPC protocols at the Sunyani Regional Hospital. An assessment of healthcare quality at 27 district and municipal hospitals in the then Brong Ahafo Region, conducted even before the onset of the Covid-19 pandemic, revealed that Sunyani Regional Hospital ranked 26th out of 27 hospitals in the region for IPC practices (Regional Peer Review Report, 2018). Given the hospital's status as the primary referral centre with the highest population of HCWs in the region, the IPC programme and activities must receive the utmost attention (District Health Information

Management System-2, 2018). Despite the public health significance of this issue, it remains mainly uninvestigated to the best of my knowledge. If left unchecked, the situation could eventually overwhelm the healthcare system and hinder its response to health emergencies (Bandyopadhyay et al., 2020). Furthermore, it is well-established that HCWs play a pivotal role in preventing communicable infections in healthcare settings, as they are at higher risk of spreading diseases than the general community (Ashinyo et al., 2020). Recognising the limited research on IPC compliance, I found it imperative to conduct this study. The success of this study would contribute to the knowledge of infectious disease prevention and improve access to quality and essential healthcare services, as targeted by Sustainable Development Goals 3.3 and 3.8.

Purpose of the Study

The primary purpose of this study was to assess factors influencing healthcare worker compliance with infection prevention and control in the Sunyani Regional Hospital of the Bono Region.

Research Questions

1. What IPC facilities are available to HCWs in Sunyani Regional Hospital?
2. What safety precautions do HCWs practise during healthcare interactions in the hospital?
3. What is the level of IPC compliance among clinical HCWs in Sunyani Regional Hospital?
4. What is the prevalence of occupational injuries among HCWs in the hospital?
5. What are HCW constraints in IPC compliance at the hospital?

6. Does a difference exist between male and female clinical HCWs in IPC compliance?

Significance of the Study

The findings of this study will form the basis for effective intervention programmes and policies for reinforcing compliance with infection prevention and control. Similarly, stakeholders and IPC committees will use findings to design and implement effective training programmes to build staff capacity in the fight against healthcare-associated infections.

Above all, the literature from this work will serve as a diagnostic tool and reference material for the Ministry of Health and the Ghana Health Service to plan contingencies against future epidemics such as the novel coronavirus disease. Stakeholders will be guided to prepare needed logistics (medical consumables and equipment) and human resources to contain medical emergencies in healthcare facilities.

Delimitations

This study was delimited to the category of HCWs comprising clinical and non-clinical staff working in Sunyani Regional Hospital in the Bono Region. It focused on the staff of this hospital primarily because it is the main referral healthcare facility with the highest population of healthcare workers in the region. Further studies are therefore recommended for the remaining healthcare facilities in the area.

Limitations

Every research project has its challenges, and this study was no exception. In investigating multiple domains of IPC with questionnaire, it was time consuming and the accuracy of responses being reflective of issues in IPC

in the hospital could not be ascertained. Also, the inability to control respondents' environment (hospital) to enhance response to the questionnaire and having all aspects of questionnaires answered was a factor that frustrated the study. Though this quantitative approach allowed the researcher to reach a larger sample, it prolonged and unduly delayed the entire data collection process. Notwithstanding these and many other challenges, the data collection was successful.

Definition of Terms

Infection: Is the entry of microorganisms into a person to cause disease

Compliance: This means strictly following guidelines.

Communicable disease: An infectious disease that is transmissible by contact

Corona Virus Infection (COVID-19): An infectious disease caused by severe acute respiratory syndrome coronavirus

Diagnosis: The act of identifying a disease from its signs and symptoms

Fomites: Object materials which are likely to carry infection

Hand hygiene: This is cleaning of hands either by washing with soap and running water or by using sanitisers or alcohol rub

Human Immunodeficiency Virus: It is a deadly virus that weakens the immune system

Morbidity: state considered to be outside the realm of everyday well-being**.**

Mortality: State of being mortal

Intensive care unit: Section of a hospital where seriously ill patients are kept and observed

Surveillance: A practice by which the spread of disease is monitored

Catheter: A thin rubber tube inserted into part of the body to inject or drain fluids from the body

Nosocomial Infection: Avoidable infection acquired in a hospital

Organisation of the Study

This study was organised into five chapters. The first chapter contains an introduction (a description of the background) to the study, a statement of the problem, formulation of research questions, significance of the study, delimitation, limitations, and how the study was organised into chapters.

Chapter Two reviewed relevant literature related to the problem studied. This was organised according to theoretical and contextual sub-themes about infection prevention and control compliance. The chapter further presented relevant ideas and discoveries of previous researchers and those of other scholars similar to this work.

Chapter three outlined the research methodology to guide and direct data collection, analysis, interpretation, and presentation. This chapter comprised an introduction, study design, study area, population, and sampling procedure. The rest included data collection instruments, data collection procedures, data processing, and analysis.

Chapter four analyses the data gathered from the responses, while chapter five summarises the findings, conclusions, and recommendations.

CHAPTER TWO

LITERATURE REVIEW

The primary purpose of this study was to assess factors influencing HCW compliance with infection prevention and control in Sunyani Regional Hospital in the Bono Region. The research examined published studies conducted by other researchers on infection prevention and control to answer the research questions. Areas covered in this chapter include;

1. Theoretical framework
2. Conceptual base of the study
3. IPC facilities in healthcare
4. Safety precautions in IPC
5. IPC compliance among HCWs
6. Prevalence of occupational injuries among HCWs
7. Challenges in IPC compliance and,
8. Summary of reviewed literature.

Theoretical Framework

This research was guided by Cooper's Reciprocal Safety Culture Model, which was carefully selected for its effectiveness in reducing accidents related to routine tasks and promoting occupational health and safety through the interplay of psychological, behavioural, and institutional factors. It was anticipated that applying this model would provide a valuable framework for identifying factors associated with IPC compliance in preventive and occupational health.

Cooper's Reciprocal Safety Culture Model

Creating a safe environment in the workplace was not a priority until the 1980s when the importance of prioritising and sustaining occupational safety was recognised. The adverse events of chemical explosions in an Indian state on December 3, 1984, led to the adoption of a guiding principle called 'safety culture.' Although there is variation in understanding what safety culture means, the essence of the concept remains the same across nations. In the absence of a universally agreed definition, safety culture is understood as a set of characteristics and conditions that reduce the exposure of clients, employees, managers, and relevant others to injurious or harmful conditions in the organisation (how we think and how things are done to promote well-being) (Cooper, 2016).

Safety culture was thus seen as a goal-directed outcome resulting from the interaction of internal psychological factors, observable behaviours, and situational workplace factors. According to Cooper, safety culture results from operationalising employees' perceptions and attitudes towards corporate safety goals, routine safety practices, and structures and systems to propel goal-directed behaviours (Cooper et al., 2019).

It was suitably adopted as a multifaceted safety culture model to provide both a practical and theoretical foundation for preventing process safety incidents and injuries and promoting safety performance in the workplace (Cooper, 2015; 2018).

Figure 1: Cooper's Reciprocal Safety Culture Model

Source: Adopted from Cooper (2000), Reciprocal Safety Culture Model

The **psychological aspect** of the model refers to how people and management in the organisation feel about safety. This includes attitudes, beliefs, values, and perceptions of people or sub-groups that influence the organisation's safety climate. The consistency with which an individual acts over time can be linked to attitude. Patterns of shared beliefs, norms, and values within sub-groups in the organisation influence this consistency. Because these elements are considered standards, they directly affect the knowledge, skills, and abilities people need to perform duties effectively in the workplace (Cooper, 2018).

The **behavioural factors** of the model describe safety-related actions, such as activities people engage in at all levels to prevent or reduce the impact of occupational accidents or injuries. These observable behaviours include wearing PPEs, hand hygiene, and compliance with general safety protocols (Cooper, 2016). The **situational aspect** of the model is described as organisational structures and facilities that promote safety at all levels. These

assets range from policies, standard operating procedures, communication networks, management, and leadership functions. They are collectively referred to as corporate structures (Cooper, 2016).

As is characteristic of many organisations, Cooper explained that the lack of procedural guides for safety leads to non-compliance among employees. At the same time, management may ignore administrative responsibilities regarding safety to increase productivity. Employees may circumvent safety protocols in a poorly supervised system to find easier ways to execute routine workplace tasks (Cooper, 2018).

Effective leadership, for example, can provide strategic direction, resources, supervision, and constant reinforcement to propel organisational success and safety culture at all functional levels (Cooper, 2015).

Conceptual Base of the Study

This work employed the three constructs of Cooper's Reciprocal Safety Culture Model psychological, situational, and behavioural factors to build the conceptual foundation of healthcare worker (HCW) compliance with infection prevention and control (IPC). As the conceptual diagram indicates, these constructs, also called independent variables, determine compliance with safety precautions. Safety precautions, as shown in the diagram, refer to observable basic IPC measures employed during healthcare delivery, meant to reduce or prevent the risk of transmitting an infectious pathogen to a patient or oneself, whether from a known or unknown source. Such practices include hand hygiene, adherence to IPC policy guidelines, personal protective equipment (PPE), injection safety, house cleaning, etc. (Adebayo et al., 2015).

Psychological variables such as knowledge, beliefs, perceptions, and self-efficacy are personal factors that play a vital role in behavioural compliance with IPC protocols. A HCW with high self-efficacy towards their duties is more likely to perform all necessary safety precautions to prevent and control the spread of infection than a person with a perception of low self-efficacy (Sawitri et al., 2015). Similarly, the assumption that HCW behaviour is directly congruent with institutional policies and practices, devoid of intrapersonal factors (knowledge, skills, and practices), is unrealistic. Noncompliance with simple hand hygiene protocols could be influenced by knowledge, skills, practices, or other personal factors (Edward et al., 2012). Thus, regular in-service training programs should be a precursor for bridging knowledge gaps and capacity building, while regular monitoring and supervision should be enforced at all levels (Mitchell et al., 2014).

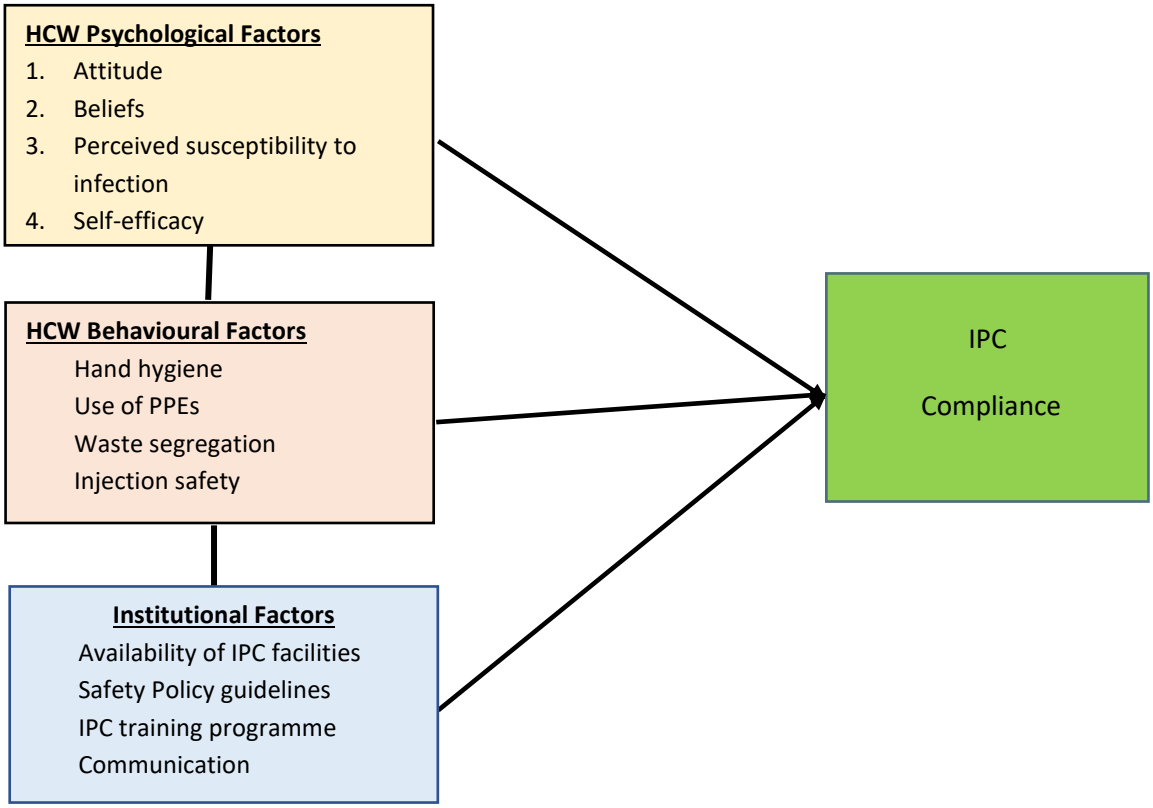

Figure 2: Conceptual Diagram

Source: Author's Construct

In addition, the variable attitude plays a role in one's perception of susceptibility to infection within the hospital environment. Sometimes, professional inconsistencies are attributed to forgetfulness of basic IPC safety precautions. With the impact of attitude, where an HCW perceives less susceptibility to the risk of acquiring an infection, compliance with safety precautions like regular handwashing is compromised (Russell et al., 2018). Even with professional knowledge, a nurse might disregard wearing a face mask or administering prescribed antibiotics, thinking these measures are less protective. Similarly, occupational injuries such as needle sticks among HCWs go unreported because no threat is perceived (Edward et al., 2012).

