A COMPARATIVE STUDY ON THE ADHERENCE TO STANDARD PRECAUTIONS BY HEALTH CARE WORKERS IN THE UNIVERSITY OF BENIN TEACHING HOSPITAL

BY

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DECLARATION

I hereby declare that this project work titled '**A COMPARATIVE STUDY ON THE ADHERENCE TO STANDARD PRECAUTIONS BY HEALTH CARE WORKERS IN THE UNIVERSITY OF BENIN TEACHING HOSPITAL'** was conducted under the supervision of PROF OKOJIE AND DR MOKOGWU and has not been submitted anywhere else for the award of a degree or certificate.

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CERTIFICATION

This is to certify that this research work titled "A Comparative Study on Adherence to Standard Precautions amongst Healthcare Workers in University of Benin" was carried out in the Department of Community Health, School of Medicine, College of Medical Sciences, University of Benin, Benin City, Edo State, Nigeria as part of the requirements for the award of Bachelor of Medicine, Bachelor of Surgery (MBBS) by **EHINOMEN OBEHI SADOH** with matriculation number **MED1807495.**

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DEDICATION

This project is dedicated first to God Almighty for His grace, strength and guidance throughout the course of this study.

I dedicate this work to my parents whose unwavering sacrifices, encouragement, prayers and financial support made this journey possible.

I equally dedicate this work to my seniors and mentors who have contributed immensely to this work.

I also dedicate this work to my friends and well-wishers who have aided me along the way.

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LIST OF ABBREVIATIONS

- **CDC** Center of Disease Control
- **HAI** Healthcare Associated Infections
- **HCW** Health Care Worker
- **HICPAC** Healthcare Infection Control Prevention Advisory Committee
- **HIV** Human Immunodeficiency Virus
- **IPC** Infection Prevention Control
- **NAUTH** Nnamdi Azikwe University Teaching Hospital
- **PPE** Personal Protective Equipment
- **SP** Standard Precautions
- **TB** Tuberculosis
- **UBTH** University Of Benin Teaching Hospital
- **WHO** World Health Organization

DEFINITION OF TERMS

- **Compliance:** is a practical protocol that healthcare workers should follow during clinical care to prevent exposure to infection, antimicrobial resistance, and occupational infections from patients, healthcare workers, and the community.
- **HAI:** are infections a patient gets during care in a hospital or other facility, which wasn't present at admission, including those appearing after discharge, and occupational infections in staff, stemming from susceptible hosts, pathogens, and transmission vehicles in the healthcare setting, significantly impacting patient health and costs.
- **Healthcare Worker:** a person with the proper education, training, and licensure to perform medical and surgical services.
- **IPC**: is a scientific approach and practical solutions designed to prevent HAI.
- **SP**: are the minimum infection prevention practices that apply to all patient care practices, regardless of the patient's suspected or confirmed infection status, in any setting where healthcare services are delivered.

ABSTRACT

Background: Standard precautions are essential infection prevention and control measures used to reduce healthcare associated infections and occupational exposure among healthcare workers. Inadequate compliance with standard precautions remains a major public health concern in many healthcare facilities, particularly in resource-limited settings.

Aim: This study assessed and compared adherence to standard precautions among healthcare workers in the University of Benin Teaching Hospital and identified determinants influencing compliance.

Methods: A descriptive cross-sectional study was conducted among 370 healthcare workers (doctors and nurses) in the University of Benin Teaching Hospital. Data was collected using a structured self-administered questionnaire. Knowledge and Adherence was assessed using standardized questionnaires. Data analysis was performed using Statistical Package for the Social Sciences version 27. Descriptive statistics, chi-square tests and logistic regression analysis were used for analysis. Statistical significance was set at $p<0.05$.

Results: The mean age of respondents was 35.10 +/- 8.03 for doctors - who constituted 53.8% of the total population and 36.18 +/- 11.01 for nurses. The majority of respondents demonstrated good knowledge of standard precaution however doctors displayed a higher level of knowledge compared to nurses and the difference was statistically significant (48.6% and 37.6% respectively, p=0.01). Predictors of good knowledge were the male gender and doctors with males being less likely to have good knowledge (Odds Ratio= 0.210, C.I: 0.055 -0.799, p=0.022) and doctors being 2 times more likely to have good knowledge (Odds Ratio= 9.030, C.I: 2.342- 34.813, p=0.001). Hand hygiene and sharps disposal practices

recorded higher compliance levels compared with the use of protective eye goggles and face shields. Significantly more nurses 91(25.3%) always practiced hand hygiene before touching a patient compared to doctors 69(19.2%). The difference was statistically significant ($p<0.0001$). Respondents who previously attended infection prevention training demonstrated better compliance compared with those without training. There were no statistically significant predictors of compliance for doctors and nurses.

