ASSESSMENT OF KNOWLEDGE ON INFECTION PREVENTION AND CONTROL AMONG RADIOGRAPHERS AT UNIVERSITY OF BENIN TEACHING HOSPITAL, BENIN CITY , EDO STATE

BY

EMEKA-ILOH GOD'SGIFT OSAWESE

BMS2101804

DEPARTMENT OF RADIOGRAPHY

SCHOOL OF BASIC MEDICAL SCIENCES

COLLEGE OF MEDICAL SCIENCES

UNIVERSITY OF BENIN CITY

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EMEKA-ILOH GOD'SGIFT OSAWESE

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SUPERVISOR: MR. UGBABE JOHNSON EBUTE

OCTOBER 2025

CERTIFICATION

This is to certify the project on ASSESSMENT OF KNOWLEDGE ON INFECTION PREVENTION AND CONTROL AMONG RADIOGRAPHERS AT UNIVERSITY OF BENIN TEACHING HOSPITAL, BENIN CITY , EDO STATE written by EMEKA-ILOH GOD'SGIFT OSAWESE with matriculation number BMS2101804 in partial fulfillment of the Bachelor of Radiography Degree (B.Rad) in the DEPARTMENT OF RADIOGRAPHY, SCHOOL OF BASIC MEDICAL SCIENCES, UNIVERSITY OF BENIN.

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MR. UGBABE JOHNSON EBUTE ….……..……

(Supervisor) Date

….……

MRS. F. O. IGBINEDION ….…….

(Head of Department) Date

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EXTERNAL EXAMINER Date

DEDICATION

I dedicate this project defense first and foremost to God, whose guidance and strength have been my foundation through every challenge. To my beloved grandma, whose love and wisdom have inspired me to persevere and believe in myself. To my dad, whose support and encouragement have been my steady anchor. And to myself, for the hard work, determination, and resilience that have brought me to this moment. This achievement is a reflection of the love, faith, and effort we share and I'm so grateful.

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ABSTRACT

Infection prevention and control (IPC) measures are a cornerstone of safe healthcare delivery, aimed at minimizing the risks of healthcare-associated infections (HAIs) among patients, radiographers and the broader community. The study aimed to assess the knowledge and comprehension of infection prevention and control methods among radiographers at UBTH. The study utilized a cross sectional descriptive design with a sample size of 31 radiographers. The results showed that knowledge levels were high, with 96.8% correctly defining IPC, 100% identifying its aim as infection prevention, and 100% recognizing PPE components. While 71.0% always used PPE and 61.3% always followed hand hygiene, only 51.6% sometimes cleaned equipment after use, sometimes received updates, and sometimes reported breaches. This indicated moderate-to-high compliance with notable gaps. The greatest challenge was inadequate training and resources, cited by 61.3% of respondents. Additionally, 51.6% always felt at risk of infection during procedures, while limited access to PPE and weak management support were also identified. The chi-square test showed $\chi^2 = 0.11$, df = 2, p = 0.95. Since $p > 0.05$, the null hypothesis was accepted, indicating no significant relationship between knowledge and compliance of IPC among radiographers at UBTH. In conclusion the study revealed that radiographers at UBTH possess high knowledge of IPC principles, particularly regarding hand hygiene, PPE use, and sharps disposal. However, compliance was inconsistent, especially in areas requiring institutional reinforcement, such as equipment cleaning, reporting breaches, and receiving regular protocol updates. The major barriers identified were lack of training opportunities.

Keywords: Knowledge, compliance, challenges, infection prevention control, healthcare-associated infections.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Infection prevention and control (IPC) measures are a cornerstone of safe healthcare delivery, aimed at minimizing the risks of healthcare-associated infections (HAIs) among patients, clinical staff and the broader community. The importance of IPC has been well-documented in both high-income and low- and middle-income countries (LMICs), with global health organizations advocating for stronger measures to reduce morbidity, mortality, and healthcare costs associated with preventable infections (World Health Organization [WHO], 2021). Despite these efforts, HAIs continue to pose a significant public health burden, especially in LMICs where health systems are often fragile, under-resourced, and overwhelmed (Maki & Zervos, 2021). The COVID-19 pandemic dramatically underscored the critical need for robust IPC practices across all healthcare settings. During the pandemic, lapses in IPC not only fueled the spread of the SARS-CoV-2 virus within healthcare facilities but also intensified the burden on already strained health systems (Greaves et al., 2023; Tomczyk et al., 2021). Moreover, COVID-19 exposed long-standing gaps in radiographers training, resource allocation, and institutional readiness, thereby bringing IPC compliance into sharper focus on the global health agenda (Houghton et al., 2021; Smallwood et al., 2022). In Nigeria, and by extension in institutions like the University of Benin Teaching Hospital (UBTH), the challenges facing IPC implementation are multifaceted. Studies have highlighted that low awareness, poor compliance, inadequate supply of personal protective equipment (PPE), and substandard waste management practices contribute significantly to the high rates of HAIs in Nigerian hospitals (Ogboghodo et al., 2021; Igwe et al.,

2024). Furthermore, cultural beliefs, resource limitations, and insufficient governmental support have also been implicated in undermining IPC efforts (Ezeudu et al., 2022).

Hand hygiene remains a central pillar of IPC but is frequently neglected in clinical practice. Observational studies reveal a consistent gap between self-reported and actual compliance rates among radiographers, often due to complacency, high workload, and lack of access to hand hygiene facilities (Diefenbacher et al., 2022; Ibrahim et al., 2021). Interventional studies utilizing training, electronic reminders, and voice prompts have demonstrated some success in improving compliance (Chakma et al., 2024), but sustaining such behavior change requires more than technical solutions; it necessitates a deep-rooted culture of safety and institutional commitment. The Health Belief Model (HBM) provides a useful theoretical framework for understanding radiographers's IPC behaviors. The HBM suggests that an individual's perception of susceptibility to infection, the perceived severity of health consequences, perceived benefits of preventive action, and perceived barriers to action all influence compliance behavior (Anuar et al., 2020; Devi et al., 2022). Additionally, self-efficacy—the belief in one's ability to successfully perform IPC measures—plays a crucial role in determining adherence levels.

Incorporating multidisciplinary collaboration into IPC programs has also been emphasized in recent literature. Effective IPC requires coordination among various cadres of healthcare providers, including doctors, nurses, laboratory staff, cleaners, and administrative personnel (Alqahtani et al., 2022). Strengthening teamwork and communication within healthcare institutions is therefore vital to ensuring a unified approach to infection prevention.

The role of healthcare waste management in IPC cannot be overstated. Improper waste disposal practices increase the risk of pathogen transmission within healthcare facilities and the surrounding environment (Aziz et al., 2022). Studies have shown that many clinical staff lack sufficient training in waste segregation, disposal, and recycling protocols, thus highlighting another critical area for intervention (Ezeudu et al., 2022). In Nigeria, while there are national IPC guidelines aligned with international standards, implementation at the institutional level remains inconsistent. Research conducted by Ochie et al. (2022) indicated that many clinical staff in Nigerian tertiary hospitals had inadequate knowledge of IPC principles, and even fewer demonstrated consistent compliance in practice. Factors identified as barriers included lack of institutional enforcement, limited availability of resources, poor training, and attitudinal factors such as risk perception and complacency.

At UBTH, anecdotal evidence and limited published data suggest that although efforts have been made to improve IPC practices, significant gaps remain, particularly in adherence to hand hygiene protocols, PPE usage, environmental cleaning, and safe waste management (Kouko, 2023). As a tertiary healthcare facility, UBTH serves as a referral center for many states in Nigeria, making the strengthening of IPC practices at the institution particularly critical. Failure to address IPC lapses could have wide-reaching consequences for patient outcomes, healthcare worker safety, and public health at large. The WHO's latest Global Report on Infection Prevention and Control (2023a) urges healthcare systems to build resilience by investing in IPC infrastructure, fostering leadership commitment, enhancing training, and promoting a safety culture among radiographers. Without systematic and sustained efforts to improve knowledge

and compliance with IPC measures, healthcare institutions risk continued outbreaks of HAIs, increased antimicrobial resistance, and exacerbated health inequities (WHO, 2023b).

Thus, assessing the level of knowledge and comprehension of IPC methods among radiographers at UBTH is crucial. It will provide empirical evidence needed to guide institutional policy reforms, training initiatives, and infrastructural improvements aimed at enhancing the quality of healthcare delivery and protecting public health. Moreover, identifying gaps between knowledge and practice can inform the design of targeted interventions tailored to the specific needs and challenges of the UBTH healthcare workforce.

1.2 Statement of problem

The scale of IPC non-compliance at UBTH is broad, affecting. UBTH, being a major referral center in southern Nigeria, caters to a substantial patient population, amplifying the risks associated with lapses in IPC. National and international studies indicate that in similar settings, compliance rates with basic IPC protocols, such as hand hygiene, can be as low as 20%–40% (WHO, 2023a; WHO, 2023b). Poor adherence to environmental hygiene, appropriate PPE usage, and medical waste management further compounds the risk of HAIs within hospital premises (Chakma et al., 2024). The widespread nature of these compliance gaps suggests a systemic issue that has potential ramifications not only within the hospital but across the broader community it serves. Failure to adequately address IPC compliance has significant and far-reaching consequences. For patients, non-compliance increases the risk of acquiring infections during hospitalization, which may result in prolonged hospital stays, increased morbidity and mortality, and elevated healthcare costs (Tomczyk et al., 2021). Radiographers face an increased risk of

occupational exposure to infectious diseases, contributing to workforce depletion through illness, absenteeism, or psychological distress (Smallwood et al., 2022). Furthermore, inadequate IPC practices facilitate the spread of antimicrobial-resistant organisms, posing a critical threat to public health at large (WHO, 2021). If left unaddressed, these challenges could undermine public confidence in the healthcare system and exacerbate the strain on already limited health resources.

While general knowledge of IPC practices exists among radiographers, studies have revealed discrepancies between knowledge and actual practice (Aziz et al., 2022). In the context of UBTH, there is a paucity of comprehensive data that specifically examines both the knowledge and actual compliance levels among different categories of radiographers. Furthermore, previous studies have often focused on isolated aspects of IPC, such as hand hygiene, without a holistic exploration of other critical domains like PPE use, waste management, environmental hygiene, and administrative support structures (Ogboghodo et al., 2021; Chakma et al., 2024). Additionally, few studies have assessed the institutional barriers that impede compliance, such as resource availability, training opportunities, and organizational culture. The absence of such detailed, context-specific evidence hampers the development of targeted interventions aimed at improving IPC practices. This study seeks to bridge the identified knowledge gap by assessing the level of knowledge and compliance with IPC measures among radiographers at the University of Benin Teaching Hospital. By systematically investigating radiographers' knowledge, practices, and perceived barriers to IPC adherence, the study aims to generate actionable evidence that can inform the design of targeted training programs, enhance resource allocation, and strengthen institutional IPC frameworks. Ultimately, the study endeavors to

contribute to the reduction of HAIs, promote radiographers safety, and enhance the overall quality of patient care at UBTH.