It is equally important to evaluate health system enabling resources (situational factors) for IPC compliance. Outcome expectations can be met in a favourable working environment where necessary logistics and facilities are provided. IPC practices such as waste segregation, hand hygiene, house cleaning, and injection safety depend primarily on the availability and appropriateness of IPC resources. In instances where HCWs work in unsuitable and deteriorating infrastructure to deliver care or where essential PPE and other equipment are unavailable, compliance is affected. Lack of isolation space for barrier nursing, poorly ventilated wards, and a lack of shower facilities are common in many hospitals. Decontaminating soiled linen and instruments is sometimes a problem due to lacking detergents. Poor hand hygiene practices were attributed to the lack of adjacent handwashing sinks, clean running water, and soap. Similarly, HCWs have been compelled to recycle disposable PPE or use it for extended periods against safety precautions due to the non-availability of these essential materials (PPE) (Houghton et al., 2020; Tirivanhu et al., 2014). According to Cooper, employee engagement and partnership are associated with fewer incidents of safety violations. Employees are motivated and committed to corporate goals and values through engagement and a safety partnership that improves safety performance (Cooper, 2016).

Availability of IPC Facilities in Health Care Institutions

The success of IPC programmes generally depends on the right proportion of personnel and physical and financial resources, which are influenced by the unique characteristics of the population being cared for by the healthcare institution (Bryant et al., 2016). These resources (facilities) are, in other words, the structure of the healthcare institution, medical consumables and

equipment, and, above all, the skilled human resource factor. In the structure of a hospital, isolation rooms for infectious diseases, for example, can be described as the cornerstone of IPC (Yoon et al., 2016). Structural requirements, such as ward rooms with bathrooms, handwashing sinks, safe waste management and plumbing systems, and air-conditioned rooms, are needed in modern hospitals. Meanwhile, in the absence of modern hospitals, minimum standard protocols such as separation and cohorting of patients in open wards should still be ensured. Disinfection, sterilisation, and environmental cleaning must be adhered to (Rodríguez-Baño et al., 2015).

Microbiological support, ward staffing, and education programmes are equally essential components of IPC. In microbiology, for example, providing reliable results about pathogens responsible for HAIs is necessary to break the disease transmission chain. Also, maintaining the right proportion of nurses and doctors at the frontline or in triaging centres promotes adherence to IPC protocols (Rodríguez-Baño et al., 2015). The Sunyani Regional Hospital is a modern healthcare facility with the above-mentioned resources. Human resources development is an essential IPC asset needed to ensure the success of IPC programs and activities. Intensified education and training of healthcare workers (HCWs), education of patients and relatives, identifying and minimising hazards, outbreak investigation, surveillance, research, monitoring, and evaluation are important areas of consideration (Ministry of Health, Ghana, 2015). Again, training programmes, both in-service and refresher programmes, are available to the hospital staff. This continuously creates the staff's awareness of utilising the facilities available for their safety responsibly and ethically.

In ensuring a safe environment and the realisation of Sustainable Development Goal 3, the WHO highlighted the importance of IPC facilities and contributed significantly to ensuring that IPC guidelines and programmes suit the local settings of individual countries. In a proposed guide, 1) Structure, organisation, and management of IPC, 2) Education and training, and 3) Outcome and process indicator surveillance in IPC were spelt out in the IPC implementation guide (Wang et al., 2019). These guides are a resource to reduce impact variations and promote successful IPC activities (Sax et al., 2013).

The Practice of Safety Precaution in IPC

Safety precautions are basic IPC measures employed during healthcare delivery, meant to reduce or prevent the risk of transmitting an infectious pathogen to a patient, either from a known or unknown source. These precautions are designed to prevent and control the risk of acquiring opportunistic infections while providing healthcare to clients in health facilities. Handling all hospital equipment and devices with care is essential, especially when there is a high suspicion of contamination with blood, body fluids, excretions, and secretions without intact skin and mucous membranes (Adebayo et al., 2015). Sometimes referred to as IPC standard or universal precautions, these assume that all body fluids are contaminated and have the potential to cause harm to the patient or healthcare provider. Safety precautions are defined as “hand hygiene, the use of personal protective equipment, blood and fluid spillage management, sharps safety, routine environmental cleaning, processing of reusable medical equipment and instruments, respiratory hygiene and cough etiquette, aseptic non-touch technique, patient placement, textile and laundry, and waste management” (Kondor & Adoma-Afari, 2018).

Generally, universal precautions are recommended for all invasive procedures in healthcare settings. For this reason, special care should be taken when handling all body fluids because they are essential sources of potential infection. HBV, HIV, HCV, Lassa fever virus, Dengue virus, yellow fever, and other droplet infections of airborne origin (tuberculosis, SARS, rubella, mumps, pertussis, etc.) are typical examples (Adebayo et al., 2015). Standard precautions entail all cost-effective measures and practices to ensure that the risk of infection within the hospital premises is reduced or prevented entirely. Hand hygiene (hand washing), the use of barriers (e.g., gloves, mask, cap, gown), care of devices or instruments, equipment, and linen used during care, environmental control (e.g., surface cleaning protocols), medical waste handling and management, handling and treatment (incineration) of sharp instruments including needles, respiratory hygiene and cough etiquette, and patient accommodation management are the main activities under standard precautions (Adebayo et al., 2015). Strict adherence to hand hygiene practices, such as hand washing and antiseptic hand rub application duration, reduces the risk of nosocomial infections in hospitals (Njovu, 2012). Thus, Hammerschmidt and Manser (2019) recommended role modelling, supervision, and organisational support as key elements for adherence to standard precautions. It is the case that the regional hospital staff adhered to the safety precautions stipulated by the authors above. That was an issue this study sought to address at Sunyani Regional Hospital.

Level of IPC Compliance among HCWs

According to Bandyopadhyay, Baticulon, and Kadhum (2020), the WHO defines HCWs as "all people engaged in actions whose intent is to

enhance health." This includes doctors, nurses, midwives, paramedical staff, community workers, administrators, and support staff who face the risk of being infected or dying from an infection. This encompasses paid and unpaid individuals at risk of direct or indirect exposure to contamination from body fluids, tissue, blood, contaminated supplies, equipment, or air. HCWs include, but are not limited to, clinical staff (physicians, nurses, emergency medical technicians, midwives, nurse assistants, therapists, phlebotomists, pharmacists, home care personnel, laboratory technicians, etc.) and non-clinical staff (health administrators, clerks, environmental services, dietary staff, security, engineering, laundry, billing, and volunteer staff) (CDC, 2021).

Regardless of an HCW's professional area, poor knowledge of specific disease conditions and their preventive measures leads to risky exposure for the individual and others (Faith et al., 2019). Similarly, though indispensable, knowledge of basic preventive measures has been reported inadequate among health personnel. This inadequacy was evident in practices related to disinfection, sterilisation in healthcare settings, cleaning, PPE use, hand hygiene, and waste management (Ministry of Health, Ghana, 2015). A research report from Kenya showed that poor decontamination of instruments and inadequate IPC led to outbreaks of opportunistic infections in healthcare facilities (Gichuhi et al., 2015). In a cross-sectional study to assess knowledge of occupational exposure to HIV infection among 401 HCWs in two regional hospitals in Tanzania, a more significant proportion (96.3%) of all categories of HCWs knew they were at risk of exposure to HIV infection. Also, workers trained in PPE use and post-exposure prophylaxis protocols (71.4% and 87.1%,

respectively) were primarily nurses. At the same time, over a quarter of those not given any training were less knowledgeable (Mashoto et al., 2015).

In assessing the knowledge, attitude, and perceived safe environment of 197 nurses working in a hospital in Korea, it was discovered that 67.4% of them (nurses) demonstrated adequate knowledge of IPC, and 87.4% complied with IPC protocols. In contrast, the lowest score (55%) was recorded for knowledge of multi-drug-resistant organisms (Kim & Hwang, 2020). On IPC practices among 294 HCWs concerning Lassa fever in Nigeria, it was reported that respondents with good knowledge, good attitudes, and good IPC practices were 4.4%, 63.3%, and 41.2%, respectively. Regardless of the cadre or category of staff, IPC practices were poor in both government and private healthcare institutions (Faith et al., 2019).

It is also concerning that occupational injuries among HCWs go unreported. In northern Ghana, a study on awareness of Hepatitis B Virus infection among some clinical staff at the Tamale Teaching Hospital revealed that 94.4% knew they were at risk. However, only a few were aware of post-exposure prophylaxis (Akagbo et al., 2017). Despite limited literature on factors contributing to low IPC compliance among HCWs, the attitude has never been undervalued in IPC practice. Sometimes, positive attitudes can be identified in individual staff or organisations, but these attitudes do not always reflect actual compliance (Ward, 2012). HCWs are potential vectors for transmitting infective biological agents because the entire hospital environment is infested with infectious opportunistic pathogens. This phenomenon becomes more pronounced due to negative attitudes and poor compliance with IPC practices. Refusal to follow IPC precautions during invasive procedures, such as intra-

arterial injections, biopsies, and blood culture collection, further worsens the situation (Chauhan, 2017).

Medical care is increasingly complex, expensive, and characterised by multiple invasive procedures, which increase the likelihood of contracting an opportunistic infection. With good knowledge and a positive attitude toward IPC, about seventy per cent (70%) of these infections could be prevented (Umscheid et al., 2011). For example, during the recent COVID-19 pandemic, few HCWs were trained and deployed to well-resourced COVID-19 treatment centres, while most HCWs were left with the illusion that they were less exposed to the infection. This situation culminated in high infection rates among all groups of HCWs, especially in developing countries like Ghana (Calò et al., 2020). Thus, education and regular training of all categories of staff on IPC are crucial, especially during the emergence of novel diseases (Dramowski, 2020).

Prevalence of Occupational Injuries Among HCWs

In the line of duty, HCWs are constantly exposed to occupational hazards predominantly because their place of work is considered unsafe. Needle stick injury, fire and explosion, electrical, chemical, biological and others, are common hazards that threaten the lives and well-being of HCWs. A global report in the year 2000 indicated that sharp injuries alone contributed to the high incidence of hepatitis C, hepatitis B and human immunodeficiency virus infection among HCWs (Mossburg, Agore, Nkimbeng, & Commodore-Mensah, 2019). The World Health Organisation (WHO) predicted that out of about 35 million HCWs, 3 million get exposed to percutaneous injuries annually. Out of this number, most cases were recorded in less-resourced

African Countries. This directly affects the quality of healthcare delivery and the emotional state of HCWs (Mbaisi, Ng'ang'a, Wanzala, & Omolo, 2013).