Conclusion: Although healthcare workers demonstrated moderate to good knowledge and compliance with standard precautions, important gaps still exist. Continuous infection prevention training, improved institutional support and adequate provision of personal protective equipment are recommended to improve adherence to standard precautions among healthcare workers in UBTH.

CHAPTER ONE

INTRODUCTION

1.1 Background

Health Care Associated Infections (HAIs) remain a major public health concern particularly in developing countries where they contribute significantly to patient morbidity, mortality and increased health care costs. One of the most effective strategies for the prevention of HAIs is the consistent application of Standard Precautions by Health Care Workers (HCWs). [1]

Standard Precautions are a set of infection Prevention Practices applied consistently with all patients, regardless of diagnosis or presumed infection status, in any healthcare setting. These measures were designed to reduce the risk of transmission of microorganisms from both recognized/unrecognized sources of infection.[2]

Standard Precautions initially began as Universal Precautions and was introduced by the Centre of Disease Control (CDC) in 1985 in response to Human Immunodeficiency Virus (HIV).[3]

In 1987, the CDC introduced another set of guidelines termed the Body Substance Isolation guidelines but was limited by its emphasis on hand washing after removing gloves only if the hands were soiled. Thus, in 1996, the CDC guidelines for isolation precautions in hospitals prepared by the Healthcare Infection Control Practices Advisory Committee (HICPAC) combined the major features of Universal Precautions and Body Substance Isolation guidelines into what we have now as Standard Precautions.[3]

The components of Standard Precautions include; Personal protective equipment (PPE), Respiratory hygiene and cough etiquette, Prevention of injures from sharps and safe

injection practices, Safe handling of patient care equipment, Principles of asepsis, Handling of laundry and linen and Environmental infection control.

Personal Protective Equipment includes gloves, masks, gowns, goggles, respirators, etc. They are used to create a barrier against infectious agents. Selection of PPEs is based on risk assessment results, for example gloves should be worn when coming in contact with blood or body fluid while goggles, masks and gowns should be worn when carrying out procedures likely to generate splashes or sprays.[4]

In Respiratory Hygiene and Cough Etiquette, Its aim is to reduce the spread of respiratory pathogens e.g. Tuberculosis, Influenza, etc. it involves covering the mouth and nose with tissue or elbow when coughing or sneezing, disposing of the tissues appropriately, carrying out hand hygiene afterwards and wearing of mask to contain respiratory secretions when necessary. [4]

Prevention of injuries from sharps and Safe Injection Practices which comprises of safe handling of needles and sharp instruments reduces the risk of injuries that could lead to blood borne infections e.g. HIV, Hepatitis B. Safe injection practices include using safety engineered devices, proper disposal in sharps container and avoiding recapping needles. Safe Injection Practices are designed to reduce transmission of blood borne infection between patients, from HCWs to patients and vice-versa.[5] The practices also include using aseptic techniques to avoid contamination of the injection equipment and medication, using single dose vials whenever possible and ensuring needles and syringes are only used once and discarded appropriately. [4]

In safe handling of patient care equipment, reusable equipment must be cleaned, disinfected and sterilized before reuse. Single use items should be disposed of appropriately after use to avoid cross contamination. [4]

Asepsis refers to practices that prevent the introduction of pathogens into sterile areas of the body. It includes using sterile instruments, maintaining a sterile field during procedures, and employing aseptic techniques during invasive procedure to protect patients from infections.[6]

Soiled linens should be handled carefully to prevent the dispersal of infectious agents. They should be placed in designated containers, laundered using the appropriate agents and temperatures to ensure decontamination. [6]

For Environmental Infection Control it involves regular cleaning and disinfection of surfaces, especially those frequently touched to help reduce the transmission of pathogens. Guideline should be put in place to handle proper cleaning of spills and waste management.[7]

Globally, adherence to Standard Precautions has been acknowledged as an important factor in preventing HAIs, protecting both healthcare workers, patients and their visitors thus extending this protection to the general public. [4] Examples of Common HAIs include; Urinary Tract infections, Surgical Site Infections, Bloodstream Infections, Pneumonia, Skin and Soft Tissue infections and Gastrointestinal Infections.