1.3 Research questions

1. What is the level of knowledge of infection prevention and control (IPC) among radiographers at UBTH?
2. What is the level of compliance to infection prevention and control (IPC) among radiographers at UBTH?
3. What are the challenges experienced by radiographers in adhering to infection prevention and control (IPC) at UBTH?

1.4 Research hypothesis

Null Hypothesis: There is no significant relationship between the level of knowledge and level of compliance to infection prevention and control (IPC) among radiographers at UBTH.

Alternative Hypothesis: There is significant relationship between the level of knowledge and level of compliance to infection prevention and control (IPC) among radiographers at UBTH.

1.5 Aim of the Study

The study aims to assess the knowledge and comprehension of infection prevention and control methods among radiographers at UBTH.

1.6 Objectives of the Study

1. To assess radiographers' knowledge of basic infection prevention and control practices.

2. To evaluate the compliance levels with infection prevention and control measures among radiographers at UBTH.

3. To assess the challenges faced by radiographers in adhering to infection prevention and control procedures.

1.7 Significance of the Study

The study is important for improving patient safety by identifying gaps in IPC knowledge and practice, reducing HAIs at UBTH, and supporting global IPC standards, it will contribute insights into the challenges radiographers face in adhering to IPC protocols, leading to better hospital policies and resource allocation. It will strengthen IPC measures to reduce the spread of infections within healthcare settings, serving as a model for other hospitals in Nigeria.

1.8 Scope of the Study

The study focused on radiographers at UBTH. It will assess knowledge through surveys without directly observing IPC practices in real-time. The findings will be specific to UBTH radiographers and may not be generalizable to other hospitals.

1.9 Operational definition of terms

Infection Prevention and Control (IPC): The standard practices and measures implemented by radiographers to prevent and reduce the spread of infections within healthcare settings.

Healthcare-Associated Infections (HAIs): Infections acquired by patients during their stay in a healthcare facility that were not present at the time of admission.

Knowledge of IPC: The level of awareness and understanding radiographers have about IPC principles, guidelines, and best practices.

Compliance with IPC Measures: The extent to which radiographers consistently follow recommended IPC protocols in their daily clinical activities.

Challenges in IPC Adherence: The difficulties radiographers face in implementing IPC measures, including lack of resources, high workload, or inadequate training.

CHAPTER TWO: LITERATURE REVIEW

2.1 Conceptual Review

2.1.1 Overview of Infection Prevention and Control (IPC)

Infection Prevention and Control (IPC) refers to a complete collection of processes and policies aimed to prevent the spread of infections, mainly in hospital settings. These practices are founded on evidence-based policies aimed at limiting the transmission of infectious illnesses among patients, healthcare personnel, and visitors (Costa et al., 2021). The World Health Organization (WHO) characterises IPC as a scientific approach with practical solutions that minimise the prevalence of healthcare-associated infections (HAIs) by rigorous hygiene and environmental care (WHO, 2023). The idea is vital to healthcare delivery as it fulfils the dual goals of ensuring patient safety and providing a healthy work environment for radiographers. IPC encompasses a range of treatments and procedures that are crucial for treating infections caused by bacteria, viruses, fungi, and parasites (WHO, 2021). These treatments include hand hygiene, sterilization of medical equipment, utilisation of personal protective equipment (PPE), environmental cleaning, isolation of infected patients, and immunisation programs. Hand cleanliness, for instance, is considered the cornerstone of IPC and is promoted as the single most effective strategy of reducing the transmission of infectious microorganisms within healthcare facilities. When combined with other IPC measures, such as the use of PPE and regular cleaning of surfaces, the risk of infections may be drastically minimised (Morris and Murray, 2021).

The scope of IPC extends beyond individual patient care to embrace the management of healthcare facilities and public health initiatives. It plays a significant role in reducing outbreaks

of illnesses such as TB, influenza, and COVID-19, all of which pose major dangers in clinical settings. IPC measures are not only vital for the protection of immunocompromised patients but also for safeguarding radiographers who are routinely exposed to infectious infections. In the absence of effective IPC systems, healthcare facilities may become epicenters for disease outbreaks, leading to avoidable morbidity, death, and financial burdens on healthcare systems (Andrew, 2024).

Globally, healthcare-associated infections (HAIs) pose a serious public health hazard, responsible for millions of diseases and deaths annually. According to the WHO, roughly 7% of patients in high-income countries and 15% in low- and middle-income countries get at least one HAI during hospital stays (WHO, 2023). These infections often result in lengthier hospital hospitalisations, greater medical expenses, and an increased risk of complications and mortality. The occurrence of HAIs is most obvious in resource-limited settings where healthcare infrastructure is insufficient, personnel shortages persist, and basic supplies like PPE and antiseptics are typically unavailable (Maki and Zervos, 2021).

In Nigeria, the obstacles involved with adopting effective IPC measures are reflected in greater systemic concerns in the healthcare industry. Despite the adoption of national IPC standards by the Federal Ministry of Health, adherence is variable among healthcare facilities, especially tertiary institutions like the University of Benin Teaching Hospital (UBTH) (Ogboghodo et al., 2021). The need of IPC was further underlined during the COVID-19 pandemic, which showed gaps in global healthcare systems' readiness for infectious disease epidemics. The pandemic underlined the importance for healthcare personnel to follow rigorously to IPC protocols to avoid

cross-infection among patients and staff. It also identified major gaps in the availability of PPE, hand sanitizers, and training on IPC procedures, particularly in low-resource settings. Lessons from the pandemic have highlighted the necessity for continual investment in IPC training, resource allocation, and monitoring mechanisms to achieve lasting improvements in infection control procedures (Tomczyk et al., 2021).

The WHO's framework for IPC includes critical aspects that healthcare organisations must embrace to ensure successful infection control. These elements include: (1) a clearly defined IPC program supported by institutional leadership, (2) regular training and education for radiographers, (3) availability of necessary resources such as PPE and disinfectants, (4) effective communication and collaboration among healthcare teams, and (5) rigorous monitoring and evaluation of IPC practices (WHO, 2023). Each component is interrelated, underlining the necessity for a comprehensive approach to IPC implementation.

Education and training are crucial for the success of IPC initiatives. radiographers need continual education to remain informed on changing infections, new IPC procedures, and changes in rules. Studies have repeatedly demonstrated that training enhances understanding and adherence to IPC standards among healthcare staff (Zhang et al., 2024). For instance, studies in sub-Saharan Africa found that hospitals with extensive IPC training programs reported considerably reduced incidence of HAIs compared to institutions without such programs (Igwe et al., 2024). These results underline the necessity of incorporating IPC education into the core curriculum for medical and nursing students, as well as continuous professional development programs.

2.1.2 Knowledge of Infection Prevention and Control Among Radiographers

Infection prevention and control (IPC) is a critical component of healthcare delivery, aimed at reducing healthcare-associated infections (HAIs) and ensuring patient and staff safety. The knowledge of IPC among radiographers directly impacts their compliance with infection control measures, which is essential for preventing the spread of infectious diseases (Alhumaid et al., 2021). Understanding the level of IPC knowledge among RADIOGRAPHERSs and the factors that influence it can provide insights into improving infection control strategies within healthcare settings.

Knowledge of IPC encompasses an understanding of standard precautions, transmission-based precautions, hand hygiene, personal protective equipment (PPE) usage, environmental cleanliness, and waste disposal (Andrew, 2024). According to Alqahtani et al. (2022), IPC knowledge is fundamental to implementing multidisciplinary infection control strategies in healthcare settings. However, despite its importance, studies have shown that many radiographers have gaps in IPC knowledge, leading to poor compliance with standard protocols (Alhumaid et al., 2021).

Several factors influence the level of IPC knowledge among radiographers. One of the most significant determinants is education and training. Continuous professional development programs have been identified as key enablers of IPC adherence (Aika & Enato, 2022). Without regular training and reinforcement of IPC protocols, radiographers may lack updated knowledge on emerging infection control strategies. Additionally, workplace culture and institutional support play a crucial role in shaping radiographers' understanding and implementation of IPC

measures. Studies have shown that institutions with strong infection control leadership tend to have higher levels of IPC knowledge and compliance among staff (Assiri et al., 2021).

Another major factor affecting IPC knowledge is access to resources and materials. Hospitals that experience shortages of PPE, disinfectants, and proper waste management systems may inadvertently contribute to reduced adherence to IPC guidelines (Aziz et al., 2022). Furthermore, workload and time constraints can limit the ability of radiographers to practice proper IPC measures consistently. In high-pressure healthcare environments, workers may prioritize patient care over strict adherence to infection control protocols, leading to increased risks of HAIs (Adams et al., 2021).

Deficiencies in IPC knowledge among radiographers can have significant implications for healthcare delivery. Poor infection control practices contribute to increased HAIs, prolonged hospital stays, and higher treatment costs for patients (Andrew, 2024). Furthermore, inadequate IPC knowledge can compromise the safety of radiographers themselves, leading to occupational exposure to infectious diseases (Alqahtani et al., 2022).

At a broader level, weak IPC knowledge and compliance can undermine public trust in healthcare institutions. In resource-limited settings, where healthcare infrastructure may already be strained, ineffective IPC measures can escalate outbreaks and place additional burdens on the healthcare system (Aika & Enato, 2022). To mitigate these risks, there is a need for continuous IPC education, institutional commitment, and policies that reinforce compliance among radiographers (Assiri et al., 2021).

2.1.3 Importance of Knowledge of IPC Among Radiographers

In healthcare facilities, personnel are continually exposed to infectious pathogens owing to direct contact with patients, invasive medical procedures, and contaminated surfaces or equipment. Knowledge of IPC empowers healthcare personnel with the skills to avoid the beginning and spread of HAIs, which are a substantial cause of illness and death globally (Alqahtani et al., 2022). HAIs include infections such as bloodstream infections, pneumonia, surgical site infections, and urinary tract infections, all of which impair patient safety and contribute to longer hospital stays and greater medical expenditures (Kamble, 2020). Inadequate IPC knowledge may result in avoidable infections that delay recovery durations, complicate treatment strategies, and in extreme situations, lead to patient mortality (Alqahtani et al., 2022). For example, a research by Alhumaid et al. (2021) indicated that hospitals with well-trained personnel reported considerably reduced incidence of surgical site infections compared to those with minimal IPC training.

Radiographers are at significant risk of occupational exposure to infectious illnesses, including TB, hepatitis, and new viruses like COVID-19. Knowledge of IPC helps them comprehend and adhere to procedures that limit their exposure risk (Alhumaid et al., 2021). The effective use of PPE, such as gloves, masks, and gowns, may avoid direct contact with infectious organisms. Without a clear awareness of these rules, radiographers may unknowingly expose themselves and their coworkers at risk of infection (Draper, 2022).