There is a reported disproportionate burden of occupational exposure between Sub-Saharan Africa and the developed countries. Within a period in Africa, 11.8% of Hepatitis B infections (HBV), 2.8% of Hepatitis C infections (HCV) and 5.8% of Human Immunodeficiency Virus infections (HIV) were recorded which is in contrast to the situation in the American Subregion where 0.51% for HBV, 1.6% for HCV and, 0.29% for HIV infection were recorded (Mossburg, Agore, Nkimbeng, & Commodore-Mensah, 2019). A retrospective study examining the proportion of needle sticks and sharp injuries among 393 HCWs in a medical centre in Jordan reported that most occupational exposures occurred in the hospital wards (46.1%) and at waste collection points (38.2%). Among staff, nurses recorded the highest incidence of risky exposures (39.7%), followed by cleaners (36.7%), physicians (10.4%), general staff (7.4%) and laboratory workers (5.9%) (Saadeh et al., 2020). In no different setting, Mbaisi, Ng'ang'a, Wanzala, and Omolo (2013) reported similar findings from their study where they determined the prevalence and nature of percutaneous injuries among 305 HCWs. It was discovered that 25% of participants were exposed to blood and other body fluids in the past 12 months. 19% was recorded for sharp injuries, 7.2% for body fluid splash exposure, while nurses and midwives recorded the highest risks of 50% and 30%, respectively (Mbaisi, Ng'ang'a, Wanzala, & Omolo, 2013)

The situation in Ghana has not been different. Recently, there was a reported high incidence of sharp-related injuries of body-fluid-associated pathogens in the main teaching hospital among HCWs in the Ashanti Region.

The study, which assessed the prevalence of occupational injuries and risky exposures among healthcare workers, revealed that about 28.9% of staff reported some form of sharp injuries of bloodborne origin within one year. Out of the 42 participants in the study, 18% reported two sharp injuries, while 36.3% experienced more than four injuries in the line of duty within the past 12 months (Lori, McCullagh, & Krueger, 2016). Protecting the healthcare system with its staff has become crucial and necessary following the trend of risky occupational exposures. Thus, stakeholders and governments, in particular, must support by establishing policies and active surveillance systems and providing adequate training for HCWs (Saadeh et al., 2020)

Constraints in Infection Prevention and Control Compliance Among HCW

Healthcare-associated infections are preventable if IPC protocols can be effectively implemented. Strengthening IPC interventions is essential to fighting opportunistic infections and antimicrobial resistance and reducing avoidable infections globally by 35% to 55% (WHO, 2016). IPC programmes in many countries, including Ghana, lack adequate resources and support structures. In an assessment report of WHO focal points from countries that pledged to the 'Clean Care is Safer Care' challenge, it was reported that out of 103 eligible countries, only 67% had national protocols on IPC, 36.4% had an implementation work plan, while compliance with protocols and a dedicated budget was 21.6% (Tartari et al., 2020).

Although healthcare facilities' accreditation has been regulated to enforce compliance with standards, the actual implementation and evaluation of IPC to ensure a safe environment are non-existent. To bridge this gap, a recommended framework was implemented that targeted antimicrobial and

diagnostic stewardship, enhanced interventions on IPC, institutional accreditation to strengthen safety and medical care, and legislation to promote compliance with all provisions of IPC (Manchanda et al., 2018).

Attention to IPC activities often focuses on selected aspects such as disease surveillance. Policymakers show little commitment to IPC activities, and local experts are not consulted for guidance during the development and implementation of IPC programmes. This breach led to failed IPC programmes and the loss of essential data on the performance of these activities. For example, the vaccination of HCWs against communicable diseases such as the Hepatitis B virus was introduced as a cost-effective IPC measure but was later ignored by stakeholders. In 2003, HCWs vaccinated against the Hepatitis B Virus were estimated at 18% in Sub-Saharan Africa, while 71% were recorded in Europe (World Health Organization, 2021). Additionally, there is a reported shortage of HCWs. This situation, coupled with the inequitable distribution of this workforce, leads to excessive workloads for a few individuals (Asamani et al., 2019). With 15% of the world's healthcare providers, Sub-Saharan Africa and Southeast Asia, for example, suffer a disproportionate percentage (53%) of the world's disease burden. A study assessing factors affecting compliance among 30 HCWs in a mission hospital in Zambia reported that 47.9% indicated an unbearable workload on staff, 38.3% cited staff shortages, 33% mentioned overcrowding, and 31% pointed to a lack of supervision (Njovu, 2012). The burden of administrative duties alongside the provision of medical care to patients makes it difficult to follow safety precautions, especially during emergencies (Akagbo et al., 2017).

Despite IPC's crucial role in strengthening healthcare, funds for IPC logistics have always been challenging in many healthcare facilities. Buxton et al. (2019) explained that infrastructure to promote IPC compliance is non-existent in many health institutions. According to them, 55% of healthcare facilities, especially in less developed countries, lack access to clean water services, one out of five suffer from poor sanitation, and 35% lack soap for handwashing. In a less-resourced setting, the nonavailability of appropriate PPEs leads to poor practices such as prolonged use and reuse of disposable PPEs, using septic materials to secure venous insertions, using disposable syringes to flush multiple venous insertions, keeping specimens in unsterile containers, and keeping in-dwelling catheters for several days (Buxton et al., 2019). This situation affects staff morale and further defeats the purpose of creating a safe working environment for healthcare delivery. For a well-resourced system, government and stakeholder involvement are fundamental (Manchanda et al., 2018)

Chapter Summary

The impact of HAIs is detrimental and often associated with increased morbidity and mortality, prolonged hospitalisation, and higher healthcare costs (WHO, 2011; Cassini et al., 2016; Magill et al., 2018). A hospital-acquired or nosocomial infection is any infection suffered by patients or healthcare workers within the hospital premises during patient care, and some of these infections may only be detected after the patient has been discharged (He, Lingbo, & Wang, 2015; WHO, 2022). Infection Prevention and Control (IPC) is fundamental to improving infectious disease epidemiology, social science, and health system health. IPC addresses patient safety and the quality of universal

healthcare coverage during every healthcare encounter, both within healthcare settings and in the community (WHO, 2020; Ministry of Health, Ghana, 2015).

It is well-established that adherence to standard precautions and using Personal Protective Equipment (PPE) such as gloves, gowns, face masks, aprons, and sterile equipment can reduce the risk of healthcare workers contracting infections (Hoffmann, Buchholz, & Schnitzler, 2020; Murray & Holmes, 2021). However, compliance with these IPC precautions has been challenging, particularly in developing countries like Ghana (Ampadu & Hoeschle, 2020; Nyarko & Cobblah, 2014). This challenge can be attributed to a lack of organisational support, inadequate IPC facilities, staff shortages, poor awareness of IPC practices, and insufficient budgetary allocation for IPC activities. Moreover, while the literature on IPC is scarce, it is alarming that occupational injuries among healthcare workers often go unreported.

Compliance with IPC is a significant issue globally in healthcare facilities. The Institutional Care Division (ICD) on infection prevention and control has provided discouraging evidence regarding HCWs' adherence to IPC guidelines. This has been particularly evident in practices related to disinfection and sterilisation in healthcare settings, cleaning, healthcare waste management, and other aseptic procedures (Ministry of Health, Ghana, 2015; Njovu, 2012).

It has been reported that very little research has been done on infection prevention and control, especially in low- and middle-income countries (Saint et al., 2013). The few studies conducted in this area are often confronted with several limitations. These studies typically involve small sample sizes, rely on self-reported data from participants, focus on limited risk factors, or concentrate on a single domain, such as hand hygiene (Bedoya et al., 2020). The reviewed

literature indicates a significant gap in infection control research in healthcare delivery. This gap is even more pronounced in less-resourced countries, with dire consequences for healthcare outcomes (WHO, 2020). This situation underscores the need for active surveillance and extensive research to understand the factors influencing healthcare workers' compliance with IPC. IPC is a critical tool for reducing morbidity and mortality associated with communicable diseases.

In light of the above, this chapter reviewed relevant literature to answer research questions about factors influencing HCW compliance with IPC in the Sunyani Regional Hospital. The review used Cooper's Reciprocal safety culture model as the theoretical framework for the study. Other thematic areas explored include IPC facilities, safety precautions, IPC compliance, and clinical and non-clinical HCWs' challenges.

CHAPTER THREE

RESEARCH METHODS

The general objective of this study was to assess factors influencing HCW compliance with infection prevention and control in Sunyani Regional Hospital in the Bono Region. This chapter aims to provide methodological processes employed to gather and analyse data from respondents. The chapter was organised to cover the following;

1. Study design,
2. Study area,
3. Population,
4. Sampling procedure
5. Data collection instrument
6. Data collection procedures and,
7. Data processing and analysis.

Study Design

A cross-sectional design assessed factors influencing HCW compliance with infection prevention and control policy in Sunyani Regional Hospital of the Bono Region. The choice of a cross-sectional design to evaluate factors influencing healthcare worker compliance with infection prevention and control policy in Sunyani Regional Hospital of the Bono Region was likely made to efficiently capture a snapshot of the current situation, assess prevalence, facilitate comparison, and identify associations between different factors and compliance levels. The study adopted a quantitative approach, which Miller (2020) indicated allows the investigator to investigate a larger sample size, reduces the influence of outliers on results, and makes it easier to generalise

conclusions accurately. Since this study sought to find out factors influencing HCW compliance with infection prevention and control, it goes beyond relying on the instincts and opinions of respondents. (Miller, 2020).

Study Area

Sunyani Regional Hospital is the primary referral hospital serving the entire then-Brong Ahafo Region. It is located in the most populous district of the Bono Region, which happens to be the region's administrative capital. According to the Population and Housing Census (2010), the Sunyani Municipality, established on 10th March 1989, has a population of 123,224, representing 5% of the region's total population. The population characteristically has more female (50.1%) than male (49.1%). According to the Population and Housing Census (2000), the Municipality has a surface area of 506.7 sq km. Information on the economic activity status indicates that individuals over 15 years and beyond form 62 per cent of the economically active population. (Ghana Statistical Service, 2014).

The hospital currently has a capacity of about 320 beds and is accessible to all regions of the then Brong Ahafo Region. It was built on 11th May 1927 by the then-colonial masters. It was established to provide medical services to the people of Western Ashanti**.** It has undergone a series of transformations since the Brong Ahafo Region was carved out of the Ashanti Region about 45 years ago. On 4th August 2003, the 79-year-old facility was moved into an ultra-modern hospital where it currently operates. The 320-bed facility currently has about 1400 staff with different professional backgrounds, offering clinical or non-clinical services to clients (Sunyani Regional Hospital, 2020). Health services provided in the facility include curative, preventive, promotive and

rehabilitative care. The hospital has been divided into 12 departments, comprising clinical and non-clinical units for administrative purposes**.** The clinical units consist of Laboratory, Nursing (Theatre, Medical, Surgical and, Public Health), Patient Department (Paediatric, Surgery, Accident and Emergency, Obstetrics and Gynaecology, Physiotherapy and, Mental Health Unit), Ear, Nose and Throat (ENT), Radiology, Dental, Pharmacy and, Eye Department. The non-clinical units include the General Administration (Transport, Social welfare and customer service), Finance, Human Resources and Customer Care Unit.

Population

The study population was 1400 clinical and non-clinical staff of the Sunyani Regional Hospital who offer paid or unpaid services to clients. The sample frame comprised 1400 HCWs from the 12 hospital departments. They formed the study population because they are directly involved in the care of patients and face the risk of being infected or dying from infection. This population comprises Doctors, Nurses, Midwives, Health Assistants, Laboratory Technicians, Radiologists, Caterers and Physiotherapists. The rest are Dieticians, Administrators, Account Clerks, Artisans, Laundry Workers and electromedical Engineers. Sunyani Regional Hospital has the highest population of HCWs in the region. It doubles as the primary referral facility that receives medical referrals from most hospitals in and outside the region.

Sampling Procedure

This research employed stratified systematic sampling for its data collection. The population was divided into 12 departments, known as strata. The research participants were then randomly selected from the 12

administrative departments of the hospital proportionally against the population size of each stratum. Stratified systematic sampling involves splitting the study population into smaller groups or strata based on shared attributes of the population. Drawing random proportional samples from each stratum according to their size permits the generalizability of findings and affords consideration for external validity (Sharma, 2017).