Standard Precautions are based on the principle that all blood, body fluids, secretions, excretions, non-intact skin and mucous membranes may contain transmissible infectious agents. Hence, they are applicable to all patient interactions irrespective of their suspected or confirmed infection status. [6]

In resource limited settings like Nigeria, compliance with Standard Precautions is often impeded by systemic challenges or factors such as lack of infection control policy and guideline, inconsistent surveillance, inadequate staffing, lack of training, irregular supply

of PPE, overcrowding, insufficient access to water and sanitation, and poor management of hospital waste.[8]

The Standard Precaution guidelines are for all HCWs includimg: Doctors, Nurses, Nursing Assistants, Medical Laboratory Scientists, Laboratory Technicians, Pharmacists, Physiotherapists, Radiographers, Dental Technicians, and Community Health Workers.

1.2 Statement of the Problem

Health Care Associated Infections (HAIs) have remained a significant public health challenge in Nigeria contributing to increased morbidity, mortality, healthcare costs and antimicrobial resistance. Standard Precautions are essential Infection Prevention and Control (IPC) measures made to minimize the risk of transmission of infectious agents in healthcare settings. With increased exposure to hospital acquired infections, there is prolonged hospital stay among patients, increased healthcare cost and an increase in the burden placed on HCWs. Infected HCWs could also contribute to increased burden due to reduced workforce in the hospital.

A recent study done at UBTH- University of Benin Teaching Hospital, suggests good overall compliance in the adherence to SPs amongst HCWs.[9] However, non-compliance in certain practices and persistent barriers means that full adherence is imperfect and there is room and need for improvement. These Gaps – particularly in hand hygiene and use of appropriate PPE – increase the risk of HAIs and endanger both the patients and staff. . A decline in adherence not only compromises patient safety but also increases the risk of occupational exposure for healthcare workers. While national studies provide a

broad perspective on the issue, there is an inadequacy or scarcity of institution specific data on Standard Precaution adherence in UBTH.

A Descriptive cross sectional study done in UBTH has showed that 93.5% of the respondents consistently practiced Hand washing; only 8% always used protective eye wear and 91.9% adhered strictly to Standard Precautions (SPs) only when the patient's risk status was perceived as high.[9] However, adherence to standard precautions should be done for all patients regardless of perceived risk status. The lack of use of protective goggles also puts the doctors at risk of bodily fluids contamination the eyes putting them at risk of infection e.g. Hepatitis B, Herpetic conjunctivitis/keratitis, inclusion conjunctivitis.

A Descriptive cross-sectional study done in Edo State, Nigeria, showed that 91.72% of the respondents had not received any formal training on TB and Standard Precaution in the past two years. The study revealed that healthcare professionals possess a baseline understanding of Tuberculosis (TB) and the necessary standard precautions.[14] Education increases perceived risk, benefits and self-efficacy however after a long duration of time without receiving refresher training; knowledge fades thus increasing negligence or complacency toward consistent compliance with standard precautions.

A Descriptive cross-sectional study done in Enugu, Nigeria showed that on the concept of Standard Precautions as a component of IPC, 90.3% of the respondents did not know that the potentials for transmission of infectious agents should be considered in all patients. This could possibly result in higher patient-to-patient transmission and increased HAIs. Amongst 61.7% of the respondents, needle-stick injury was identified as a source of occupational exposure to infections which shows a possible increased occupational exposure among HCWs. Considering moments of hand-washing, 81.3% of

the respondents could not correctly identify the circumstances for hand-washing but they knew that hands should be washed after removing gloves.[12] If HCWs only practice hand hygiene after glove removal, they will miss the critical transmission points, especially before patient contact and before aseptic tasks. This will lead to higher patient-to-patient disease transmission.