In resource-constrained contexts, such as those common in low and middle income nations, expenses may strain already restricted healthcare resources. Knowledgeable healthcare personnel

who adhere to IPC guidelines help decrease the incidence of HAIs, consequently minimising cost constraints on healthcare facilities and patients. The indirect advantages of enhanced IPC knowledge also include decreased worker absences due to sickness, which helps maintain appropriate staffing levels in healthcare organisations (Kouko, 2023).

Global health organizations, such as the World Health Organization (WHO), have published IPC standards that explain the best practices for infection prevention in hospital settings. National governments, particularly Nigeria, have also introduced IPC policies customised to local settings. Healthcare personnel' awareness of these criteria is vital for attaining compliance and satisfying accreditation requirements. Knowledge gaps among radiographers might lead to uneven execution of these regulations, weakening attempts to standardize infection prevention procedures throughout the nation (Price, 2022).

Beyond specific healthcare institutions, the awareness of IPC among healthcare personnel has larger consequences for public health. Effective IPC procedures at hospitals lower the likelihood of community spread of infectious illnesses, adding to overall disease control efforts. Radiographers serve as a critical connection between hospital and community settings, and their adherence to IPC policies may greatly affect public health outcomes (Burton et al., 2023).

2.1.4 Components of IPC Practices

Infection Prevention and Control (IPC) procedures represent a comprehensive collection of measures meant to prevent the spread of infections in healthcare environments. These procedures attempt to safeguard patients, healthcare staff, and the society at large by reducing the spread of infectious pathogens.

Hand Hygiene

Hand hygiene is commonly acknowledged as the cornerstone of IPC procedures. It includes the cleaning of hands to eliminate or destroy bacteria, hence minimising the danger of transferring infections. The relevance of hand hygiene arises from the fact that healthcare personnel routinely use their hands to conduct clinical duties, making them a main vehicle for disease transmission.

Healthcare personnel are encouraged to undertake hand hygiene using two basic methods: washing with soap and water or using an alcohol-based hand rub (ABHR) (Kramer et al., 2022). The WHO's "Five Moments for Hand Hygiene" describes important times when hand hygiene must be performed:

- Before touching a patient.
- Before undertaking aseptic operations.
- After exposure to body fluids.
- After touching a patient.
- After contact with patient settings (Diefenbacher et al., 2022).

Studies have indicated that adherence to adequate hand hygiene may lower HAIs by up to 50% However, challenges such as time limits, lack of resources, and insufficient expertise among healthcare personnel sometimes hamper compliance. Healthcare institutions must provide the availability of hand hygiene materials, such as sinks, soap, ABHR, and paper towels. Also, instructional programs, audits, and feedback systems may promote compliance among healthcare professionals (Donati et al., 2020).

Personal Protective Equipment (PPE)

Personal Protective Equipment (PPE) acts as a barrier between healthcare personnel and infectious pathogens, safeguarding both the user and those they deal with. PPE comprises gloves, masks, gowns, goggles, face shields, and respirators, each having a distinct role in infection prevention (Verbeek et al., 2020).

The optimal selection of PPE depends on the kind of operation, the amount of risk, and the route of disease transmission. For example, gloves are worn for direct contact with blood or body fluids, whereas masks and respirators are used for operations that create aerosols. Proper donning and doffing practices are crucial to prevent contamination during PPE usage (Park, 2020).

In resource-limited environments, PPE shortages constitute a substantial impediment to compliance. During the COVID-19 pandemic, several healthcare institutions encountered acute PPE shortages, exposing personnel to heightened risks of infection (Leaver et al., 2022).

Environmental Cleaning and Disinfection

The hospital environment plays a vital role in the transmission of germs, especially on high-touch surfaces such as bedrails, doorknobs, and medical equipment. Environmental cleansing and disinfection are thus crucial to IPC procedures. Healthcare institutions must set cleaning schedules that emphasise patient care areas, isolation units, and operating theaters (Humphreys et al., 2023). Disinfectants with established efficiency against common pathogens should be used to assure surface decontamination. Reusable medical equipment, such as surgical tools and endoscopes, must undergo sterilization operations to eradicate all bacteria. Sterilization processes include autoclaving, ethylene oxide gas, and chemical disinfectants. Failure to effectively sterilize equipment has been associated with HAIs, underlining the necessity for careful

adherence to standards. Environmental cleaning professionals need training on the proper use of cleaning products and processes. Regular monitoring and feedback guarantee that cleaning requirements are constantly fulfilled (Assiri et al., 2021).

Isolation and Cohorting of Patients

Isolation procedures are necessary for handling patients with infectious illnesses. By segregating these individuals from others, healthcare institutions may limit the spread of diseases. Types of Isolation include

- Contact Precautions: Used for infections spread via direct or indirect contact (e.g., methicillin-resistant Staphylococcus aureus [MRSA]).
- Droplet Precautions: Applied for infections transmitted by respiratory droplets, such as influenza.
- Airborne Precautions: Necessary for illnesses spread by airborne particles, such as TB and measles (Currie, 2022).

Cohorting

In circumstances when individual isolation rooms are unavailable, cohorting (grouping patients with the same infection) might be an effective option. However, careful processes must be followed to avoid cross-contamination (Patterson et al., 2020).

Safe Injection Practices

Unsafe injection practices are a substantial cause of HAIs and bloodborne illnesses, such as hepatitis B, hepatitis C, and HIV. Adherence to proper injection methods decreases these hazards.

Training healthcare personnel on safe injection procedures and monitoring adherence are critical for minimising epidemics related with hazardous practices. Important guidelines include the use of fresh, sterile syringe and needle for each patient, avoiding the reuse of single-dose vials and the disposal of sharps in designated sharps containers immediately after use (Schaefer et al., 2020).

Waste Management

Healthcare waste contains infected, non-infectious, and hazardous items, each needing appropriate disposal strategies to reduce environmental contamination and infection hazards. Infectious waste needs autoclaving or incineration. Hazardous waste must be managed according to environmental safety requirements and Non-infectious garbage may be disposed of using standard waste management systems. Using color-coded containers at the site of waste creation simplifies segregation and decreases the danger of inappropriate disposal (Aziz et al., 2021).

Respiratory Hygiene and Cough Etiquette

Respiratory hygiene tries to prevent the transmission of respiratory germs, such as those causing TB, influenza, and COVID-19. Recommendations include covering the mouth and nose with a tissue or elbow while coughing or sneezing. The disposal of tissues promptly after use and the providing of masks to patients with respiratory complaints. Healthcare institutions may encourage respiratory hygiene by posting instructional posters and assuring the availability of hand sanitizers and masks (WHO, 2023).

Vaccination of Radiographers

Vaccination programs protect radiographers from vaccine-preventable infections, lowering absenteeism and boosting overall infection control. Common vaccinations include Hepatitis B., Influenza and COVID-19. Healthcare organisations must keep vaccination records and give free or discounted immunisations to personnel (Maltezou et al., 2022).

2.1.5 Challenges in Implementing IPC Measures in Healthcare Settings

Achieving consistent compliance with IPC norms is typically tough owing to many systemic, organizational, and human issues. These obstacles are especially obvious in low and middle income countries (LMICs) like Nigeria, where resource limitations and structural inefficiencies increase the difficulties associated with IPC implementation.

Resource Limitations

A fundamental problem in adopting IPC measures is the lack of resources essential for adequate infection control. These resources include personal protection equipment (PPE), hand hygiene supplies, sterilising equipment, and environmental cleaning products. Healthcare institutions, especially in LMICs, regularly encounter shortages of gloves, masks, and gowns. During the COVID-19 epidemic, several hospitals had serious PPE shortages, placing healthcare personnel at higher risk of exposure to infectious pathogens (Lowe et al., 2021).

Hand hygiene is one of the most effective IPC interventions, yet in many healthcare settings, there is limited access to clean water, soap, or alcohol-based hand rubs. According to WHO, one in four healthcare institutions worldwide lacks basic water supplies, which impairs adherence to hand hygiene guidelines (WHO, 2023). Insufficient availability of autoclaves and other

sterilization technologies also impairs the capacity to effectively disinfect reusable medical equipment, increasing the risk of HAIs. Resource restrictions lead to uneven use of IPC measures, leaving both patients and healthcare personnel exposed to infections (WHO, 2020).

Inadequate Training and Knowledge

Healthcare staff need continual education and training to comprehend and apply IPC procedures successfully. Many healthcare facilities nonetheless do not emphasise IPC training owing to funding restrictions or personnel shortages. Studies have demonstrated that many healthcare personnel lack appropriate awareness of IPC standards, such as correct hand washing methods and safe injection practices (Zhang et al., 2024). A research done in Nigeria found that only 60% of healthcare personnel displayed appropriate awareness of IPC principles (Ogboghodo et al., 2021). IPC training is also sometimes provided intermittently, leaving many staff members unprepared for rising risks, including as multidrug-resistant organisms (MDROs) and novel infectious disorders like COVID-19. Conflicting instructions from multiple health agencies might further confuse radiographers and hamper adherence to IPC norms (Egan, 2021).

Poor Compliance with IPC Protocols

Even when IPC resources and training are available, attaining continuous compliance among healthcare personnel remains a problem. Radiographers may disregard IPC regulations owing to time restrictions, weariness, or miscalculation of the consequences associated with non-compliance. Overburdened radiographers generally prioritize essential patient care activities above basic IPC procedures, such as hand hygiene or environmental cleaning. Longstanding

habits and attitudes may also inhibit the adoption of new IPC practices, especially in contexts where healthcare personnel are averse to changes in their routines (Alhumaid et al., 2021).

Cultural and Behavioral Challenges

In certain contexts, healthcare personnel may underestimate the relevance of IPC precautions, assuming that the danger of infection is minor. Isolation and cohorting of infectious patients may be opposed by both patients and radiographers owing to worries about stigmatization. Traditional behaviours, such as unwillingness to use PPE or uneven hand cleanliness might potentially clash with contemporary IPC guidelines (Irfan et al., 2021).

Infrastructure Deficiencies

Many hospitals, especially in resource-limited countries, lack the required infrastructure to support infection control efforts. High patient-to-staff ratios and limited space make it challenging to maintain physical distance and perform isolation measures. Inadequate ventilation systems increase the danger of airborne transmission of infectious pathogens, such as TB and COVID-19. Many healthcare institutions also do not have defined isolation units for handling infected patients, leading to increased cross-contamination (Khan and Nott, 2021).

Emerging Infectious Diseases

The advent of novel infectious illnesses, such as COVID-19, Ebola, and multidrug-resistant bacteria, offers considerable obstacles for IPC implementation. Healthcare institutions may struggle to control outbreaks of new illnesses owing to a lack of planning and resources. The dynamic nature of developing infectious illnesses needs regular modifications to IPC procedures, which might mislead radiographers (Wardhani, 2023).