A predetermined sample size of 550 participants was derived from a sample size calculation formula where N $= P(100\% - P)/(SE)2$. P = Estimated response to questionnaire (70%), SE = Standard error, where SE = $(confidence\ interval\ (5)\ )/(z\ \ score\ (1.96)\ of\ 95\%\ confidence\ level)$. So N $=(70\%(100\% - 70\%))/((1.96)2) = 2100/3.84 =$546 (rounded up to 550 participants) (Fox, Huun, & Mathers, 2009). Through departmental heads, nominal roll and duty rosters were used across the 12 administrative groups to afford all HCWs an equal chance of being selected to respond to a questionnaire. The sample of 550 participants was divided into 12 parts proportionally (about 45 samples per department) to reflect the different population strengths of various departments. A sample interval calculation was done by dividing the sample frame by the sample size of each department to obtain a fraction. A randomly selected number from a ballot between 1 and the fraction formed the basis for sampling. For example, if the chosen number is 5, then every 5^{th}, 10^{th}, 15^{th}, 20th, etc., allocated HCW in that department qualified to respond to the questionnaire, but voluntarily. This method was meant to promote accuracy and generalisation of results on the study population.

Data Collection Instrument

The research instrument (Appendix A, page 114) for gathering data from the respondents was a questionnaire. The specific questions on the questionnaire are 30 close-ended questions structured to answer the research questions. All sections of the questionnaire were adapted from the WHO COVID-19 risk assessment tool, Occupational injury assessment tool by Lori, McCullagh, Krueger & Oteng (2016), safety precautions guidelines from CDC (2018) and, WHO Infection Prevention and Control Assessment Framework at the Facility Level (2018). To ensure instrument reliability, there was a pre-testing of the instrument on 30 HCWs with similar characteristics as the study population in the Sunyani Military Hospital, which is outside the study area of the Sunyani Regional Hospital. This pretesting allowed the researcher to adopt the questions to address the objectives adequately. It also helped the researcher to determine the timelines for responding to the questionnaire.

The instrument comprised six parts, with section (A) covering socio-demographic data. It contained characteristics of participants: gender, age, level of education, type of health professional (clinical or non-clinical), and duration of working experience. The second part, section (B), consisted of six questions concerning the availability of IPC facilities in the hospital, adapted from the WHO COVID-19 risk assessment tool. It covered the availability of Personal Protective Equipment (PPE), water supply, cleaning materials, waste management, hand hygiene materials, and post-exposure prophylaxis. The third part, section (C), contained seven questions on safety precautions adapted from CDC (2018). Items cover hand hygiene, use of PPEs, sharp safety, respiratory

hygiene, injection safety, sterile instrument use, clean environment, and waste management.

Section D comprised four questions adapted from the WHO COVID-19 risk assessment tool. The section covers PPE use by HCWs, and questions reflected the frequency of PPE use as “always as recommended” (95% of the time), “most of the time” (50% or more but not 100% use) and” rarely” means (less than 20%). Section E had seven items under one question that covered occupational injuries among HCWs. They were adapted from a similar study examining occupational injuries among 42 emergency nurses in a similar survey by Lori, McCullagh, Krueger, and Oteng (2016). The last five questions (section F) fall under IPC challenges among HCWs adapted from the WHO Infection Prevention and Control Assessment Framework at the Facility Level (2018).

To ascertain the instrument's reliability and workability, it was pretested so that the adapted questionnaire could be scrutinised and modified to reflect the reviewed literature. For face and content validity, the instrument was evaluated by the supervisor of this research work and experts from the Department of Health, Physical Education and Recreation (HPER). All necessary modifications were made, and the wording was devoid of ambiguity to ensure the supervisor and researcher were satisfied before data collection.

Data Collection Procedure

Ethical clearance (Appendix B) was sought from the University of Cape Coast Institutional Review Board (IRB), and granted with an approval number UCCIRB/CES/2022/10. An introductory letter was also obtained from HPER. The introductory letter was submitted to the administrative head of the Sunyani Regional Hospital. After receiving permission to gather data, departmental

heads were contacted to seek their approval to conduct the study in their respective departments. The study's nature and purpose were thoroughly explained in straightforward English to elicit participants' consent, and the questions were clarified. Systematic random sampling was done at each department to select participants after voluntarily consenting. The investigator and a research assistant carried out data collection. The investigator trained the assistant on the research methodology and data collection procedure before the commencement of the process. All respondents were given a week each to respond to the issues in the questionnaire and answered questionnaires were retrieved from participants as soon as they were completed for safe keeping with the researcher. Equally, extra time was allocated to participants who could not complete the questionnaire due to their busy schedules. Though the administration and retrieval of the questionnaire were expected to last for a month, unfortunately, it went beyond two months.

Data Processing and Analysis

In my work, data analysis included inspection for completeness, cleaning and coding responses on the questionnaire. Initially, frequencies were run to detect incorrect entries, coding and missing variables. These data were processed and entered using the IBM Statistical Package for Social Science 23 (SPSS), a computer software package that provides statistical analysis and data management systems. The study used descriptive statistics, frequency tables, and percentages for almost all research questions. While mean and standard deviation were analysed to answer questions 3 and 4, a non-parametric independent sample t-test, specifically the Mann-Whitney test, was used to answer research question 6.

CHAPTER FOUR

RESULTS AND DISCUSSION

The study explored factors affecting healthcare worker compliance with Infection Prevention and Control in the Sunyani Regional Hospital, Ghana. A descriptive study design using a closed-ended questionnaire was employed to uncover factors affecting HCW compliance with IPC.

A sample size of 550 participants was targeted from a sample frame of 1400 HCWs in the hospital. This study population comprised clinical and non-clinical hospital staff directly or indirectly involved in patient care who risk being infected or dying from infection. Five hundred thirty-seven participants completed the questionnaire during the data collection, representing a 97.6% response rate.

Demographic Characteristics of Respondents

Descriptive statistics were used to examine respondents' ages for the demographic data. The analysis is presented in frequencies and percentage counts, as indicated in Table 1.

Table 1: Age of respondents

Age	Frequency	Percentage (%)
< 30 yrs.	317	59.0%
30 – 40	196	37.0%
> 40	24	5.0%
Total	**537**	**100%**

Source: Fieldwork, Liribu (2022).

From Table 1, the total number of respondents indicated their ages was 537 (n=537). Out of this number, most were under 30, but none were under 18. Thirty-seven (37.0%) percent of the population was equally between the ages of 30 and 40, while very few respondents were above the age of 40 but less than

the retirement age of 60. The data shows that we have a youthful workforce at Sunyani Regional Hospital. Granted that the youth today are very eclectic, they tend to be knowledgeable in their profession and more likely to comply with the safety standards as required.

Table 2: Gender of respondents

Gender	Frequency	%
Male	198	37.0%
Female	339	63.0%
Total	**537**	**100%**

Source: Fieldwork, Liribu (2022).

Table 2 contains an analysis of respondents' gender, expressed in frequency and percentages. The table indicates that a more significant (63.0%) portion of the study population were females. So, there was a preponderance of females in the study, which indicates the general dominance of nursing as a perceived female profession in Ghana.

Table 3: Marital Status

Status	Frequency	%
Married	193	36.0%
Single	331	62.0%
Separated or divorced	7	1.0%
Widow	6	1.0%
Total	**537**	**100%**

Source: Fieldwork, Liribu (2022).

Table 3 presents the respondents' marital status. Only 36% were married, while most (62%) were single. As reported in the table, widows and separated or divorced respondents comprised 1% of the respondents.

Table 4: Level of Education of Respondents

Qualification	Frequency	%
Basic Education	7	1.3%
Secondary Level	7	1.3%
Certificate	53	9.9%
Diploma	264	49.2%
Bachelors	178	33.1%
Masters	28	5.2%
Total	**537**	**100%**

Source: Fieldwork, Liribu (2022).

Table 4 entails the level of educational qualification attained by respondents. Primary and secondary level schools were the least qualified among the study population. Certificate holders recorded 10.5%, while most participants (49.2%) were bearers of diploma certificates. For higher qualifications, a considerable portion of the staff acquired bachelor's degrees (33.1%), while the remaining 5.5% were holders of master's degrees in various fields. The implication is that most participants are well-educated and will be more aware of their environment and the profession's ethics. Education influences people's attitudes, which is a positive sign for the staff of the Sunyani Regional Hospital.

Table 5: Type of Health Professional

Type	Frequency	%
Clinical	420	78.0%
Non-clinical	117	22.0%
Total	**537**	**100**

Source: Fieldwork, Liribu (2022).

Another important demographic characteristic in Table 5 is the respondents' type of health professional. Participating respondents were classified as clinical or non-clinical healthcare workers. As presented in Table

5 above, most respondents (78.0%) were clinical (doctors, nurses, midwives, laboratory technicians, health assistants, cleaners, etc.). The rest were non-clinical staff, comprising account clerks, administrators, artisans, security officers, etc.

Table 6: Years of Working Experience

Years	Frequency	%
< 5 years	369	68.7%
5 -10 years	133	24.8%
11-15 years	32	6.0%
16 - 20 years	2	0.4%
> 20 years	1	0.2%
Total	**537**	**100%**

Source: Fieldwork, Liribu (2022).

Participants' years of working experience are captured in Table 6. Most participants (68.7%) had less than five years of working experience, while a significant portion (24.8%) had between five and ten years of working experience. For various periods above 10 years, only a few respondents were captured. Respondents noted that for most extended years of working experience above 20 years but below the compulsory retirement age, only 1% of the entire population. Given the data on the years of experience, it is realised that the majority had less than 5 years of working experience. This shows that it is possible that the practice of safety precautions and the level of IPC compliance will not come automatically. The greater the years of experience, the more compliance becomes a habit. However, being youthful could heighten their awareness of the precautionary measures within the profession, which will benefit the hospital in terms of compliance.

RQ 1: Facilities Available to HCWs in Sunyani Regional Hospital

This question was meant to identify existing IPC facilities in the Sunyani Regional Hospital and, most importantly, the quantities available to HCWs for IPC practice. Descriptive statistics was employed, with frequencies and percentage counts used to quantify the targeted variables in the question. Table 7 below presents the data on this objective.

Table 7: Availability of IPC Facilities in the Sunyani Regional Hospital

Facilities	Yes		No		Total	
	Freq	%	Freq	%	Freq	%
-Interruption of Water Supply	247	46.0%	290	54.0%	537	100%
-PPEs	283	52.7%	254	47.3%	537	100%
-Cleaning Materials	385	71.7%	152	28.3%	537	100%
-Waste Collection Materials	490	91.2%	47	8.8%	537	100%
-Hand Hygiene Materials	429	79.9%	108	20.1%	537	100%
-Access to Post Exposure Prophylaxis	407	75.8%	130	24.2%	537	100%

Source: Fieldwork, Liribu (2022).

In Table 7 above, water supply, PPEs, cleaning materials, waste collection materials, hand hygiene materials, and access to post-exposure prophylaxis were the identified IPC facilities in the Sunyani Regional Hospital. As reported, a significant number (46%) of the respondents indicated frequent water supply interruption. This was a worrying trend because water forms the basis for cleaning in the hospital. Similarly, a significant number of the

respondents (47.3%) also indicated that the PPEs were unavailable. This does not encourage staff to take precautionary measures to protect themselves since some critical equipment is unavailable. The unavailability of hand hygiene materials, cleaning materials, and post-exposure prophylaxis were reported by 20.1%, 28.3%, and 24.2% of participants, respectively. These did not appear to be a serious problem as many of those facilities were available, as the data portrays in Table 7. A few respondents (8.8%) reported the absence of waste collection materials in some hospital departments, which did not pose a problem as the items were primarily available.

RQ 2: Practise of Safety Precautions by HCWs During Healthcare Interactions in the Hospital

Frequencies and percentages were employed to answer this question. This helped identify the exact safety precautions and protocols that exist or are enforced in the Sunyani Regional Hospital.