A Descriptive cross-sectional study done in Obafemi Awolowo University Teaching Hospitals Complex showed that only 20.3% of doctors, 3.9% of nurses and 1.6% of ward attendants had good knowledge of Hand Hygiene. Of the 174 opportunities for Hand hygiene observed, compliance rates were 42.3%, 55.8% and 68.9% among doctors, nurses and ward attendants respectively. The results showed that good knowledge about hand hygiene were uncommon among doctors, nurses and ward attendants. However, ward attendants had the highest compliance with hand hygiene. There was also a high prevalence of HAIs in this institution.[13]

A Descriptive cross-sectional study done in Public Hospitals in Addis Ababa, Ethiopia, showed that the level of compliance of HCWS with SPs was below average accounting for only 36.5% of respondents. Their level of knowledge regarding IPC Standard Precautions was favourable with 51.9% having an optimal level of knowledge. The study findings revealed that nurses had 2.3 times the odds of adhering more to SPs compared with physicians. HCWs who received IPC training were almost two (2) times more compliant with SPs than those not receiving training. The findings of this study demonstrated that the overall compliance with SPs was suboptimal and the HCWs' knowledge of IPC was optimal. This could significantly increase the risk of HAIs such as bloodstream infections, surgical site infections etc. suboptimal compliance also raises the likelihood of needle-stick injuries, blood and body fluid exposure, and eye or mucous

membrane splashes, leading to occupational infections such as HIV, hepatitis B and hepatitis B.[15]

A Descriptive cross-sectional study done) in Songwe region, Tanzania, showed that only 22.5% of the HCWs had high compliance with the SPs. It was found that the majority of the HCWs reported highest compliance on discarding used sharps into sharps containers (94%), the lowest SPs compliance was for the correct handling of spills, taking a shower after extensive splashing and not re-using disposable masks, 8%, 28.5% and 34% respectively. It was observed that the number of years of work experience was associated with compliance with SPs. HCWS who had been at work for 11-15 years were more likely to comply with SPs compared to those who and worked for less than 6 years.[16]

Non-adherence with standard precautions among HCWS has serious consequences not only for the HCWs themselves but also for the patients and the general public. Gaps in Standard Precautions application have been tied to HAIs, occupational infections and the spread of antimicrobial resistance.

Patients have the greatest risk of contracting HAIS when HCWs fail to adhere to SPs. This increases the risk or morbidity and mortality, prolongs their hospital stay, and raises their hospital cost.[17] For example, failure to adhere to proper hand hygiene and sterilization of patient equipment can lead to transmission of pathogens like Staphylococcus aureus, Clostridium difficle etc. Researchers in Ethiopia reported that failure to implement SPs significantly (36.5%) correlated with increased patient infections. [15]

1.3 Justification

Adherence to Standard Precautions is a vital component of IPC and essential for the prevention of HAIs. A decline in adherence not only compromises patient safety but also increases the risk of occupational exposure for healthcare workers. [4] Literature shows that there is a gap in knowledge and adherence to these standard precautions amongst HCWs in developing countries and resource limited settings like Nigeria. HCWs in such places face high exposure risks, infrastructure, and financial challenges, ensuring SP compliance is very important. [8]

Despite the proven effectiveness of SPs, documented gaps exist in hand hygiene compliance, use of PPE, safe injection practices, environmental sanitation and post exposure protocols. These lapses significantly increase the risk of HAIs, occupational exposure to blood borne pathogens such as HIV, HBV, and HCV, prolonged hospital stay, antimicrobial resistance and increased healthcare costs. UBTH is one of Nigeria's leading tertiary hospital and its HCWs are routinely exposed to infection risks. However, there is a scarcity on institution specific data on the actual level of compliance with SPs across the different professional categories within UBTH. Without accurate localized data, policymakers may be unable to design targeted interventions, appropriately allocate resources or assess the effectiveness of on-going infection control programmes.

Furthermore, different HCWs have varying levels of risk exposure, clinical responsibilities, training opportunities and work pressure which can influence how consistently they adhere to SPs. These differences may also contribute to variations in their understanding of SPs. Evidence shows that improved knowledge correlates strongly with better adherence and reduced occupational risk. Therefore, a comparative assessment is essential to identify the disparities between doctors, nurses, and other cadres.

This study provided data to further evaluate extent to which HCWs adhere to SPs, identifying the proportion that consistently practice these measures and those who do not. It also examined whether their compliance encompasses all components of SPs or is limited to specific aspects during clinical practice.