2.2 Theoretical Review

2.2.1 Health Belief Model (HBM)

The Health Belief Model (HBM) is a psychological framework established in the 1950s to explain health-related behaviors. The concept suggests that individuals' choices to adopt preventive behaviors, such as IPC measures, are driven by their perceptions of health risks and the rewards of taking action. The HBM highlights six essential constructs: perceived vulnerability, perceived severity, perceived advantages, perceived obstacles, signals to action, and self-efficacy. Each component gives insight into how healthcare personnel approach IPC compliance (Anuar et al., 2020).

Perceived susceptibility refers to an individual's judgement of their sensitivity to infections. radiographers who perceive they are at a high risk of developing healthcare-associated infections (HAIs) are more likely to use IPC measures. Studies suggest that during outbreaks, like the COVID-19 pandemic, increasing knowledge of personal vulnerability spurred radiographers to follow closely to standards including hand cleanliness and the use of personal protective equipment (PPE). In contrast, a low sense of danger typically leads to complacency (Cerda and García, 2021).

Perceived severity focuses on individuals' judgement of the probable consequences of getting an illness. Radiographes who understand the serious effects associated with HAIs, including extended hospital admissions, higher death rates, and personal health concerns, are more likely to comply with IPC procedures. Nurses working in critical care units generally display stronger adherence to IPC procedures owing to their understanding of the life-threatening implications of infections in fragile patients (Devi et al., 2022).

This concept also represents individuals' belief in the efficiency of preventative efforts. radiographers who regard IPC measures as useful instruments for preventing infections are more motivated to follow them. Evidence-based training programs and success stories emphasising the effect of IPC compliance on decreasing infection rates may reinforce this impression (Muzayyana and Aini, 2024).

Barriers such as time restrictions, poor resources, and physical pain might dissuade healthcare personnel from adhering to IPC standards. For example, the pain associated with extended PPE wear was a key barrier during the COVID-19 epidemic (Elliott et al., 2023).

External or internal stimuli that cause behavior change are termed signals to action. In the context of IPC, they may include training sessions, reminders from supervisors, banners encouraging hand cleanliness, or news of a local epidemic. Facilities that employ regular reminders and teaching materials frequently report improved adherence to IPC guidelines.

Self-efficacy is the confidence in one's capacity to do a given action. Healthcare staffs with stronger self-efficacy are more likely to adopt IPC measures regularly. This may be done via

hands-on training, skill-building seminars, and mentorship programs (Muzayyana and Aini, 2024).

2.2.2 Application to the Study

The Health Belief Model provides a theoretical foundation for this study by explaining how radiographers' knowledge, perceptions, and attitudes influence their IPC behavior. For example under perceived susceptibility, radiographers at UBTH who are aware and recognize that they are at a daily risk due to a plethora of things like exposed bodily fluids, sharps or aerosols are more likely to adhere to the guidelines stipulated by the IPC. This means that a nurse in the emergency room understands that a monetary slip in glove could potentially expose them to Hepatitis B or even HIV hence making them more alert and cautious.

Also under perceived severity, if radiographers a UBTH downplay the severity of hospital-acquired infections (HAIs), they might neglect IPC protocols. However, if they understand that non-compliance could lead to disability, death, or outbreaks within the hospital, they're more likely to comply strictly.

Under perceived advantages, it is more or less the opposite of perceived severity as it believes that when radiographers in UBTH understand that compliance actually reduces risk, they are more motivated to act accordingly. If they've seen infection rates drop due to improved hygiene, they're likely to become advocates of these practices. It shows that compliance is not just a duty but a life saving habit.

For perceived obstacles, a good example is if a health worker in UBTH knows the protocols but due to unexpected events such as tiredness, exhaustion or lack of supplies, they skip the steps. It blurs the fine line between ignorance and compliance

For signal to action, outbreak should serve as a wake-up call. In UBTH, regular workshops, infection surveillance reports, or even peer-led IPC campaigns could act as these "cues to action."

Lastly with self-efficacy in UBTH, training programs, simulations, mentorship, and supportive feedback can help radiographers build confidence in applying IPC skills consistently even under pressure.

By assessing the knowledge of IPC among radiographers at UBTH, this study indirectly evaluates how well these HBM constructs are understood and translated into practice. Identifying knowledge gaps and perceived barriers can inform strategies to enhance IPC compliance and reduce HAI rates in the hospital.

2.3 Empirical Review

2.3.1 Knowledge of IPC Among Radiographers

Ezeudu et al. (2022) conducted a study titled Healthcare Waste Management in Nigeria: A Review. The research was born out of growing concerns regarding the improper handling of healthcare waste across medical institutions in Nigeria, which poses significant risks to public health and environmental safety. The study aimed to critically assess healthcare waste management (HCWM) practices, the level of awareness among radiographers, and the systemic challenges impeding proper waste disposal. This was a review-based study, synthesizing

evidence from existing literature, field reports, and policy documents across different regions of Nigeria. The study particularly focused on the management of infectious waste, segregation practices, and the roles of healthcare personnel in waste handling. They found out that only about 45% of radiographers across surveyed facilities had adequate knowledge of proper waste segregation protocols. Alarmingly, inappropriate disposal of infectious waste occurred in 30% of facilities reviewed, which was linked to insufficient training, lack of color-coded waste bins, and poor monitoring. In addition, rural hospitals were disproportionately affected, as most lacked organized waste disposal systems or incineration facilities. They finally concluded that healthcare waste management in Nigeria remains a serious public health concern. The authors called for urgent implementation of national guidelines, improved funding, and regular training to bridge the knowledge gap and improve compliance, particularly in underserved regions.

Alhumaid et al. (2021) explored a study titled Knowledge of Infection Prevention and Control Among Radiographers and Factors Influencing Compliance: A Systematic Review. The study was carried out to globally assess the awareness and compliance levels of radiographers toward IPC practices, especially in the wake of rising antimicrobial resistance and infectious disease outbreaks. The research followed a systematic review methodology, analyzing findings from 46 studies conducted across multiple continents including Africa, Asia, and the Middle East. The review assessed IPC awareness, compliance factors, and barriers using standardized quality assessment tools. They found out that the overall IPC awareness score among radiographers varied widely, ranging from 40% to 85% across the included studies. The most common barriers to compliance included lack of PPE (reported in 67% of the studies), limited institutional support (43%), and irregular training programs. Notably, urban-based hospitals recorded higher

compliance rates than rural settings, largely due to better resource allocation and supervision. They finally concluded that radiographers' compliance with IPC protocols is largely influenced by awareness levels, training frequency, and availability of resources. The authors recommended targeted interventions, especially in low-resource settings, to close the compliance gap and strengthen IPC systems globally.

Ochie et al. (2022) carried out a study titled Infection Prevention and Control: Knowledge, Determinants and Compliance Among Primary Radiographers in Enugu Metropolis, South-East Nigeria. The study was initiated to evaluate both the understanding and actual practice of IPC among primary radiographers who are often the first point of contact for patients, especially in urban and peri-urban areas. It was a cross-sectional descriptive study involving 242 radiographers from multiple primary health centers in Enugu metropolis. Data were collected using structured questionnaires focusing on IPC awareness, training exposure, compliance, and infrastructural support. They found out that while 78.5% of participants were aware of general IPC principles, only 38.8% demonstrated full compliance with daily IPC routines. For instance, just 44.2% of workers could correctly describe sterilization techniques, and only 56.7% followed appropriate waste disposal protocols. Training attendance in the past year significantly influenced compliance levels ($p < 0.05$), and lack of institutional monitoring was reported by 62.3% of respondents as a barrier to adherence. They finally concluded that awareness and compliance with IPC among primary radiographers in Enugu were not optimal, with clear gaps in understanding of advanced measures like sterilization and proper waste handling. The study recommended periodic training, better supervision, and institutional reforms to enhance IPC implementation at the grassroots level.

Ogboghodo et al. (2020) conducted a study titled Health Facility Preparedness and Response to COVID-19: An Assessment of Employee Satisfaction in a Teaching Hospital in Southern Nigeria. The research was prompted by the urgent need to evaluate how well health facilities were equipped and how frontline workers perceived their safety and support during the COVID-19 pandemic. This was a descriptive cross-sectional study involving 352 healthcare staff at the University of Benin Teaching Hospital (UBTH), covering doctors, nurses, and other clinical personnel. A semi-structured questionnaire was used to assess IPC preparedness, availability of resources, staff training, and employee satisfaction. They found out that 70% of respondents demonstrated basic knowledge of hand hygiene protocols, but only 50% could correctly identify all five moments of hand hygiene as recommended by WHO. Additionally, 61.4% of staff were dissatisfied with PPE availability, and 47.9% believed that management support was inadequate. The study also highlighted that departments with more frequent IPC workshops and supervision had higher staff satisfaction and compliance scores. They finally concluded that while there was basic awareness of IPC principles among radiographers, the facility's overall preparedness and staff satisfaction were moderate at best. The authors emphasized the need for stronger leadership, regular supply of PPE, and continuous training to ensure both safety and morale among healthcare personnel during health crises.

Tomczyk et al. (2022) conducted a study titled Infection Prevention and Control in Health Care: A Systematic Review of Practices and Gaps Across Income Settings. The study was designed to compare clinical staff' awareness and compliance with IPC procedures across high-, middle-, and low-income countries, with the aim of identifying global disparities and common barriers. This was a systematic review, synthesizing data from multiple observational studies across

different regions including Europe, Africa, Asia, and South America. The researchers examined variables such as access to training, institutional policies, availability of PPE, and routine monitoring. They found out that clinical staff in high-income countries (HICs) consistently demonstrated better knowledge and compliance with IPC measures than those in low- and middle-income countries (LMICs). The primary reasons for this gap included limited resources, infrequent training sessions, and weak institutional support in LMICs. They finally concluded that improving access to training and strengthening institutional frameworks is critical for enhancing IPC compliance globally, especially in resource-limited settings.

Chakma et al. (2024) examined a study titled Impact of Targeted IPC Training on Hand Hygiene and PPE Use Among Clinical staff. The study aimed to assess whether focused instructional sessions could significantly enhance knowledge and practice related to key infection control measures. It was a quasi-experimental study conducted in multiple healthcare centers, where clinical staff received structured training on hand hygiene and proper PPE use, with pre- and post-training assessments used to evaluate knowledge improvement. They found out that participants showed marked improvement in knowledge scores after undergoing the focused training sessions. The study emphasized the importance of tailoring IPC education to core practices to enhance overall infection control compliance. They finally concluded that hands-on, targeted training modules are effective in raising clinical staff' knowledge and practical adherence to IPC protocols, particularly in areas such as hand hygiene and PPE use.

Khadse et al. (2023) conducted a study titled Antimicrobial Stewardship Awareness and IPC Compliance Among Clinical staff in Germany. The study aimed to explore how awareness of

antimicrobial stewardship programs (ASPs) relates to infection prevention practices among clinical staff in German hospitals. This was a descriptive cross-sectional study utilizing a structured online survey administered to doctors, nurses, and infection control officers in ten major hospitals across Germany. They found out that healthcare professionals with strong understanding of ASPs also demonstrated higher adherence to standard IPC practices. The study identified a correlation between antimicrobial knowledge and reduced incidence of multidrug-resistant infections in the institutions assessed. They finally concluded that IPC measures should be integrated into broader patient safety and antimicrobial resistance programs, as this synergy contributes to improved infection control outcomes.