Table 8: Existing Safety Precautions in Sunyani Regional Hospital

Facilities	Yes		No		Unknown		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Enforcement of Hand Hygiene	478	89.0%	41	7.5%	18	3.5%	537	100%
Use of PPEs	447	83.2%	70	13.1%	20	3.7%	537	100%
Respiratory Hygiene and Cough Etiquette	360	67.0%	103	19.2%	74	13.8%	537	100%
Sharp Safety at Work	483	90.0%	35	6.5%	19	3.5%	537	100%
Sterile Instrument and Devices	479	89.2%	36	6.7%	22	4.1%	537	100%
Clean and Disinfected Environment	488	90.9%	30	5.6%	19	3.5%	537	100%
Waste Segregation and Management	463	86.2%	42	7.8%	32	6.0%	537	100%

Source: Fieldwork, Liribu (2022).

Table 8 identifies hand hygiene, use of PPEs, respiratory hygiene and cough etiquette, sharp safety, sterile instruments and devices, clean and

disinfected environment, and waste segregation and management under safety precautions. Most respondents acknowledged enforcing hand hygiene protocols, while others indicated "no" and "unknown" for specific departments. Respiratory hygiene and cough etiquette are challenging among all the safety precautions listed. While 19.2% indicated such a measure was not present in the hospital, 13.8% indicated they were unaware whether such a precautionary measure existed. This means many workers do not practise these safety precautions, as their responses show in Table 8.

RQ 3: Level of IPC Compliance Among Clinical HCWs in Sunyani Regional Hospital

Descriptive statistics were used to determine the level of IPC compliance among the clinical HCWs, and the mean and standard deviation were analysed to answer the research question.

Table 9: IPC compliance among clinical HCWs

	Rarely		Occasionally		Most of the Time		Always as recommended		Descriptive	
IPC Compliance	Freq	%	Freq	%	Freq	%	Freq	%	Mean	SD
Use of gloves	16	3.8	29	6.9	84	20.0	291	69.3	3.55	0.79
Use of face mask	30	7.1	66	15.7	101	24.0	223	53.1	3.23	0.96
Use of face shield or protective glasses	78	18.6	119	28.3	78	18.6	145	34.5	2.69	1.13
Use of Gown and Aprons	41	9.8	63	15.0	95	22.6	221	52.6	3.18	1.02
Use of water-repellent boot	108	25.7	78	18.6	83	19.8	151	36.0	2.66	1.21
Replacement of PPEs	31	7.4	51	12.1	92	21.9	246	58.6	3.32	0.95
Hand Hygiene	15	3.6	20	4.8	82	19.5	303	72.1	3.60	0.74
Aseptic technique	14	3.3	31	7.4	78	18.6	297	70.7	3.57	0.77
Overall									3.23	0.95

Rarely = 1, occasionally = 2, Most of the Time =3, always as recommended =4
Source: Fieldwork, Liribu (2022).

Table 9, as shown above, demonstrates the level of IPC compliance among clinical HCWs in the Regional Hospital. The table shows that

compliance with safety precautions among clinical HCWs was generally high (mean score = 3.23, SD 0.95). The mean score of more than 3.0 indicated an appreciable level of compliance among these workers attributable to several factors. Two IPC compliance variables that recorded the least means are the usage of face shields or protective glasses (mean = 2.69, SD = 1.13) and water-repellent boots (2.66, SD = 1.21). Apart from the reason that participants work in different departments and might not require the same PPEs and specific quantities, the inadequacy of required PPEs was also reported from the data. Accessibility to these PPEs was reportedly low, as shown in the data.

RQ 4: Prevalence of Occupational Injuries Among HCWs in the Hospital

Descriptive statistics, namely the calculated mean and standard deviation of the variables in question, were used to determine the prevalence of occupational injuries among HCWs in the Sunyani Regional Hospital**.**

Table 10: Prevalence of Occupational Injuries Among HCWs in the Hospital

Occupational injuries	Rarely		Occasionally		Always		Descriptive	
	Freq	%	Freq	%	Freq	%	Mean	SD
Exposer to Splash and Body Fluids	222	41.3	208	38.7	107	19.9	1.80	0.75
Cuts from Sharp Objects	296	55.1	170	31.7	71	13.2	1.60	0.72
Needle Sticks	317	59.0	156	29.1	64	11.9	1.55	0.72
Slips / Fall Injuries	356	66.3	135	25.1	46	8.6	1.44	0.66
Exposure to Hazardous Chemicals	374	69.6	116	21.6	47	8.8	1.42	0.66
Burn/Stem	396	73.7	95	17.7	46	8.6	1.38	0.66
Other Injuries	328	61.1	149	27.7	60	11.2	1.53	0.71
Overall							1.53	0.70

Rarely = 1, Occasionally = 2, and Always = 3
Source: Fieldwork, Liribu (2022).

Table 10 above shows the prevalence of occupational injuries among HCWs in the Sunyani Regional Hospital within a 12-month. The overall

average (mean = 1.53, SD = 0.70) indicated that HCWs are highly exposed to various occupational injuries, except the less frequent or uncommon ones. These uncommon injuries (burns/stems, slip/fall injuries, and exposure to hazardous chemicals) recorded the least means below the average mean of 1.53. This shows that these health professionals work in different departments and may suffer different occupational exposure levels or risks. The table also indicated that the most prevalent occupational injuries are associated with exposure to splash and body fluids, as it recorded the highest mean (Mean = 1.80, SD = 0.75). Cuts and needle stick injuries were equally high and above the average mean. The prevalence of exposure to splash and body fluid injuries can mainly be attributed to the frequent contact of health professionals with the clients, especially at the laboratories and wards.

RQ 5: Challenges HCWs Face in IPC Compliance at the Hospital

Descriptive statistics were used to identify barriers or challenges faced by HCWs regarding the availability of IPC programs, staffing, time, and safety. Data was analysed and reported in frequency and percentages to determine if HCWs recorded challenges in the areas of concern identified in this question.

Table 11: HCW Constraints in IPC compliance

Variable	Yes		No		Total	
	Freq	%	Freq	%	Freq	%
Presence of Active IPC Programme.	394	73.4	143	26.6	537	100
Availability of IPC Training Programme.	341	63.5	196	36.6	537	100
Time Constraints in the Facility.	295	54.9	242	45.1	537	100
Staffing Constraints	296	55.1	241	44.9	537	100
Difficulty Reporting Safety Concerns.	194	36.1	343	63.9	537	100

Source: Fieldwork, Liribu (2022).

Table 11 depicts HCWs' challenges in IPC compliance at the Sunyani Regional Hospital. Most of the participants indicated that they faced some challenges at the hospital in one way or the other. However, the most prevalent challenges were the time and staffing constraints, representing 54.9% (295) and 55.1% (296), respectively, and the worst challenge was the difficulty in reporting safety concerns, which saw 36.1% of the respondents answering in the affirmative. Also, the majority of the participants, 73.4%, acknowledged the presence of an active IPC programme in the hospital. Given that understaffing is a challenge, time constraints were bound to arise. So, they could be seen as twin challenges as one led to the other. An active IPC programme with regular training activities can increase IPC compliance among the staff. However, the worst challenge that has to do with the difficulty in reporting safety concerns may have to do with the top management of the hospital. There is an apparent disconnect between some staff and the management of the hospital, which does not afford a friendly atmosphere for work.

RQ 6: Differences Between Male and Female Clinical HCWs in IPC Compliance

A normality test was performed using Kolmogorov-Smirnova and Shapiro-Wilk to determine the difference between male and female clinical HCWs regarding IPC compliance. Ascertaining the normality of this data set was imperative and a prerequisite for determining the difference between male and female clinical HCWs using the Analysis of Variance (ANOVA).

Table 12: Tests of Normality of IPC compliance among clinical HCWs

Variable	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
-How Often Respondent Uses Gloves	.411	420	.000	.623	420	.000
-How often does the Respondent Uses Face Mask	.319	420	.000	.760	420	.000
-Usage of Face Shield or Protective Glasses	.222	420	.000	.838	420	.000
-How Often Gowns and Aprons are Worn	.316	420	.000	.760	420	.000
-Usage of Water Repellent Boot	.226	420	.000	.817	420	.000
-Replacement of PPEs for Procedures	.350	420	.000	.719	420	.000
-Hand Hygiene Before and After Procedures	.425	420	.000	.587	420	.000
-Aseptic Technique During Injection	.420	420	.000	.612	420	.000
-IPC Compliance	.128	420	.000	.908	420	.000

Source: Fieldwork, Liribu (2022).

Table 12 shows the normality test of IPC compliance among clinical HCWs in the Sunyani Regional Hospital for the various subscale variables under IPC compliance. It is observed that all the values of Kolmogorov-Smirnova and Shapiro-Wilk are below a significant level of 0.05. At a substantial level of 0.05 or less, the data set is not normally distributed, and this implies that the parametric test statistics cannot be employed in analysing the data because it violates the assumption of normality. As a result, the non-parametric test statistics, specifically Mann-Whitney Test was used to determine the difference in IPC compliance between male and female clinical HCWs in the Sunyani Regional Hospital.

Table 13: Results of Mann-Whitney Test showing Comparison of Male and Female clinical HCWs IPC Compliance

Variable	Gender of respondent	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Sig
How Often Respondent Uses Gloves	Male	142	216.43	30732.50	18982.500	576777.50	-0.881	0.378
	Female	278	207.47	57677.50				
How often does the Respondent Uses Face Mask	Male	142	215.82	30646.50	19447.500	57763.500	-0.704	0.482
	Female	278	207.78	57763.50				
Usage of Face Shield or Protective Glasses	Male	142	212.55	30181.50	18657.000	58228.500	-0.257	0.797
	Female	278	209.46	58228.50				
How Often Gowns and Aprons are Used	Male	142	202.89	28810.00	18657.000	28810.00	-1.003	0.316
	Female	278	214.39	59600.00				
Usage of Water Repellent Boot	Male	142	213.65	30338.50	19290.500	58071.500	-0.396	0.692
	Female	278	208.89	58071.50				
Replacement of PPEs for Procedures	Male	142	205.61	29197.00	19044.000	29197.00	-0.665	0.506
	Female	278	213.00	59213.00				
Hand Hygiene Before and After Procedures	Male	142	210.69	29918.00	19711.000	58492.000	-0.029	0.997
	Female	278	210.40	58492.00				
Aseptic technique During Injection	Male	142	215.43	30591.50	19037.500	57818.500	-0.744	0.457
	Female	278	207.98	57818.50				
IPC Compliance	Male	142	213.57	30327.00	19302.000	58083.000	-0.373	0.709
	Female	278	208.93	58083.00				

Source: Fieldwork, Liribu (2022).

Table 13 above illustrates the results of the Mann-Whitney Test, comparing Male and Female clinical HCWs in IPC compliance. The overall results indicated no significant difference among male and female HCWs regarding IPC compliance at Z = -0.373, P = 0.709. Even though the mean rank of the male (213.57) seems to be higher than the mean rank of the female (208.93) however, they are statistically equal. In addition, there are no

differences in gender concerning the various constructs under IPC compliance, even though sometimes there are variations in the mean ranks concerning gender. It can, therefore, be deduced that both genders comply with the hospital's IPC protocols.

Availability of IPC Facilities to HCWs in the Sunyani Regional Hospital

This study section examined the availability and adequacy of essential IPC facilities at the hospital for IPC practice. Though not lacking in all hospital departments, a significant (46.0%) proportion of HCWs indicated the absence of these essential facilities for healthcare delivery. Findings indicated frequent water supply interruption, while the non-availability of PPEs was a problem reported by 47.3% of respondents. PPEs and other IPC items might not be needed in equal quantities across all hospital departments. However, their availability in sufficient quantities is necessary for the safety of clients and workers alike.