This study provided useful information that identified the current knowledge levels of standard precautions, determined whether there is refresher or maintenance training sessions aimed at reinforcing this knowledge, and assessed the extent to which such training influenced HCWs' adherence to standard precautions.

The determinants affecting adherence were also identified from the results of this study, comparing different healthcare professionals and providing actionable solutions tailored to the UBTH context. This study makes a meaningful contribution to existing literature by providing context specific data that is currently scarce particularly within UBTH. The findings will serve as a valuable reference point for future research, policy formulation, institutional interventions and training programmes that would ultimately improve healthcare quality and safety.

1.4 RESEARCH QUESTION

1. What is the level of knowledge and awareness of standard precautions amongst healthcare workers in UBTH?
2. How adherent are the healthcare workers to standard precautions in their clinical practice?
3. What are the factors or barriers that influence adherence to standard precautions amongst healthcare workers in UBTH?

1.5 GENERAL OBJECTIVE

To assess and compare the current level of standard precaution adherence amongst healthcare workers at UBTH with the aim of reducing the transmission of healthcare associated infection.

1.5.1 SPECIFIC OBJECTIVES

1. To determine and compare the level of knowledge of standard precautions amongst certain cadre of healthcare workers in the University of Benin Teaching Hospital.
2. To determine the level of compliance with standard precautions in clinical practice amongst the healthcare workers in UBTH.
3. To identify the determinants that influence adherence to Standard precautions in UBTH.

CHAPTER 2

LITERATURE REVIEW

2.1 HCWs' Knowledge and Awareness of Standard Precautions

A cross-sectional analytical study done in 2022 was conducted among healthcare workers in primary healthcare facilities in Enugu Metropolis South East Nigeria with the aim of assessing the knowledge of IPC measures with emphasis on SPs. It included a total of 300 healthcare workers comprising of various cadre of primary healthcare workers such as nurses, community health extension workers (CHEWs), community health officers (CHOs), and other clinic personnel involved in direct patient care. Participants were selected through a census of available staff in the selected facilities (100% response rate). Data was collected using a structured, interviewer-administered questionnaire. In relation to the objective, the study revealed substantial gaps in knowledge of Standard Precautions. Overall, 218 (72.7%) of respondents had poor knowledge, defined as scoring less than 50% on the knowledge assessment. Only 82 (27.3%) demonstrated good knowledge of IPC and Standard Precautions. Specific knowledge gaps included: 271 (90.3%) did not know that the potential for infection transmission in patients is part of Standard Precautions, 268 (89.3%) lacked knowledge that all blood-tinged body fluids require Standard Precautions, and majorities did not know the appropriate moments for hand washing: 60.7% unaware of hand washing before direct contact with patients and 74.7% unaware of hand washing between patient contacts. Cadre comparisons revealed that nurses were 2.5 times more likely to have good knowledge than other primary healthcare practitioners, and CHEWs/CHOs had about 2 times higher odds of good knowledge compared to other staff categories; years of practice also correlated with

knowledge levels. A key strength of the study is its complete response rate (100%) and inclusion of multiple professional cadres, enhancing internal representativeness. [12]

A cross-sectional descriptive study done in 2015 was conducted in two tertiary hospitals in Nigeria with the objective of assessing hospital workers' knowledge, attitudes, and practices relating to Standard Precautions. It included 290 healthcare workers, comprising 111 doctors, 147 nurses and 32 laboratory scientists. Participants were selected through convenience sampling, and data were collected using a structured, self-administered questionnaire adapted from established infection-control assessment tools. In relation to knowledge, the study found that although awareness of some Standard Precaution components was high, several critical gaps remained. For instance, only 53% correctly identified all situations requiring hand hygiene, and just 43% demonstrated adequate knowledge of injection safety procedures. Furthermore, less than half (48%) understood the full scope of Standard Precautions, including its application to all patients irrespective of perceived infection status. Junior nurses, house officers, and laboratory personnel had significantly lower knowledge scores than senior or more experienced staff.

The study's strengths include its use of a validated data-collection instrument, which enhanced internal consistency. However, the use of convenience sampling and reliance on self-reported knowledge limit generalizability to other tertiary settings such as UBTH.[8]

A cross-sectional analytical study done in 2024 aimed to assess compliance with Standard Precautions and factors associated with noncompliance among healthcare workers in nine public hospitals in Addis Ababa, Ethiopia however for the purpose of this review, only the knowledge component was considered. The study included 422

healthcare workers, selected using stratified random sampling, and data were collected via a structured questionnaire based on WHO Infection Prevention and Control standards.