2.3.2 Compliance of IPC Among Radiographers

Weldetinsae et al. (2023) examined a study titled Adherence to Infection Prevention and Control Measures and Risk of Exposure among Health-Care Workers: A Cross-Sectional Study from the Early Period of COVID-19 Pandemic in Addis Ababa, Ethiopia. The study emerged during a critical period when healthcare systems worldwide were grappling with the COVID-19 pandemic, and frontline workers faced elevated risks due to gaps in infection prevention and control (IPC) practices. Recognizing the vital role of IPC in curbing healthcare-associated infections, the authors sought to evaluate the level of adherence among clinical staff and the corresponding risk of exposure in public hospitals. It was a facility-based cross-sectional study involving 1,062 clinical staff across six major public hospitals in Addis Ababa. Data were collected using structured questionnaires that assessed adherence to IPC measures, availability and use of personal protective equipment (PPE), and perceived institutional support. They found out that only 52.1% of clinical staff reported full adherence to recommended IPC practices. Notably,

33.9% did not maintain consistent hand hygiene, and 41.3% failed to regularly use N95 masks. Moreover, clinical staff who had attended at least two IPC-related training workshops within the year were 40% more likely to comply with hand hygiene protocols than those without training. Lack of adequate PPE supply, poor institutional support, and limited access to training were cited as major barriers. They finally concluded that adherence to IPC protocols was suboptimal among clinical staff, placing them at significant risk of COVID-19 exposure. The study emphasized the importance of continuous training, resource availability, and management support as essential pillars to strengthen IPC compliance in healthcare settings.

Hong and Xu (2024) carried out a study titled Hand Hygiene Practices Among Clinical staff in Tertiary Hospitals in China: Evaluation and Compliance. The study was motivated by the increasing emphasis on hand hygiene as a frontline IPC measure in preventing healthcare-associated infections. It was a cross-sectional study involving healthcare professionals from three major tertiary hospitals in China. Data were gathered through structured questionnaires and observation checklists to assess knowledge, practice, and compliance with WHO hand hygiene protocols. They found out that the majority of clinical staff were well-informed about the importance of hand hygiene, and a large proportion adhered to the recommended five moments of hand hygiene. The study highlighted that frequent feedback mechanisms and institutional monitoring contributed significantly to high compliance levels. They finally concluded that continuous training, active supervision, and a strong culture of safety are essential for sustaining high hand hygiene compliance among clinical staff.

Alhumaid et al. (2021) explored a study titled Clinical staff' Compliance With Infection Prevention Measures: A Systematic Review of Global Trends. The research aimed to evaluate the relationship between training exposure and compliance with IPC protocols, including specific outcomes like needle-stick injuries. This was a systematic review that compiled findings from multiple global studies involving clinical staff across different continents and healthcare systems. They found out that healthcare professionals who participated in at least two IPC training sessions per year reported significantly fewer needle-stick injuries and improved use of personal protective equipment. The review emphasized that regular, interactive training programs increased both knowledge retention and safety behaviors. They finally concluded that structured, continuous IPC training is a strong predictor of compliance and can substantially reduce occupational hazards in healthcare environments.

Greaves et al. (2023) explored a study titled Simulation-Based Training for PPE Use: A Comparative Study on IPC Compliance. The research focused on assessing the impact of simulation exercises on clinical staff' practical skills and adherence to PPE protocols. It was a comparative experimental study, with participants divided into two groups: one received theoretical education, while the other engaged in hands-on simulation-based PPE training, including donning and doffing procedures. They found out that the group involved in simulation training demonstrated significantly higher adherence to correct PPE usage and reported greater confidence in applying IPC measures in clinical settings. They finally concluded that simulation-based IPC training enhances both competence and compliance and should be integrated as a standard component of IPC education programs for clinical staff.

Debrah et al. (2021) examined a study titled Effect of Refresher Training on Waste Management Practices Among Clinical staff in Nigeria. The study aimed to investigate the role of continuous education in maintaining IPC compliance over time. It was a cross-sectional study with a follow-up intervention involving regular refresher courses on waste segregation, disposal, and related IPC measures. They found out that compliance rates with waste management protocols improved significantly among clinical staff who received periodic refresher training. The study noted that a single training session was not sufficient to ensure sustained adherence. They finally concluded that continuous education is essential to maintain clinical staff' knowledge and practice of IPC measures, especially in dynamic and evolving healthcare environments.

Yilma et al. (2024) conducted a study titled Contextualized IPC Training in Resource-Limited Settings: Lessons from Rural Africa. The study sought to evaluate how localized and community-based training programs impact IPC compliance in underserved regions. This was a community-based intervention study conducted in rural health facilities across several African countries. The program addressed local constraints, including limited PPE, infrastructure, and staffing. They found out that clinical staff who participated in the context-specific training reported better IPC compliance and a subsequent reduction in healthcare-associated infection rates. They finally concluded that IPC training programs should be adapted to local realities to be effective in resource-limited settings. Tailoring training to existing systemic challenges ensures higher engagement and practical application.

2.3.3 Challenges of IPC Among Radiographers

Houghton et al. (2022) examined a study titled Barriers and Facilitators to Clinical staff' Adherence to Infection Prevention and Control Guidelines: A Global Qualitative Evidence Synthesis. The aim was to explore clinical staff' perceptions and experiences regarding IPC compliance across different regions, particularly focusing on challenges in LMICs. It was a qualitative evidence synthesis, drawing from 81 qualitative studies across diverse healthcare settings. The study analyzed themes such as attitudes toward IPC, structural barriers, and the influence of institutional culture. They found out that while most clinical staff were aware of basic IPC procedures, consistent adherence was limited by inadequate access to water, PPE, hand hygiene stations, and poor staffing levels. Additionally, weak enforcement of IPC guidelines and outdated protocols further reduced compliance in many LMICs. They finally concluded that overcoming structural and systemic barriers is crucial for improving IPC adherence. The authors recommended investing in infrastructure, routine training, and leadership involvement to ensure better compliance among clinical staff.

Wanyonyi et al. (2024) conducted a study titled IPC Practices in Public Hospitals in Ungar: Gaps and Opportunities. The study aimed to investigate the existing IPC policies and practices in public healthcare settings in Ungar, with a focus on identifying outdated procedures and areas needing improvement. This was a descriptive mixed-method study, combining surveys, interviews, and observational data collected from public hospitals across three major regions in Ungar. They found out that clinical staff relied heavily on outdated IPC guidelines, which led to inconsistency in practice. Many staff members reported a lack of refresher courses and updates on new IPC recommendations. The absence of an enforcement body also contributed to poor

adherence in high-risk departments like surgery and emergency care. They finally concluded that updating IPC policies, training staff regularly, and establishing monitoring teams are critical steps toward improving IPC practices in public hospitals in Ungar.

Horgan et al. (2024) conducted a study titled Aseptic Technique Training and Its Impact on Postoperative Infection Rates in UK Surgical Units. The study aimed to evaluate how targeted training on aseptic procedures influences clinical outcomes, particularly infection rates in surgical settings. This was a retrospective interventional study conducted across four surgical units in the United Kingdom. It measured infection rates before and after a series of focused training workshops on aseptic techniques. They found out that infection rates in surgical wards decreased by 30% following the implementation of the training program. Staff also reported increased confidence and adherence to aseptic protocols. They finally concluded that instructional activities tailored to specific IPC components, such as aseptic practice, significantly contribute to improved patient safety and reduced healthcare-associated infections.

2.4 Summary of Literature Review

The literature review highlights the importance of infection prevention and control (IPC) among clinical staff, emphasizing the role of proper knowledge, adherence to guidelines, and institutional support in reducing healthcare-associated infections (HAIs). Despite the presence of IPC policies, compliance among clinical staff remains inconsistent due to inadequate training, resource constraints, and heavy workloads. The COVID-19 pandemic further exposed gaps in IPC preparedness, reinforcing the need for continuous education and better resource allocation. The study is framed using key theories, including the Health Belief Model (HBM), which

explains IPC adherence based on perceived risk and barriers, and the Theory of Planned Behavior (TPB), which emphasizes the influence of attitudes, norms, and perceived control. Additionally, the Social Cognitive Theory (SCT) and Organizational Culture Theory (OCT) highlight the role of observational learning, institutional leadership, and workplace culture in shaping IPC behaviors. Empirical studies reveal significant gaps in IPC knowledge among clinical staff, particularly in Nigeria, where limited access to training and inadequate resources hinder compliance. Global research shows that high-income countries have better IPC adherence due to stronger institutional frameworks and continuous training programs, whereas low-resource settings struggle with implementation challenges.

Despite extensive studies on IPC, gaps remain in understanding the specific challenges clinical staff face in implementing IPC measures in resource-limited settings like UBTH. Many studies focus on general compliance levels but do not assess the underlying factors influencing knowledge and adherence among different healthcare worker groups. Additionally, limited research explores the effectiveness of institutional interventions in improving IPC practices within Nigerian hospitals. This study aims to bridge these gaps by assessing the level of knowledge, compliance, and challenges radiographers at UBTH encounter in IPC implementation. The findings will provide insights into targeted interventions, training programs, and policy recommendations to enhance IPC adherence, ultimately improving patient safety and reducing HAIs within the hospital environment.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Research Design

This study adopted a descriptive cross-sectional research design. A descriptive design was appropriate because it allowed for the systematic assessment of awareness and compliance with infection prevention and control measures among radiographers without manipulating variables. The cross-sectional approach enables data collection at a single point in time, making it efficient and suitable for capturing the current situation among radiographers at the University of Benin Teaching Hospital, Benin City.

3.2 Research Setting

This study was carried out in University of Benin Teaching Hospital (UBTH), Benin City, Edo State. UBTH is a tertiary healthcare facility which was established in 1973. It is located in Ugbowo, Egor Local Government Area. Edo State comprise of 18 local government areas. Egor Local government area where University of Benin Teaching Hospital is located falls within the southern senatorial district of Nigeria. UBTH offers both clinical and diagnostic services and offers a wide range of services, which makes it an important healthcare facility in the state, region and the nation at large. It is estimated that UBTH has a bed capacity of over nine hundred and ten (910) (UBTH, 2024). UBTH has nineteen (19) clinical departments and three (3) Medical Laboratory Department and 3 emergency departments. These departments offer emergency services for the general/primary health needs of the people. They offer both

outpatient and in-patient services and they are staffed with health professionals such as Doctors, Nurses and paramedics to carry out their daily routines

3.3 Target Population

The target population for this research included radiographers at UBTH and they are directly engaged in patient care and associated services.

3.4 Sampling Technique and Sample Size

The sampling technique employed in this study was purposive sampling. This non-probability sampling method was selected to allow the researcher to deliberately include all radiographers who met specific inclusion criteria and were available during the period of data collection. A total of 31 radiographers at UBTH were purposively selected and invited to participate in the study.