The absence of PPEs, water and other essential consumables, as discovered from the findings, is a recipe for high HAIs among clients and HCWs. This situation becomes worse and more challenging for HCWs, mostly during epidemics when basic amenities are lacking. This discovery is consistent with a WHO report that indicated that more than 55% of healthcare centres and hospitals in less developed countries lacked essential water services for healthcare delivery (World Health Organization, 2019). The absence of essential items such as gloves, sanitisers, and soap for hand washing agrees with similar findings from Nigeria, indicating the lack of vital consumables in infection control. The report highlighted inadequate cleaning products and equipment and poor waste segregation as critical areas of concern (Buxton et

al., 2019). The effect of a resource-constrained system is the resultant prolonged hospitalisation of patients, long-term disability, economic loss, high morbidity and mortality, and undue exposure of HCWs to nosocomial infection (Harun et al., 2022).

Even beyond Africa, resource constraints hindering IPC have been similarly reported. In three Tertiary Teaching Hospitals in Bangladesh, there were no functional hand-washing facilities for staff, patients, and relatives. Fewer surgical gloves, less than 50% of the required quantity, were provided, and disposable nasal catheters, equipment, and nebuliser masks were reused due to scarcity. The non-availability of waste collection materials also resulted in the dumping of unsegregated hazardous waste in the open. (Babar, et al., 2020). In the same setting, a similar finding from a study on hand hygiene also revealed a severe constraint on supplies. From 14,668 observations from the study, barriers to hand hygiene were reported as insufficient (57.9%) supplies of sanitisers, soap (27.0%) and water. For posters that serve as hand hygiene reminders, only 13.1% of the 337 hand hygiene basins had these posters, while hand drying supplies for patients and attendants were lacking in all wards of the hospitals. (Harun, et al., 2022).

Furthermore, the study identified that the absence of PPEs and essential consumables worsened following the coronavirus outbreak. Gowns, surgical masks, and goggles for frontline healthcare providers had to be worn over hours without replacing them due to shortage. The lack of essential PPEs during epidemics, as discovered in this study, is consistent with reports from other studies that indicated a global shortage of necessary PPEs even in well-equipped healthcare systems. The situation amplified and got out of control for less-

resourced systems already plagued with inadequate resources as many countries could not provide essential consumables to save lives. (Cooper, Wiyeh, Schmidt, & Wiysonge, 2020).

In assessing IPC preparedness in the post-COVID era in 56 Ghanaian healthcare facilities, the lack of basic supplies was a significant finding highlighted. Similarly, basic IPC materials such as detergents, PPEs, and clean running water were not sufficiently provided for staff. (Oppong, et al., 2020). At a specific time, the absence of hand hygiene materials in most patient care centres at the Korle-bu Teaching Hospital in Ghana is another finding that agrees with the discoveries of this study. In most instances, essential equipment for hand hygiene, such as hand dryers and liquid soap dispensers, are not readily available. Even in high-risk centres such as the isolation wards and the phlebotomy units of the laboratory, these indispensable facilities were under-supplied (Yawson & Hesse, 2013). To ensure the safety of both patients and ordinary healthcare workers, the provision of basic IPC logistics must be treated with urgent attention by all stakeholders who share this responsibility.

Safety Precautions Practiced by HCWs in the Sunyani Regional Hospital

This part of the study examined the existence of safety precautions as a component of IPC practice in healthcare delivery. The majority (above 80%) of HCWs in the Sunyani Regional Hospital acknowledged the presence and enforcement of safety precautions among workers in the hospital. Hand hygiene, sharp safety, sterile instruments and devices, and a clean environment were the hospital authority's most enforced IPC safety measures.

HCWs agreed that safety practices to protect life and reduce the cost-of-service delivery were available and fully implemented across all hospital

departments. However, there may be variations in the level of implementation of these practices due to the varied activities in the different wards and departments of the hospital. Notwithstanding, these finding agrees with a survey report that indicated that when the cadre of workers engaged in healthcare provision have professional training with more extended working experience, it is understandable that they would demonstrate adequate familiarity with basic safety precautions (Bahegwa et al., 2022). This outcome is similar to a study that indicated that 70.9% of HCWs in an Ethiopian hospital, irrespective of the client's diagnosis, always wore the appropriate PPEs during invasive procedures or interactions with clients. The highest compliance was recorded for sharp safety as HCWs disposed of all used needles and sharps appropriately into safety boxes immediately after use. (Bekele, Ashenaf, Ermias, & Arega, 2020).

The existence and enforcement of IPC safety practices in hospitals is an integral and essential component of quality healthcare delivery. A survey report from a teaching hospital in South Korea discovered a similar finding by indicating that the availability of active IPC programmes to enforce safety protocols is a requirement for accreditation (Enunja & Choi, 2019). Mandatory structures reinforce the practice, including periodic educational activities, administrative sanctions, and reward systems. Meanwhile, the literature reviewed by several studies has supporting evidence that in departments and wards of hospitals where the physical presence of clinical supervisors is regularly ensured, adherence to safety precautions is high. (Griffiths, Renz, Hughes, & Rafferty, 2009). In some hospitals, periodic IPC training programmes are mandatory, while departmental heads are equally required to

accept responsibility for IPC practice (Hale, Powell, Drey, & Gould, 2015). In selected hospitals within the Ashanti Region of Ghana, similar findings from a survey indicated that safety protocols were available and well implemented across the region. Hand hygiene before and after invasive procedures, use of face masks, and other PPEs were rated above 90% by respondents involved in the survey (Ashinyo et al., 2020). This evidence shows that in rendering care, especially in high-risk units, HCWs must carry out safety precautions between procedures, examinations or after contact with clients or body fluids (Yawson & Hesse, 2013). At the peak of COVID-19, several urgent public health measures were implemented to curtail and fight the communicable disease. Even in public places outside hospitals, strict measures such as travel restrictions, social distancing, wearing face masks, and hand hygiene were the order of the day (Nimer, Sweden, Kofahi, & Khabour, 2021). The Ministry of Health and the Ghana Health Service initiated in-service training for HCWs, PPEs, and strategies in hand hygiene, waste management, and sharp safety, which undoubtedly could have contributed to the implementation of safety precautions, as discovered in the study.

Level of IPC Compliance Among Clinical HCWs in Sunyani Regional Hospital

Concerning this objective, the findings showed high compliance with safety precautions among clinical HCWs (mean score = 3.23, SD 0.95). Two variables (use of face shield and use of water-repellent boots), however, recorded the least compliance (mean = 2.69, SD = 1.13), (2.66, SD = 1.21), respectively. This difference can be attributed to the non-availability of these PPEs or the differences in activity levels among the various wards and departments.

Data collection for this study was done when the fight against the novel coronavirus disease was a global concern, and the efforts of individual HCWs were crucial in dealing with the communicable disease. This sense of responsibility, coupled with the fear of getting infected with a disease, motivates the individual to adhere to prescribed safety precautions (Cooper, Wiyeh, Schmidt, & Wiysonge, 2020). These findings agree with an Ecuadorian study report that established a high correlation between perceived risk of infection, increased adherence to hand hygiene, and correct use of PPEs (Colindres et al., 2018). In a similar study on attitudinal factors of COVID adherence guidelines by three researchers in Italy, high compliance to safety precautions was reported for both HCWs and the general population. According to their discovery, perception, anxiety and susceptibility or severity of the covid 19 infection strongly predict strict adherence to quarantined guidelines or safety protocols (Carlucci, D'Ambrosio, & Balsamo, 2020).

The level of adherence to safety precautions among clinical HCWs from the data is high even though it is less than one hundred per cent (100%). Supporting evidence from previous studies has indicated socio-demographic factors' impact on increased IPC adherence. With sex, for instance, females demonstrate better adherence to safety precautions as compared to their male counterparts. The same is reported for education, where individuals with high educational qualifications adhere highly to infection prevention protocols among other education grades. (Carlucci, D'Ambrosio, & Balsamo, 2020). From Kabarole District in Uganda, Mpamize & Robert (2016), who investigated adherence to universal precaution in infection prevention among health workers, also found that females were more compliant with infection control

protocol than males. The findings of this study are consistent with reports from other studies as the female population doubled (63%) that of males (37%), and participants with high educational qualifications formed a more significant (87.5%) proportion of the entire study population in the Sunyani Regional Hospital.

However, this study's findings differ from research reports carried out among primary and secondary care providers of Enugu State in Nigeria. The report discovered poor knowledge and wrong application of preventive measures for Lassa fever, leading to risky exposure of the individual and others (Faith et al., 2019). This difference is likely due to regular supervision, constant training, and retraining of HCWs in tertiary government hospitals rather than the privately owned facilities referenced here. In Ghana, evidence of poor practices in modes of disinfection and sterilisation in health care settings, cleaning, PPE use, hand hygiene and waste management have been indicated in other studies among different clusters of healthcare facilities, including privately owned hospitals (Ministry of Health, Ghana, 2015). The impact of COVID-19 at the time of this study could contribute to high compliance with safety precautions, as against the previous survey, which was carried out in a different setting and season.

Notwithstanding these contrary outcomes, numerous other studies have discovered consistent findings that agree with this discovery. A cross-sectional study that assessed knowledge and practices against occupational exposure to HIV infection among 401 HCWs in two regional hospitals in Tanzania indicated that a more significant proportion (96.3%) of all categories of HCWs recorded high compliance with safety precautions because they were at risk of exposure

to the HIV infection. Similarly, a study to assess IPC compliance at COVID treatment centres in selected Ghanaian hospitals discovered improved adherence to safety protocols. The improvement in IPC compliance in various settings, including this study, is attributable partly to a network of factors. It is also in line with Cooper's Reciprocal Safety Culture Model which has a goal-directed outcome which results from the interaction of internal psychological factors, observable behaviours and situational workplace factors. The model holds that safety culture results from operationalising employees' perceptions and attitudes towards corporate safety goals. As such, in the case of the Sunyani Regional Hospital, providing sufficient PPEs, regular supervision, active IPC committees, and regular supervision positively impact IPC (Mashoto, Mubyazi, & Mushi, 2015).

The Prevalence of Occupational Injuries Among HCWs in the Sunyani Regional Hospital

This part of the study determined the prevalence of occupational injuries among HCWs in the Sunyani Regional Hospital. Findings suggest that HCWs were exposed to occupational injuries, mainly cuts, needle sticks, and splashes from body fluids (Mean = 1.80, SD = 0.75). With these injuries measured over 12 months, only exposure to hazardous chemicals, burns, and falls recorded the fewest occurrences below average (mean = 1.53, SD = 0.70).

In the line of duty, HCWS are constantly exposed to avoidable occupational hazards predominantly because their place of work is unsafe. Needle stick injury, exposure to contaminated body fluids, and others are common threats to the life and well-being of HCWs. Supporting evidence can be found in a global report that indicated that sharp injuries alone contributed to the high incidence of hepatitis C, hepatitis B and human immunodeficiency

virus infection among HCWs in the year 2000 (Mossburg, Agore, Nkimbeng, & Commodore-Mensah, 2019). Research work by WHO further predicted that out of about 35 million HCWs, 3 million get exposed to percutaneous injuries annually, and the majority of the cases were recorded in less-resourced African Countries. (Mbaisi, Ng'ang'a, Wanzala, & Omolo, 2013).

The prevalence of percutaneous and splash injuries is generally high. Similar findings were found when researchers assessed the prevalence of occupational accidents/ injuries among HCWs in a Federal Medical Centre in Southern Nigeria. Out of a population of 167 HCWs, 53.3% suffered blood splash injuries, while 54%, comprising the different cadre of professionals, recorded cuts injuries from sharp objects (Isara & Ofili, 2014). Beyond Africa, a retrospective study examining the proportion of needle sticks and sharp injuries among 393 HCWs in a medical centre in Jordan reported that most occupational exposures occurred in the hospital wards (46.1%) and at waste collection points (38.2%). Among staff, nurses recorded the highest incidence of risky exposures (39.7%), followed by cleaners (36.7%), physicians (10.4%), general staff (7.4%) and laboratory workers (5.9%) (Saadeh et al., 2020). In no different settings, Mbaisi, Ng'ang'a, Wanzala, and Omolo (2013) reported similar findings from their study, which determined the prevalence and nature of percutaneous injuries among 305 HCWs. Like my work, it was discovered that 25% of participants were exposed to blood and other body fluids, while 19% were recorded for sharp injuries and 7.2% for body fluid splash exposure in the past 12 months. This situation is not a rare occurrence but a discovery consistent with the findings of my study.