Knowledge assessment revealed that approximately 52% of respondents had adequate overall knowledge of Standard Precautions. Cadre-specific analysis showed that doctors were more likely than nurses or allied health staff to demonstrate adequate knowledge. For example, doctors scored higher in identifying proper hand hygiene indications, sharps safety, and the principles of transmission-based precautions. Staff who had received recent IPC training scored higher regardless of cadre, highlighting the effect of professional development on knowledge retention. For this study, large multisite sample and analytical approach allowed identification of predictors of knowledge however knowledge assessment was combined with compliance evaluation, so detailed cadre-level differences were not always fully elaborated and reliance on self-reported data may overestimate true knowledge.[15]

A study done in 2017 in the Lower Manya Krobo District, Ghana used a cross-sectional design to assess healthcare workers' knowledge and compliance with Standard precautions. A total of 100 HCWs were selected from 2 tertiary hospitals and the population consisted of Nurses, Laboratory Technicians and other clinical staff involved in patient care within the facilities. The study revealed that only 37% knew that SP includes hand washing before and after direct patient contact; 39% were aware of cough etiquette; and 40% understood aseptic techniques. Cadre-specific patterns indicated that nurses had slightly higher knowledge than laboratory staff, particularly in hand hygiene and aseptic technique, though differences were modest, junior or less experienced staff demonstrated the lowest awareness levels.

While the study also explored practical barriers, which provided context for knowledge gaps, the small sample size and non-random quota sampling limit the ability to generalize findings.[20]

A descriptive cross-sectional study done in 2021 to assess the knowledge of Standard Precautions among Healthcare Professionals at a teaching Hospital in Karachi, Pakistan used a total of 300 participants. The population comprised of Doctors, Nurses and Paramedics selected through simple random sampling. A CDC-based structured questionnaire was used, categorizing knowledge levels as very good, good, or average/below average.

Results indicated that 70% of participant's demonstrated very good knowledge, 19.5% had good knowledge, and 12.2% had average or below-average knowledge. Cadre comparisons showed that doctors consistently scored highest, with most achieving very good knowledge. Nurses scored moderately, with a majority in the very good category but a higher proportion in the good range. Paramedics scored the lowest, with a notable proportion in the average/below-average category. Knowledge was strongest for glove use and sharps disposal, while weaker areas included environmental cleaning and transmission-based precautions. The study's strengths include randomized sampling and use of a standardized international instrument. [21]

2.2 Compliance with Standard Precautions

A cross sectional study done in 2015 in the Niger Delta University Teaching Hospital, Bayelsa State and Bingham University Teaching Hospital, Jos, Plateau State employed a total of 290 HCWs comprising of 111 doctors, 147 nurses and 32 laboratory scientists to assess the knowledge, attitude and practice of standard precautions of infection control among the hospital workers in the two tertiary hospitals. Participants were recruited from the two hospitals with the study reporting a hospital-based sampling strategy across cadres and data was obtained using a structured self-administered questionnaire assessing core elements of standard precautions.

The study revealed that the median practice score was 50.8% which showed that there was a significant gap between knowledge/attitude and actual compliance or implementation. It was also found that House officers, Laboratory Scientists and Nurses exhibited lower compliance levels compared to their more experienced colleagues. The study displayed a diverse professional representation which allowed for comparative analysis across different healthcare roles however the study did not include direct observation of practices which could have provided some insight into actual compliance behaviour.[8]

A cross-sectional study done in 2021 in Nnamdi Azikwe University Teaching Hospital (NAUTH) assessed the factors and barriers influencing adherence to standard precautions amongst healthcare workers. A total of 341 HCWs participated comprising of doctors nurses, pharmacists, medical lab scientist, radiographers, physiotherapists, dieticians and others. Data was collected from the healthcare workers using a self-administered questionnaire supplemented by key-informant interviews. The questionnaire collected self-reported practice and structural/unit factors. The study

revealed that overall compliance was 65.1% while specifically, PPE usage was 76.2%. The cross-sectional design was appropriate for the aim of measuring current compliance and the study was conducted in a tertiary hospital representative of similar settings. However, actual compliance behaviours were not confirmed through observation.[24]