3.5 Selection Criteria

To ensure the relevance and reliability of data collected, specific inclusion and exclusion criteria was applied in selecting participants for this study.

3.5.1 Inclusion Criteria

This study will include:

1. Radiographers currently employed at the University of Benin Teaching Hospital (UBTH).
2. Radiographers who voluntarily consent to participate in the study.

3.5.2 Exclusion Criteria

This study exclude:

1. Radiographers who are not currently employed at UBTH.
2. Student radiographers who are on postings at UBTH.
3. Radiographers who decline to give informed consent to participate in the study.

3.6 Instrument for Data Collection

The instrument for data collection in this study was a self-structured questionnaire. This was developed based on the objectives of the study. The questionnaire was made up of four sections with. Questions which was carefully drafted, sequenced and constructed in a bid to get in-depth information that is useful and relevant to the study will be used.

Section A: consist of the demographic data of the participants (Age, Marital Status, Current Educational Level, Ethnicity).

Section B: The level of awareness of infection prevention and control (IPC) among radiographers.

Section C: The level of compliance to infection prevention and control (IPC) among radiographers.

Section D: The challenges experienced by radiographers in adhering to infection prevention and control (IPC).

3.7 Validity of instrument

The instrument validity is pertained to its capability to accurately measure the intended construct or concept (Surucu & Maslakci, 2020). The various validity types assessed by researchers includes content, construct, criterion, and face to evaluate the instrument accuracy. For this research, face and content validity was utilized to validate the research tool. The questionnaire underwent validation by both the project supervisor and a field expert, and necessary adjustments was implemented by the researcher before starting the main study.

3.8 Reliability of instrument

The reliability of an instrument referred to its stability and consistency in delivering uniform outcomes when assessing the same criteria under identical circumstances (Surucu & Maslakci, 2020). It essentially gauged how consistently the instrument produced similar results across multiple trials. A reliable instrument is one that could produce the same results if the behaviour was measured again by the same scale. The Cronbach's alpha reliability technique was employed in this study. This researcher conducted a reliability testing on the instrument by distributing 3 questionnaires, which constituted 10% of the total sample size, to radiographers at Edo Specialist Hospital (which are outside the sampled population). A coefficient of 0.71 was obtained and the instrument was considered reliable.

3.9 Method of Data Collection

A well-structured questionnaire was administered to radiographers at the University of Benin Teaching Hospital until the required sample size was achieved. The radiographers was approached at the University of Benin Teaching Hospital. The purpose of the study was

explained to them, and the instrument for data collection was administered. Data collection was conducted by the researcher. The data collection took place during break periods, and on-the-spot retrieval of the administered copies of the questionnaire. Data collection lasted a week.

3.10 Method of Data Analysis

The data collected was analysed using the Statistical Package for the Social Sciences (SPSS) version 27.0. Descriptive statistics such as mean, frequency, and percentages was computed to summarize the data. Hypothesis testing was conducted using the Chi-square test of association, with the level of significance set at $p < 0.05$. The results of the analysis was then presented using tables, graphs, frequencies, and percentages to provide a clear overview of the findings.

3.11 Ethical Considerations

Ethical approval was obtained from the Health Research Committee, University of Benin Teaching Hospital, Benin City. Permission was obtained from the various ward managers before proceeding with the research. Before data collection begins, participants received detailed explanations about the research's purpose, content, and implications. They were assured of confidentiality, ensuring the protection of their personal and private information. Throughout the research, ethical guidelines was strictly adhered to, including the following considerations:

Confidentiality: Respondents' information was treated confidentially, with no request for names or addresses in the questionnaire. Participants understood that their responses are confidential and solely used for research purposes. No personal identifiers was used in any document or questionnaire to maintain anonymity.

Voluntary Participation: Participants was informed of their right to voluntary participation without facing penalties or bias. They can choose to withdraw or decline to provide information at any point if they feel uncomfortable or unsure.

Avoidance of Plagiarism: Proper citation of all authors used in the study was ensured, both within the content and in the reference page.

CHAPTER FOUR : RESULTS AND DISCUSSION

4.1 Results

Table 4.1: Demographic Characteristics of Respondents (n = 31)

Variable	Frequency (n)	Percentage (%)
Gender		
Male	14	45.2
Female	17	54.8
Age (years)		
20–30	14	45.2
31–40	7	22.6
Marital Status		
Single	27	87.1
Married	4	12.9
Highest Qualification		
B.Sc	25	80.6
MSc	4	12.9
PhD	2	6.5
Years of Experience		
< 1 year	10	32.3
1–5 years	17	54.8
6–10 years	4	12.9
IPC Training Received		
Yes	20	64.5
No	11	35.5

Based on the data from table 4.1 out of the 31 respondents, 14 (45.2%) were male and 17 (54.8%) were female. Fourteen respondents (45.2%) were within the age group of 20–30 years, while seven (22.6%) were aged 31–40 years; none were above 40 years. A total of 27 respondents

(87.1%) were single, while four (12.9%) were married. Regarding educational qualifications, 25 (80.6%) had a B.Sc, four (12.9%) had an MSc, and two (6.5%) held a PhD. Ten respondents (32.3%) had less than one year of work experience, 17 (54.8%) had between one and five years, and four (12.9%) had six to ten years, with none having more than ten years. Concerning IPC training, 20 respondents (64.5%) indicated they had received formal training, while 11 (35.5%) had not.

Table 4.2: Knowledge of Infection Prevention and Control among Respondents (n = 31)

Item	Option	Frequency (n)	Percentage (%)
Definition of IPC	Practices to reduce infection risk	30	96.8
	Medical diagnosis of infections	1	3.2
Aim of IPC	Prevent transmission of infections	31	100.0
Standard Precautions	Applied to all patients regardless of diagnosis	28	90.3
	Only for known infected patients	2	6.5
	Not necessary for radiographers	1	3.2
Hand Hygiene	Hand washing with soap/water or alcohol rub	29	93.5
	Rinsing with water	1	3.2
	Cleaning with tissue	1	3.2
When to Perform Hand Hygiene	Before and after every patient contact	30	96.8
	Only after seeing a patient	2	6.5
	Only at the end of the day	1	3.2
PPE Includes	Gowns, masks, goggles	31	100.0
Disposal of Sharps	Puncture-proof sharps container	28	90.3
	In a regular trash bin	3	9.7
Importance of IPC in Radiology	Infections spread via equipment surfaces	30	96.8
	Radiology does not involve patient contact	1	3.2

Based on the data from table 4.2 on the definition of IPC, 30 respondents (96.8%) correctly identified it as practices to reduce infection risk, while one (3.2%) viewed it as medical diagnosis of infections. All respondents (100.0%) correctly stated that the aim of IPC is to prevent transmission of infections. For standard precautions, 28 (90.3%) indicated they are applied to all

patients regardless of diagnosis, two (6.5%) stated only for known infected patients, and one (3.2%) reported that they are not necessary for radiographers. Regarding hand hygiene, 29 (93.5%) selected hand washing with soap and water or alcohol-based rub, while one (3.2%) chose rinsing with water, and one (3.2%) chose cleaning with tissue. On the timing of hand hygiene, 30 (96.8%) noted it should be performed before and after every patient contact, while two (6.5%) chose only after seeing a patient, and one (3.2%) selected only at the end of the day. All respondents (100.0%) correctly identified PPE to include gowns, masks, and goggles. For disposal of sharps, 28 (90.3%) indicated immediate disposal into a puncture-proof sharps container, while three (9.7%) stated disposal in a regular trash bin. Finally, 30 respondents (96.8%) recognized that IPC is important in radiology because infections can spread via equipment surfaces, while one (3.2%) stated that radiology does not involve patient contact.

Table 4.3: Challenges Towards Infection Prevention and Control (n = 31)
Grand Mean = 3.76

Statement	Never	Rarely	Sometimes	Often	Always	Mean ± SD	Decision
Limited access to PPE	3 (9.7%)	5 (16.1%)	1 (3.2%)	16 (51.6%)	6 (19.4%)	3.55 ± 1.26	Rejected
Using PPE is stressful and time-consuming	2 (6.5%)	13 (41.9%)	2 (6.5%)	7 (22.6%)	7 (22.6%)	3.13 ± 1.33	Rejected
IPC compliance reduces healthcare-associated infections	2 (6.5%)	8 (25.8%)	2 (6.5%)	7 (22.6%)	12 (38.7%)	3.61 ± 1.39	Rejected
Management provides adequate IPC resources	2 (6.5%)	7 (22.6%)	1 (3.2%)	6 (19.4%)	15 (48.4%)	3.81 ± 1.40	Accepted
I feel at risk of infection during radiographic procedures	0 (0.0%)	7 (22.6%)	1 (3.2%)	6 (19.4%)	16 (51.6%)	4.03 ± 1.18	Accepted
Lack of IPC training or resources	0 (0.0%)	2 (6.5%)	0 (0.0%)	16 (51.6%)	19 (61.3%)	4.55 ± 0.62	Accepted

Table 4.3 shows that the majority of respondents (51.6%) often reported limited access to PPE. A large proportion (41.9%) rarely considered PPE as stressful and time-consuming. Most respondents (38.7%) always agreed that IPC compliance reduces healthcare-associated infections. Almost half (48.4%) always reported that management provides adequate IPC resources. The

majority (51.6%) always felt at risk of infection during radiographic procedures. Finally, most respondents (61.3%) always stated that lack of IPC training or resources was a major challenge.

Table 4.4: Compliance with Infection Prevention and Control (n = 31)
Grand Mean = 3.74

Statement	Never	Rarely	Sometimes	Often	Always	Mean	±	SD	Decision
Use PPE when handling patients	0 (0.0%)	1 (3.2%)	8 (25.8%)	0 (0.0%)	22 (71.0%)	4.39	±	0.82	Accepted
Clean radiographic equipment after each patient	0 (0.0%)	0 (0.0%)	16 (51.6%)	0 (0.0%)	15 (48.4%)	3.97	±	0.18	Accepted
Follow hand hygiene before and after patient contact	0 (0.0%)	0 (0.0%)	12 (38.7%)	0 (0.0%)	19 (61.3%)	4.23	±	0.43	Accepted
Updated on IPC protocols at workplace	4 (12.9%)	6 (19.4%)	16 (51.6%)	0 (0.0%)	5 (16.1%)	2.87	±	1.07	Rejected
Report breaches in IPC practice	4 (12.9%)	8 (25.8%)	16 (51.6%)	0 (0.0%)	13 (41.9%)	3.48	±	1.16	Rejected

Table 4.4 shows that the majority of respondents (71.0%) always used PPE when handling patients. More than half (51.6%) sometimes cleaned radiographic equipment after each patient. Most respondents (61.3%) always followed hand hygiene before and after patient contact. The

majority (51.6%) sometimes received updates on IPC protocols at their workplace. Finally, most respondents (51.6%) sometimes reported breaches in IPC practice.