In Ghana, COVID-19, during the period after July 2020, revealed a worsened situation where 37,812 cases and 191 deaths were recorded among HCWs across the country, including the Bono Region, as a result of occupational exposure. Again, a similar study that examined occupational injuries among Ghanaian HCWs in a public district hospital discovered that the majority of occupational injuries among workers were unreported. Findings showed that workers were highly stressed and could hardly keep up with safety behaviours due to heavy workloads and inadequate staffing. (Appiagyei, Nakua, Donkor, & Mock, 2021). A very recent investigation into this phenomenon among 156 Emergency Medical Technicians in northern Ghana reported nothing different from the findings of this very study. Within a year, 38.6% of the study population suffered various degrees of avoidable occupational injuries and or risky exposures. The inadequacy of PPEs, as indicated in research question one, was equally reported by more than half (56.9%) of the Emergency Medical Technicians involved in the study (Awini, et al., 2023). These consistent findings from different study settings suggest that the absence of essential PPEs significantly contributes to the high incidence of avoidable injuries among HCWs.

Constraints of HWCs in IPC Compliance at the Sunyani Regional Hospital

This study section delved into constraints on IPC compliance among hospital HCWs. Most of the study participants acknowledged the presence of an active IPC programme. At the same time, 54.9%, 55.1%, and 36.1% of the respondents reported main constraints (staffing, time constraints, and difficulty reporting safety concerns) affecting healthcare delivery.

IPC compliance is influenced by various factors ranging from lack of needed infrastructure to lack of human resources. The findings of this study highlight the peculiar challenges and constraints reported by earlier literature. In assessing opportunities and barriers to IPC in selected conflict-prone African countries, it was reported that staff shortage was a significant setback in IPC compliance. In contrast, high staff turnover, especially among the auxiliary workers, was linked to low wages due to lack of funding. (Lowe, et al., 2021). Due to the heavy workload against inadequate staff, essential safety rituals such as hand hygiene or donning appropriate PPEs are skipped during specific procedures. (Henderson, Willis, Blackman, Verrall, & McNeill, 2021). From the lower Manya Krobo in Ghana, a similar survey report confirmed that HCWs lack adequate time to follow safety precautions due to the varied care needs of their clients. (Akagbo, Nortey, & Ackumey, 2017). This is common during life-threatening emergencies when staff are pressured to save a life. (Efstathiou, Papastavrou, Raftopoulos, & Merkouris, 2011).

With 15% of the world's health care providers, Sub-Sahara Africa and Southeast Asia, for example, suffer a disproportionate percentage (53%) of the world's disease burden. My work's findings are consistent with a study that assessed factors affecting compliance among 30 HCWs in a mission hospital in Zambia. It was reported that 47.9% of research participants indicated an unbearable workload on staff, a shortage of staff (38.3%), overcrowding (33%), and a lack of supervision. (Njovu, 2012). This situation leads to an excessive workload on a few hands (Asamani et al., 2019), While the burden of administrative duties, alongside the provision of medical care to patients, makes it challenging to follow safety precautions (Akagbo, Nortey & Ackumey, 2017).

In Ghana, Kondor and Adoma-Afari (2018), in their study on IPC, reported that 66.4% of participants were non-compliant with IPC protocols due to time constraints at their workplaces. It was observed that following IPC guidelines and protocols was time-consuming, especially when there was a shortage of staff or an increased workload.

Ineffective communication of safety concerns is another factor that affects IPC compliance negatively. The study findings indicate that about 36% of HCWs have difficulty communicating or reporting safety concerns to management. This development agrees with an earlier study that examined barriers to speaking up about safety concerns among 1314 HCWs. It was discovered that 55% (731) of participants failed to speak up for fear of superiors, fear of no change after speaking up, and fear of ignored opinion as main barriers in communicating safety concerns (Etchegaray, Ottosen, Dancsak, & Thomas, 2017). In some instances, issues of trust and fear of blame are linked to the problem. Others feel insecure reporting issues or proposing ideas, especially when they risk losing their jobs (Sjoerd, Rooy, & Diederik, 2022). In identifying barriers to reporting safety concerns in Indonesian Public Hospitals, most HCWs involved in the study indicated that they did not know where and how to report them. For others, lack of feedback and fear of conflict were their main problems (Dhamanti, Leggat, & Barraclough, 2022). Additionally, human barriers were identified as failure to challenge authority, victimisation, and poor listening (Siewert, Swedeen, Brook, Eisenberg, & Hochman, 2018). This worrying situation affects staff morale and further defeats the purpose of creating a safe working environment for healthcare delivery.

Differences Between Male and Female Clinical HCWs in IPC Compliance

This aspect of the study determined the difference between male and female clinical participants regarding IPC compliance. Results from the Mann-Whitney test indicate HCWs are statistically indifferent ($Z = -0.373$, $P = 0.709$). In other words, the variable gender is not a predictor of compliance in IPC practice.

Adherence to IPC precautions is influenced by several factors ranging from institutional to individual and socio-demographic factors. An individual factor such as gender, though not a sole predictor or determinant of high IPC compliance, its impact has been documented in other studies. In examining gender differences in awareness and behaviour of medical and dental students about coronavirus disease in Pakistan, the researchers discovered no significant difference in knowledge among the two genders. However, they found that the female respondents were better compliant with IPC practice than their male counterparts (Lodhi et al., 2022). Similarly, a cross-sectional study in China where undergraduate students assessed knowledge, attitude and practice among undergraduate students revealed that both genders were proactive in knowledge and practice during disease outbreaks. However, the female gender was seen as superior in hand hygiene and wearing a face mask (Peng et al., 2020). In comparison, the study population in both scenarios comprised students under professional training who were conveniently sampled for both studies. The difference in gender adherence to IPC contained in both surveys is understandable but inconsistent with the findings of my research, which discovered no significant difference between the two genders who are actual HCWs with practical working experience and knowledge.

Again, existing literature investigating gender differences in specific IPC practices in double gloving among surgeons was reported. From a tertiary care centre where this study was done, double gloving was found to be influenced by several factors but not necessarily gender. Instead, HCW's decision to do double gloving depended on the type of procedure or surgery involved (Alsaigh et al., 2019). Differences in compliance also exist among professional groupings or cadre of HCWs, compared to gender. Midwives in the maternity wards and laboratory technicians, for example, in their clients' care, are highly exposed to body fluids. This makes them more cautious and compliant with safety precautions than their counterparts working in less risky environments (Mutaru, Balegha, Kunsu, & Gbeti, 2022). People's beliefs and perceptions of a particularly contagious disease like covid 19 are essential in adopting healthy and recommended preventive behaviours irrespective of gender (Carlucci, D'Ambrosio, & Balsamo, 2020). Thus, indifference in the level of compliance among both genders could be precipitated by the influence of the deadly global pandemic since data collection for this study was done when COVID-19 preventive measures were fully enforced in all public places, including our healthcare institutions. This phenomenon is also a prediction that most HCWs probably receive enough education and training in IPC. Without recourse to gender, all HCWs need continuous and regular capacity building in the fight against opportunistic infection and the provision of quality healthcare.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATION

The main purpose of this study was to uncover factors influencing healthcare worker compliance with infection prevention and control at the Bono Regional Hospital in Sunyani. This chapter contains the summary, conclusion, and recommendation based on the study's results.

Summary

Chapter One commenced with a general introduction to infection prevention and control and its impact on healthcare globally. According to the literature, opportunistic or hospital-related infections do not only threaten the lives of clients and care providers but can weaken and disrupt the few existing healthcare institutions. WHO defined HCWs as all individuals engaged in activities aimed to promote health. The section further indicated that the resultant effect of noncompliance to IPC protocols posed safety risks, financial implications on clients and governments, and a failure to attain universal healthcare coverage as contained in Sustainable Development Goal Three (SDG 3).

Next was the background to the study. This section touched on the trend and burden of hospital-acquired infection from a global perspective. This led to a discussion on the effects of these avoidable infections concerning associated morbidities, mortalities and the resultant exorbitant cost borne by individual care seekers and healthcare institutions. Bloodstream infection, pneumonia, wound infection, urinary tract infection, etc., were indicated as some disease conditions resulting from blood product contamination, lack of disinfection and quarantine measures, and medical staff hand contamination. Previous research

works also reported that opportunistic infections are the leading cause of hospital death but can be reduced through appropriate IPC, intensive research and active surveillance. High HIV and hepatitis infection prevalence recorded in the health sector was linked to unsafe injections. At the same time, multi-drug-resistant organisms are associated with deadly diseases such as Ebola, coronavirus disease, yellow fever, and the influenza virus. The disproportionate nature of the disease burden where African countries suffered the most was also highlighted. Some literature also speculated that resource constraints, inadequate education and training of HCWs, congestion, attitude and behavioural factors were significant contributors to Africa's high disease burden. These countless uninvestigated factors from various study settings formed the basis of this study.

Statement of the problem highlighted unresolved issues under IPC with identified research gaps. From my literature review, several researchers investigated negligible domains of the problem of IPC among HCWs, but none was holistic. Many of their findings also concluded from self-reported data that did not address factors influencing HCW compliance with IPC. While the purpose of the study was specific to HCWs' compliance with IPC in the Sunyani Regional Hospital, six research questions intended to unearth factors influencing HCWs' compliance with safety protocols guided the entire study. Apart from contributing to the pool of existing literature, the Ghana Health Service, Ministry of Health, Healthcare Training Institutions, and IPC committees in hospitals stand to benefit significantly from this study's findings.

The study was delimited to the category of HCWs comprising clinical and non-clinical staff of the Sunyani Regional Hospital in the Bono Region.

This defined group was the target because they directly or indirectly were engaged in providing healthcare to clients in the facility and, therefore, suffered some occupational exposure to injury. The study also encountered some challenges beyond the control of the researcher. Rejection of the questionnaire, incomplete and inaccurate responses, delay in filling out the questionnaire, etc., were some of the limitations that frustrated the study. The definition of terms used in the research and the organisation of chapters formed the last part of this section.

Under the literature review, the research was guided by the safety culture model and a conceptual framework that examined the effects of certain independent variables on IPC. The topical areas discussed in the literature review stemmed from the research questions.

Chapter three provided the study with methodological processes to gather and analyse data from respondents. The quantitative approach and a cross-sectional design were adopted. Then came the study area description, where key features of the Sunyani Municipality were highlighted. Under the study population, 1400 HCWs in the hospital, comprising clinical and non-clinical staff, formed the sample frame. A stratified systematic sampling method was used to pick data from a predetermined sample size of 550 participants.

The research instrument, a questionnaire comprising 30 predetermined close-ended questions, was adapted to gather data on factors influencing HCW compliance with IPC. The instrument was evaluated by the supervisor of this project and pre-tested in a similar setting and cadre of respondents to ensure its reliability. Before data collection, ethical clearance was sought from the Institutional Review Board (IRB) of the University of Cape Coast. Data

collection under strict Covid 19 safety protocols was done within two months by the researcher and a trained assistant. Collected data was coded and entered into SPSS version 23 to answer the six research questions. Descriptive statistics with frequency tables, mean, and standard deviation were used. The last question was, however, answered using a non-parametric test, Mann-Whitney Test.

Chapter Four presented and discussed results in the context of relevant literature. Here, the characteristics of the sample and significant findings based on the research questions were examined concerning previous literature—the last chapter of the research covered a summary, conclusion, and recommendation. The identified gaps and suggestions emanating from the study are reported here.

Key Findings of the Study

The main aim of this study was to explore factors influencing healthcare worker compliance with infection prevention and control in the Sunyani Regional Hospital, Ghana. Underlisted are the main findings of this research:

It was discovered that IPC facilities were available to HCWs in the Sunyani Regional Hospital, though they were inadequate. This was especially in the case of running water for the hospital and PPEs.

It was also discovered that although some safety precautions were strictly enforced among HCWs in the hospital, precautionary measures on respiratory hygiene and cough etiquette were not apparent to some staff. It was discovered these precautions did not exist, or some staff were unaware if they existed.