4.2 Hypothesis Testing

Table 4.5: Chi-square Test of Relationship Between Knowledge and Compliance of IPC (n = 31)

Variables	χ^2	df	p-value	Decision
Knowledge × Compliance	0.11	2	0.95	Not Significant (Fail to Reject H_0)

The cross-tabulation of knowledge and compliance showed that respondents were distributed across moderate and high knowledge levels, with corresponding moderate and high compliance levels. The chi-square test yielded $\chi^2 = 0.11$ with 2 degrees of freedom and a p-value of 0.95. Since the p-value is greater than 0.05, the null hypothesis is accepted, indicating that there is no statistically significant relationship between the level of knowledge and the level of compliance with infection prevention and control among radiographers at UBTH.

4.3 Discussion of Findings

The findings from Table 4.2 reveal that nearly all respondents demonstrated good knowledge of infection prevention and control (IPC). Specifically, 96.8% correctly identified IPC as practices to reduce infection risk, while all respondents (100%) recognized that the main aim of IPC is to prevent transmission of infections. Similarly, 90.3% correctly acknowledged that standard precautions should be applied to all patients, and 93.5% identified proper hand hygiene as washing with soap and water or using alcohol-based rub. Furthermore, all respondents (100%)

correctly listed PPE to include gowns, masks, and goggles, while 90.3% correctly indicated that sharps should be disposed of in puncture-proof containers.

These results clearly indicate that radiographers at UBTH possess strong foundational knowledge of IPC principles, particularly on hand hygiene, PPE use, sharps disposal, and standard precautions. Such high knowledge levels suggest that awareness campaigns and formal training programs in UBTH may have contributed to ensuring radiographers understand the basics of IPC, which is essential in preventing cross-infection in radiology departments where equipment is used by multiple patients.

This result is consistent with the findings of Alhumaid et al. (2021), who reported wide-ranging IPC awareness levels among radiographers globally, with many studies showing knowledge scores as high as 85% in resource-supported facilities. Similarly, Ogboghodo et al. (2020) also found that about 70% of healthcare workers at UBTH demonstrated good knowledge of hand hygiene, which supports the current finding of high awareness among radiographers in the same facility. However, this contrasts with the study by Ochie et al. (2022) in Enugu metropolis, where although 78.5% of radiographers were aware of IPC, only 44.2% could correctly describe sterilization techniques, and just 56.7% adhered to proper waste disposal protocols. This discrepancy suggests that while UBTH radiographers are well-grounded in theoretical IPC knowledge, other regions still struggle with knowledge gaps, possibly due to differences in training exposure and institutional support.

The implication of this finding is that UBTH radiographers are adequately equipped with the theoretical knowledge required to minimize infection risks in their practice. However, translating

this knowledge into consistent practice remains crucial. Strengthening continuous professional training and monitoring can help sustain these knowledge levels and ensure they are effectively applied in clinical practice to protect both patients and staff.

Table 4.4 shows that the majority of respondents (71.0%) reported that they always used PPE when handling patients. More than half (51.6%) sometimes cleaned radiographic equipment after each patient, while 61.3% always followed hand hygiene before and after patient contact. However, 51.6% indicated they only sometimes received updates on IPC protocols in their workplace, and 51.6% sometimes reported breaches in IPC practice. The grand mean of 3.74 indicates an overall moderate-to-high level of compliance with IPC measures among the respondents.

These findings indicate that while radiographers at UBTH demonstrate high compliance in core practices such as PPE use and hand hygiene, areas such as equipment cleaning, regular updating on IPC protocols, and reporting breaches remain suboptimal. This suggests that compliance is not uniform across all domains of IPC. It appears that routine, visible practices like hand hygiene and PPE use are prioritized, while institutional-driven aspects such as continuous training updates and breach reporting receive less attention.

This finding is in agreement with Hong and Xu (2024), who reported that healthcare professionals in Chinese tertiary hospitals showed high adherence to hand hygiene protocols due to frequent supervision and feedback mechanisms. Similarly, Greaves et al. (2023) also observed improved compliance with PPE protocols following simulation-based training, aligning with the high compliance with PPE use seen in this study. On the other hand, the result differs from the

findings of Weldetinsae et al. (2023) in Ethiopia, who reported that only 52.1% of healthcare workers adhered to IPC practices, with many failing to use PPE consistently due to supply shortages. Also, Ochie et al. (2022) found that compliance among radiographers in Enugu was low, with only 38.8% following daily IPC routines. These contrasting results highlight the role of institutional support, resource availability, and supervision in sustaining compliance levels.

The implication is that although UBTH radiographers exhibit commendable compliance in high-visibility IPC practices, lapses in equipment cleaning, updates, and breach reporting could expose both staff and patients to preventable risks. Institutional leadership needs to focus more on strengthening monitoring systems, encouraging reporting cultures, and ensuring regular updates on IPC guidelines to close these compliance gaps.

Table 4.3 indicates that 51.6% of respondents often reported limited access to PPE, while 41.9% rarely considered PPE to be stressful and time-consuming. A majority (38.7%) always agreed that IPC compliance reduces healthcare-associated infections. Almost half (48.4%) always reported that management provided adequate IPC resources, and 51.6% always felt at risk of infection during radiographic procedures. Finally, the largest proportion (61.3%) always stated that lack of IPC training or resources was a major challenge. The grand mean of 3.76 shows that respondents generally agreed that challenges significantly affected IPC adherence.

The results suggest that the biggest barrier to IPC among UBTH radiographers is inadequate training opportunities and resources. Despite high knowledge levels, the absence of regular refresher programs and sufficient resources can limit consistent compliance. Although management was positively rated by nearly half of respondents, the perception of risk during

radiographic procedures highlights ongoing concerns about occupational exposure. The stress of PPE use was less commonly identified as a challenge, suggesting that radiographers are more concerned with systemic issues than with personal inconvenience.

These findings are consistent with Houghton et al. (2022), who reported that poor access to PPE, lack of infrastructure, and weak enforcement were common barriers to IPC adherence, especially in low- and middle-income countries. Similarly, Wanyonyi et al. (2024) found that outdated IPC policies and lack of refresher training in public hospitals contributed to poor adherence, which aligns with respondents in this study citing inadequate training as a challenge. However, the results differ from Horgan et al. (2024), who demonstrated that structured aseptic training programs in the UK reduced infection rates by 30%, indicating that challenges can be effectively overcome when targeted training is consistently provided. This contrast emphasizes that the challenges faced by UBTH radiographers are less about personal motivation and more about systemic and institutional gaps.

The implication is that while radiographers are knowledgeable and willing, their ability to fully comply with IPC measures is undermined by structural barriers such as inadequate training, insufficient resources, and perceived occupational risks. Addressing these systemic issues through consistent training programs, resource allocation, and enforcement of IPC protocols will significantly enhance IPC adherence and safeguard both patients and staff.

Table 4.5 presents the chi-square test outcome, showing $\chi^2 = 0.11$ with 2 degrees of freedom and a p-value of 0.95. Since the p-value is greater than the 0.05 level of significance, the null

hypothesis was accepted. This implies that there is no statistically significant relationship between knowledge of IPC and compliance with IPC practices among radiographers at UBTH.

The result indicates that having high knowledge of IPC does not necessarily guarantee high compliance with IPC practices. Although the majority of radiographers were knowledgeable, as shown in Table 4.2, this did not translate directly into consistent compliance in Table 4.4, where lapses were observed in equipment cleaning, reporting breaches, and receiving updates. This finding points to a possible gap between theoretical knowledge and practical application, suggesting that compliance may be influenced more by institutional support, monitoring, and availability of resources than by knowledge alone.

This finding contrasts with Ochie et al. (2022), who reported that training attendance significantly influenced compliance among radiographers in Enugu, indicating that higher awareness was linked with improved compliance. Similarly, Alhumaid et al. (2021) noted that radiographers' compliance was strongly influenced by awareness levels and training frequency, showing a clear relationship between knowledge and practice. On the other hand, the present finding aligns with Weldetinsae et al. (2023), who found that despite awareness of IPC, healthcare workers in Ethiopia demonstrated low compliance due to systemic barriers such as lack of PPE and weak institutional support. This suggests that knowledge alone is insufficient to guarantee compliance unless the right environment and resources are provided.

The implication is that while knowledge is an important foundation, it is not the sole determinant of IPC compliance. For UBTH radiographers, institutional interventions such as continuous training, regular supervision, resource availability, and enforcement of IPC protocols may be

more decisive in driving compliance than knowledge levels alone. This underscores the need for management-driven initiatives to bridge the knowledge–practice gap.

CHAPTER FIVE: SUMMARY, CONCLUSION AND SUGGESTION FOR FURTHER STUDIES

5.1 Summary of Findings

This study assessed the knowledge, compliance, and challenges of infection prevention and control (IPC) among radiographers at the University of Benin Teaching Hospital (UBTH). A total of 31 respondents participated.

Demographics (Table 4.1): The respondents were predominantly female (54.8%), mostly aged 20–30 years (45.2%), and largely single (87.1%). A majority (80.6%) held a B.Sc degree, and more than half (54.8%) had between one and five years of practice. About two-thirds (64.5%) had received formal IPC training.

Knowledge of IPC (Table 4.2): Knowledge levels were high, with 96.8% correctly defining IPC, 100% identifying its aim as infection prevention, and 100% recognizing PPE components. Overall, respondents demonstrated strong awareness of core IPC measures.

Compliance with IPC (Table 4.4): While 71.0% always used PPE and 61.3% always followed hand hygiene, only 51.6% sometimes cleaned equipment after use, sometimes received updates, and sometimes reported breaches. This indicated moderate-to-high compliance with notable gaps.

Challenges to IPC (Table 4.3): The greatest challenge was inadequate training and resources, cited by 61.3% of respondents. Additionally, 51.6% always felt at risk of infection during procedures, while limited access to PPE and weak management support were also identified.

Hypothesis Testing (Table 4.5): The chi-square test showed $\chi^2 = 0.11$, df = 2, p = 0.95. Since p > 0.05, the null hypothesis was accepted, indicating no significant relationship between knowledge and compliance of IPC among radiographers at UBTH.

5.2 Conclusion

The study revealed that radiographers at UBTH possess high knowledge of IPC principles, particularly regarding hand hygiene, PPE use, and sharps disposal. However, compliance was inconsistent, especially in areas requiring institutional reinforcement, such as equipment cleaning, reporting breaches, and receiving regular protocol updates. The major barriers identified were lack of training opportunities, insufficient resources, and perceived occupational risks. Importantly, the absence of a significant relationship between knowledge and compliance suggests that knowledge alone does not drive practice; institutional support and supervision are crucial in ensuring full adherence.

5.3 Recommendations

Based on the findings, the following recommendations are made:

1. Continuous Professional Training: UBTH management should organize regular refresher courses and targeted workshops on IPC to reinforce compliance beyond theoretical knowledge.

2. Adequate Resource Provision: Steady supply of PPE, disinfectants, and sharps disposal containers should be ensured to minimize lapses caused by resource shortages.