Another seminal finding of the study was the high level of IPC compliance among clinical HCWs in the hospital. However, it was revealed that using face shields/protective glasses and water-resistant boots was low. These instances went against the expectations of IPC compliance.

The study also realised that HCWs were highly exposed to various degrees of occupational injuries. This was especially so when it came to the issue of exposure to splash and body fluids, a situation that could foster the spread of pathogens.

Time and staffing constraints were significant challenges among HCWs in the hospital. However, the worst challenge revealed by the study was the difficulty in reporting safety concerns.

Regarding the last objective, it was revealed that in IPC compliance, there was no significant statistical difference between male and female clinical HCWs.

Conclusions

The main objective of this study was to explore factors influencing healthcare worker compliance with infection prevention and control in the Sunyani Regional Hospital. The study found a high level of IPC compliance among HCWs in the Sunyani Regional Hospital. This level of compliance, if sustained, is a significant driver of quality healthcare delivery and the realisation of Sustainable Development Goal 3 (SDG 3). Several factors were identified to have fostered this compliance; however, irregular water supply, inadequate PPEs, time constraints due to understaffing, and difficulty reporting safety concerns threatened compliance. Besides, it was also noted that HCWs were highly exposed to occupational injuries.

Providing needed IPC facilities in sufficient quantities is associated with high compliance with safety protocols, and this will go a long way toward addressing the concerns of the HCWs in the Sunyani Regional Hospital. Thus, collaborative and proactive efforts are needed from all actors to manage and overcome these challenges in the hospital.

Recommendations

Based on the findings of the study, the following recommendations are put forward for consideration:

1. Sunyani Regional Hospital's leadership should regularly secure sufficient IPC materials and PPEs for HCWs in all hospital departments. This will promote quality service delivery and reduce the spread of communicable diseases.
2. Supervising and enforcing safety protocols by the hospital leadership among HCWs should be integral to healthcare delivery and not limited to epidemics, such as the recent COVID-19 outbreak. Also, regular in-service staff training on IPC practice is imperative for good compliance with safety protocols.
3. The Ghana Health Service and the hospital management should take proactive steps to create a decent and safe working environment for all staff. This will build a healthy workforce, reduce costs, and propel effective service delivery.
4. To ensure smooth and quality service delivery, management, especially the hospital's human resource unit, needs to engage and keep adequate qualified staff to reduce the unbearable workload on a few hands.

5. In maintaining high compliance in infection prevention among staff, leadership should conduct regular audit of IPC practice, and promote adherence to evidence-based practise in the hospital.
6. Male and female HCWs require same continuous and regular capacity building in the area of IPC. The Ministry of Health and the hospital leadership especially, should promote gender-friendly IPC programmes that are suitable for both sexes irrespective of their gender inclination.

Suggestion for Further Research

I suggest that, as IPC is broad and has many components, future researchers should investigate specific domains of IPC, making a comparison among health institutions in Ghana using qualitative and observational data collection methods, as a different approach to the study to unearth the perspectives of the HCWs as it pertains to their work environment. This approach would also provide a deeper insight into factors influencing HCW compliance with IPC.

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APPENDICES

APPENDIX A

UNIVERSITY OF CAPE COAST

COLLEGE OF EDUCATION STUDIES

FACULTY OF SCIENCE AND TECHNOLOGY EDUCATION

DEPARTMENT OF HEALTH, PHYSICAL EDUCATION AND RECREATION

QUESTIONNAIRE

You are invited to participate in a research study about Healthcare Worker (HCW) Compliance with Infection Prevention and Control (IPC): A Case Study of Sunyani Regional Hospital Ghana. Findings from this study will help build healthcare worker capacity in the fight against healthcare-associated infections. By agreeing to participate in this study, you are requested to respond to the questions below as honestly as possible and to the best of your ability. Data from this exercise is anonymous and will be used for academic purposes only. The decision to participate in the study is optional. You have the right to ask questions about this study from the Department of Health, Physical Education and Recreation (HPER) of the University of Cape Coast or contact the student of this project, Benjamin Liribu (benjamin.liribu@gmail.com / 02444044893)

Dept of Respondent…….

	Section A: Healthcare worker characteristics	
Q1	Age in years	
Q2	Gender	1, Male [ ] 2, Female [ ]
Q3	Marital status	1, Married [ ] 2, Single [ ] 3, Separated/divorced [ ] 4. Widowed [ ]
Q4	Highest qualification	1, Basic education [ ] 2, Secondary level qualification [ ] 3, Certificate [ ] 4, Diploma [ ] 5, Bachelors [ ] 6, Masters [ ]
Q5	Type of health professional	1, Clinical [ ] 2, Non-clinical [ ]
Q6	How many years have you been working	……
	Section B: Availability of IPC facilities	

Q7	In the past month, have you experienced an interruption in the water supply in this facility?	1, Yes 2, No	[ ] [ ]
Q8	Is PPE available in sufficient quantity in this healthcare facility?	1, Yes 2, No	[ ] [ ]
Q9	Are enough cleaning materials (detergent, mops, buckets, etc.) available?	1, Yes 2, No	[ ] [ ]
Q10	Do you have functional waste collection containers for non-infectious (general) waste, infectious waste and sharps waste?	1, Yes 2, No	[ ] [ ]
Q11	Do you easily access non-water hand hygiene materials (alcohol-based hand rub, soap, clean single-use towels)?	1, Yes 2, No	[ ] [ ]
Q12	Do you have easy access to post-exposure prophylaxis for occupational injuries in your facility?	1, Yes 2, No	[ ] [ ]
	Section C: Safety precautions in healthcare activities		
	Does your facility enforce the following practices according to IPC guidelines:		
Q13	Hand hygiene practice?	1, Yes	[ ]

		2, No [ ] 3, Unknown [ ]
Q14	Use Personal Protective Equipment (Gloves, mask, face shield or goggles).	1, Yes [ ] 2, No [ ] 3, Unknown [ ]
Q15	Respiratory hygiene or cough etiquette?	1, Yes [ ] 2, No [ ] 3, Unknown [ ]
Q16	Sharp safety (work practice and control disposal)?	1, Yes [ ] 2, No [ ] 3, Unknown [ ]
Q17	Sterile instruments and devices?	1, Yes [ ] 2, No [ ] 3, Unknown [ ]
Q18	Clean and disinfect environmental surfaces?	1, Yes [ ] 2, No [ ] 3, Unknown [ ]
Q19	Waste segregation and management?	1, Yes [ ] 2, No [ ] 3, Unknown [ ]
	NB: *If the HCW responds 'Yes' to Question 21, they are considered to have a higher occupational risk. Thus, I am qualified to proceed to answer questions from -Q21 -. Q24*	

	Section D: IPC compliance during healthcare interactions	
	For the following questions, please quantify the frequency with which you use PPE, as recommended: 'Always, as recommended' means more than 95% of the time; 'Most of the time' means 50% or more but not 100%; 'occasionally' means 20% to under 50% and, 'Rarely' means less than 20%.	
Q20	Do you carry out invasive procedures (e.g., Surgery, open airway suctioning, nebuliser treatment, wound dressing, parenteral treatment, urinary catheter, etc.) that require wearing PPE?	1, Yes [ ] 2, No [ ]
Q21	**If yes, indicate how often you use each item of PPE below.**	
	Surgical or single-use gloves	1, Always, as recommended [ ] 2, Most of the time [ ] 3, Occasionally [ ] 4, Rarely [ ]
	Surgical mask	1, Always, as recommended [ ] 2, Most of the time [ ] 3, Occasionally [ ] 4, Rarely [ ]

	Face shield or goggles/protective glasses	1, Always, as recommended [ ] 2, Most of the time [ ] 3, Occasionally [ ] 4, Rarely [ ]
	Gown and aprons	1, Always, as recommended [ ] 2, Most of the time [ ] 3, Occasionally [ ] 4, Rarely [ ]
	Water-repellent boots (water-proof boots)	1, Always, as recommended [ ] 2, Most of the time [ ] 3, Occasionally [ ] 4, Rarely [ ]
Q22	Do you remove and replace your PPE per protocol for separate patient procedures?	1, Always, as recommended [ ] 2, Most of the time [ ] 3, Occasionally [ ] 4, Rarely [ ]
Q23	During healthcare activities, do you perform hand hygiene before and after procedures?	1, Always, as recommended [ ] 2, Most of the time [ ] 3, Occasionally [ ] 4, Rarely [ ]

24	Under Safe Injection Protocol, do you practice an aseptic technique during parenteral treatment?	1, Always, as recommended [ ] 2, Most of the time [ ] 3, Occasionally [ ] 4, Rarely [ ]
	Section E: Occupational injuries among healthcare workers	
Q25	*For the following types of injury, please indicate the frequency with which you experience them within 12 months: 'Always' means 3 or more times; 'occasionally' means twice; 'rarely' means once or zero injuries.*	
	Splashes from blood and body fluids	1, Always, [ ] 2, Occasionally, [ ] 3, Rarely [ ]
	Cuts from other sharp objects	1, Always, [ ] 2, Occasionally, [ ] 3, Rarely [ ]
	Needle sticks	1, Always, [ ] 2, Occasionally, [ ] 3, Rarely [ ]
	Slips/Falls	1, Always, [ ] 2, Occasionally, [ ]

		3, Rarely [ ]
	Splashes from hazardous chemicals	1, Always, [ ] 2, Occasionally, [ ] 3, Rarely [ ]
	Burns	1, Always, [ ] 2, Occasionally, [ ] 3, Rarely [ ]
	Others	1, Always, [ ] 2, Occasionally, [ ] 3, Rarely [ ]
	Section F: challenges with IPC compliance	
Q26	Do you have an active IPC programme in your facility?	1, Yes [ ] 2, No [ ]
Q27	Are there regular IPC staff training programmes in the facility?	
Q28	Do you have time constraints when carrying out any infection prevention protocol?	1, Yes [ ] 2, No [ ]
Q29	Is staffing in this facility sufficient to handle the number of patients?	1, Yes [ ] 2, No [ ]
Q30	Is it difficult to report safety concerns to facility management?	1, Yes [ ] 2, No [ ]

APPENDIX B

ETHICAL CLEARANCE LETTER

UNIVERSITY OF CAPE COAST
INSTITUTIONAL REVIEW BOARD SECRETARIAT
TEL: 0558093143 / 0508878309
E-MAIL: irb@ucc.edu.gh
OUR REF: UCC/IRB/A/2016/1338
YOUR REF:
OMB NO: 0990-0279
IORG #: IORG0009096

22ND APRIL, 2022

Mr. Benjamin Liribu
Department of Health, Physical Education and Recreation
University of Cape Coast

Dear Mr. Liribu,

ETHICAL CLEARANCE – ID (UCCIRB/CES/2022/10)

The University of Cape Coast Institutional Review Board (UCCIRB) has granted Provisional Approval for the implementation of your research **Healthcare Worker Compliance with Infection Prevention and Control: A Case Study of Sunyani Regional Hospital, Ghana.** This approval is valid from 22nd April, 2022 to 21th April, 2023. You may apply for a renewal subject to submission of all the required documents that will be prescribed by the UCCIRB.

Please note that any modification to the project must be submitted to the UCCIRB for review and approval before its implementation. You are required to submit periodic review of the protocol to the Board and a final full review to the UCCIRB on completion of the research. The UCCIRB may observe or cause to be observed procedures and records of the research during and after implementation.

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

Always quote the protocol identification number in all future correspondence with us in relation to this protocol.

Yours faithfully,

Samuel Asiedu Owusu, PhD
UCCIRB Administrator

ADMINISTRATOR
INSTITUTIONAL REVIEW BOARD
UNIVERSITY OF CAPE COAST

APPENDIX C

TURNITIN REPORT

HEALTHCARE WORKER COMPLIANCE WITH INFECTION PREVENTION AND CONTROL: A CASE STUDY OF SUNYANI REGIONAL HOSPITAL, GHANA

ORIGINALITY REPORT

17%	16%	8%	7%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	erl.ucc.edu.gh:8080 Internet Source	1%
2	ugspace.ug.edu.gh Internet Source	1%
3	ir.ucc.edu.gh Internet Source	1%
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