3. Strengthened Monitoring and Supervision: IPC committees should be more active in supervising adherence, enforcing protocols, and encouraging reporting of breaches without fear of reprisal.

4. Risk Mitigation Strategies: Staff safety should be prioritized through vaccination, occupational health programs, and practical training on minimizing infection risk during radiographic procedures.

5. Institutional Support: Hospital leadership should foster a culture of accountability and safety, making IPC a shared responsibility across all departments.

5.4 Suggestions for Further Studies

1. A larger, multi-center study involving radiographers across several teaching hospitals in Nigeria to compare IPC practices across institutions.

2. A mixed-methods study incorporating interviews or focus groups to explore personal and systemic barriers to IPC compliance.

3. A longitudinal study to track the impact of targeted training interventions on radiographers' IPC compliance over time.

5.5 Limitations of the Study

1. Self-reported data may be influenced by social desirability bias, as respondents might overstate their compliance.

2. The cross-sectional design prevents causal inferences between knowledge, compliance, and challenges.

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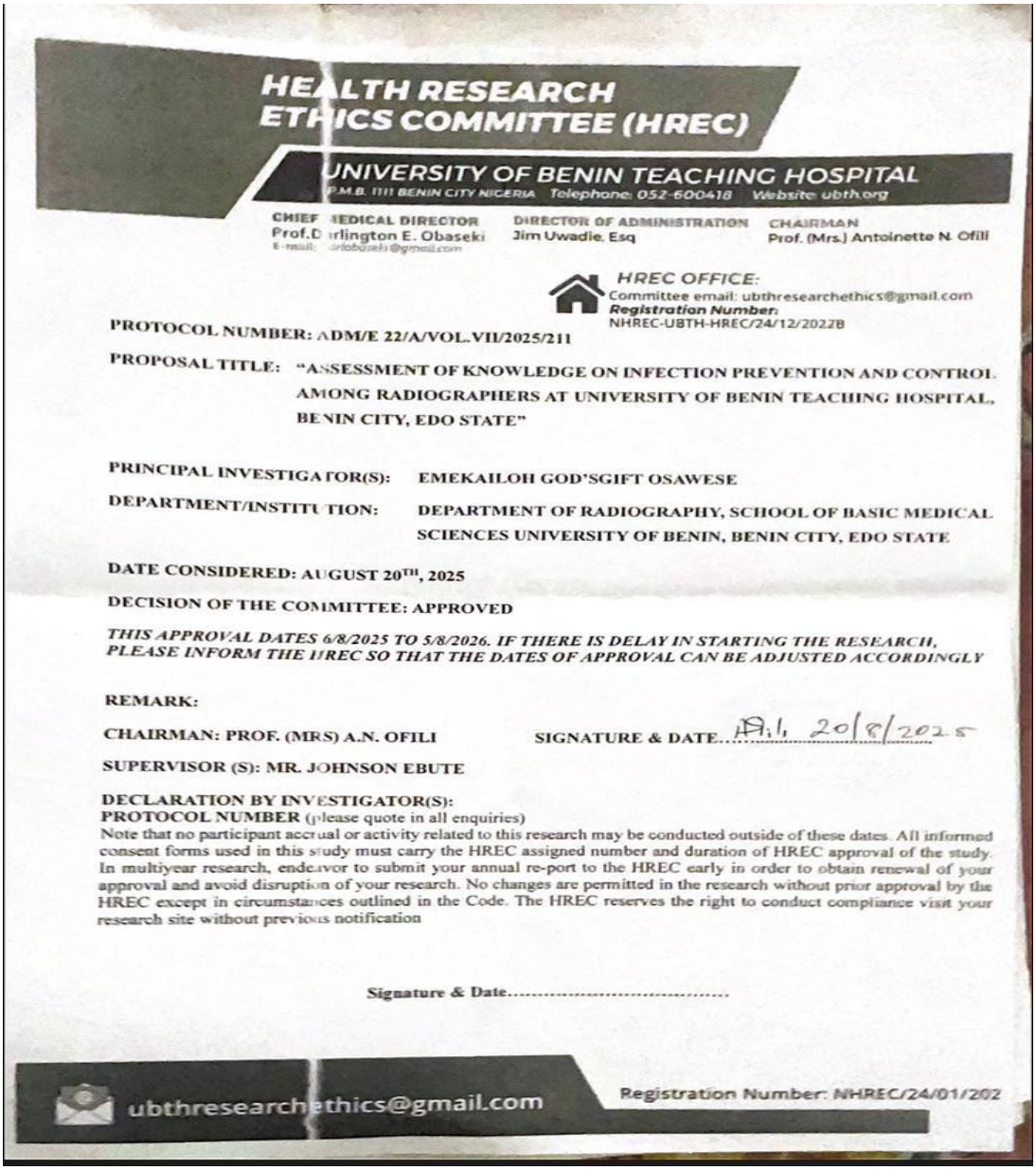
APPENDIX I



HEALTH RESEARCH ETHICS COMMITTEE (HREC)

UNIVERSITY OF BENIN TEACHING HOSPITAL

P.M.B. 1111 BENIN CITY NIGERIA Telephone: 052-600418 Website: ubth.org

CHIEF MEDICAL DIRECTOR Prof. Darlington E. Obaseki
DIRECTOR OF ADMINISTRATION Jim Uwadie, Esq
CHAIRMAN Prof. (Mrs.) Antoinette N. Ofili

HREC OFFICE:
Committee email: ubthresearchethics@gmail.com
Registration Number: NHREC-UBTH-HREC/24/12/2022B

PROTOCOL NUMBER: ADM/E 22/A/VOL.VII/2025/211

PROPOSAL TITLE: "ASSESSMENT OF KNOWLEDGE ON INFECTION PREVENTION AND CONTROL AMONG RADIOGRAPHERS AT UNIVERSITY OF BENIN TEACHING HOSPITAL, BENIN CITY, EDO STATE"

PRINCIPAL INVESTIGATOR(S): EMEKAILOH GOD'SGIFT OSAWESE

DEPARTMENT/INSTITUTION: DEPARTMENT OF RADIOGRAPHY, SCHOOL OF BASIC MEDICAL SCIENCES UNIVERSITY OF BENIN, BENIN CITY, EDO STATE

DATE CONSIDERED: AUGUST 20TH, 2025

DECISION OF THE COMMITTEE: APPROVED

THIS APPROVAL DATES 6/8/2025 TO 5/8/2026. IF THERE IS DELAY IN STARTING THE RESEARCH, PLEASE INFORM THE HREC SO THAT THE DATES OF APPROVAL CAN BE ADJUSTED ACCORDINGLY

REMARK:

CHAIRMAN: PROF. (MRS) A.N. OFILI SIGNATURE & DATE... Ofili 20/8/2025

SUPERVISOR (S): MR. JOHNSON EBUTE

DECLARATION BY INVESTIGATOR(S):
PROTOCOL NUMBER (please quote in all enquiries)
Note that no participant accrual or activity related to this research may be conducted outside of these dates. All informed consent forms used in this study must carry the HREC assigned number and duration of HREC approval of the study. In multiyear research, endeavor to submit your annual re-port to the HREC early in order to obtain renewal of your approval and avoid disruption of your research. No changes are permitted in the research without prior approval by the HREC except in circumstances outlined in the Code. The HREC reserves the right to conduct compliance visit your research site without previous notification

Signature & Date.....

ubthresearchethics@gmail.com Registration Number: NHREC/24/01/202

APPENDIX II

UNIVERSITY OF BENIN QUESTIONNAIRE (Typed Version)

DEPARTMENT OF RADIOGRAPHY
FACULTY OF BASIC MEDICAL SCIENCES
UNIVERSITY OF BENIN, BENIN CITY

Dear respondent,
I am a final year student of the above-mentioned department, carrying out a research on "Assessment of Knowledge on infection prevention and control among Radiographers at University of Benin Teaching Hospital, Benin City, Edo State". Your responses will be treated with strict confidentiality and used solely for academic purposes. Kindly answer honestly. Thank you for your cooperation.

Section A: Demographic Information

Gender: [ ] Male [ ] Female

Age: [ ] 20–30 [ ] 31–40 [ ] 41–50 [ ] Above 50

Marital Status: [ ] Single [ ] Married [ ] Divorced [ ] Widowed

Highest Qualification: [ ] ND [ ] BSc [ ] MSc [ ] PhD [ ] Others: _____

Years of Experience: [ ] Less than 1 year [ ] 1–5 years [ ] 6–10 years [ ] Above 10 years

Have you received any formal training on infection prevention and control? [ ] Yes [ ] No

Section B: Knowledge on Infection Prevention and Control (IPC)

Which of the following best defines infection prevention and control (IPC)?
[ ] Practices to reduce infection risk [ ] Medical diagnosis of infections [ ] Use of antibiotics to treat infections [ ] None of the above

The main aim of IPC is to:
[ ] Save time in hospital procedures [ ] Prevent transmission of infections [ ] Avoid use of PPE [ ] Improve X-ray image quality

What are standard precautions in IPC?
[ ] Only for known infected patients [ ] Applied to all patients regardless of diagnosis [ ] Not necessary for radiographers [ ] Only for surgery departments

Which of these is a correct method of hand hygiene?
[ ] Rinsing with water [ ] Using gloves only [ ] Hand washing with soap and water or alcohol-based rub [ ] Cleaning with tissue

When should hand hygiene be performed?
[ ] Only after seeing a patient [ ] Only before eating [ ] Before and after every patient contact [ ] Only at the end of the day

Personal protective equipment (PPE) includes:
[ ] Gloves, gowns, masks, goggles [ ] Uniforms [ ] ID cards and shoes [ ] Aprons only

What is the correct way to dispose of sharps (e.g., needles)?
[ ] In a regular trash bin [ ] Leave on the table for cleaning staff [ ] Dispose immediately in a puncture-proof sharps container [ ] Wash and reuse

IPC in radiology departments is important because:
[ ] Radiology does not involve patient contact [ ] Infections can be easily spread via equipment surfaces [ ] Only doctors need IPC [ ] Radiology uses radiation, not physical contact

Section C: Challenges Towards IPC

S/N	Statement	SA	A	N	D	SD
1	Limited access to PPE					
2	Using PPE is stressful and time-consuming.					
3	IPC compliance reduces healthcare-associated infections.					
4	Management provides adequate IPC resources in my department.					
5	I feel at risk of infection while performing radiographic procedures.					
6	Lack of IPC training or resources					
7	IPC protocols are easy to follow.					

Section D: Compliance of IPC in Radiography Department

S/N	Statement	Always	Sometimes	Rarely	Never
1	How often do you use PPE when handling patients				
2	How often do you clean radiographic equipment after				

S/N	Statement	Always	Sometimes	Rarely	Never
	each patient				
3	How often do you follow hand hygiene protocol before and after patient contact				
4	How frequently are you updated on IPC protocols at your workplace				
5	How often do you report a breach in IPC practice				