A cross-sectional study done in 2024 in 9 public hospitals in Addis Ababa, Ethiopa, aimed to determine the extent of compliance with standard precautions in clinical practice among healthcare workers. They used a total of 422 HCWs comprising of Physicians, Nurses and Laboratory technologists using a stratified random sampling technique. Data collection used a self-administered and analysis employed logistic regression to identify predictors of compliance. The study revealed that only 36.49% of HCWs were compliant with Standard Precautions indicating that compliance in these hospitals were suboptimal. The study included various categories of HCWs thus enhancing the generalizability of the findings. Though the study included multiple hospitals in Addis Ababa, the findings may not be generalizable to private hospitals.[15]

A cross-sectional study was done in 2020 to explore factors related to Nurses' compliance with practice of Standard Precautions at a hospital in Palembang, Indonesia using the Health Belief Model as a conceptual framework. The study population was 120 nurses working at the hospital in Palembang. Compliance was measured by a 12-point observation form (the research reports an observational checklist) and Health Belief Model components were captured by questionnaire. The results revealed that 56.7% of the participant demonstrated good compliance with SP and compliance was higher among nurses in operating and emergency rooms and nurses who received training showed greater compliance. The comparison across different hospital units offered a clear understanding of compliance variations however the relatively small sample size may affect the statistical power of the study.[22]

2.3 Determinants of Standard Precautions

A descriptive cross-sectional study was done in 2024 to assess the barriers to IPC implementation in 33 healthcare facilities in Ekiti State, Nigeria; 16 primary healthcare facilities, 16 secondary healthcare facilities and the one existing state government owned tertiary healthcare facility. Findings revealed that training, availability of resources and institutional policies positively influenced adherence to standard precautions. The barriers found included inadequate IPC materials (PPE, disinfectants), poor waste management, and patients' non-compliance with IPC protocols, poor infrastructure (including water and facility layout), heavy workload and lack of continuous education on IPC practices. As a purely qualitative study it does not provide prevalence estimates, so its findings are not useful for estimating how common each barrier is across healthcare facilities .[23]

A cross-sectional study done in 2021 in Nnamdi Azikwe University Teaching Hospital (NAUTH) assessed the factors and barriers influencing adherence to standard precautions amongst healthcare workers. A total of 341 HCWs participated. Data collection was with a self-administered questionnaire and key informant interviews. 62.2% reported lack of training/retraining as a factor, 51.4% reported insufficient management support while 37.8% reported no Standard Operating Procedure available was a factor. The study's sample size would have helped to improve statistical power and the use of quantitative and qualitative tools would have provided triangulation of study findings. However, in this study the authors failed to provide a clear description of its sampling method and a breakdown of professional cadre.[24]

A cross-sectional study done in 2017 in 2 hospitals in the Lower Manya Krobo District, Ghana used a cross-sectional design to assess healthcare workers' knowledge and compliance with Standard precautions. A total of 100 HCWs were selected from 2 tertiary hospitals using simple random and quota techniques and the population consisted of Nurses, Laboratory Technicians and other clinical staff involved in patient care within the facilities. A structured questionnaire was used for data collection. Findings revealed that 63% believed that wearing PPEs might cause patients to panic, 38% felt that complying with SP interfered with their ability to provide care and 44% reported insufficient time to adhere to SP due to patient care demands. The study's inclusion of HCWs from various professional backgrounds increased the comprehensive overview of the findings however the small sample size may limit the generalization of the findings .[20]

A cross-sectional study was done in 2024 in to assess the knowledge, determinants, and compliance with infection prevention and control practice among healthcare workers hospital in Addis Ababa, Ethiopia. The study involved 422 healthcare workers selected through stratified random sampling technique from 9 public hospitals. Data was collected using a structured self-administered questionnaire and observational checklists. The findings revealed that only 48.4% of healthcare workers demonstrated good compliance with standard precautions. Several determinants strongly influenced adherence, including shortages of essential supplies, with over 60% reporting inconsistent availability of PPE, 53% reporting inadequate hand hygiene facilities, and 41% indicated that running water was frequently unavailable. High workloads were also significant, as nearly half (47%) of HCWs stated that patient volume limited their ability to follow SP consistently. Training was another major determinant as those who had not received IPC training in

the last year were 1.7 times more likely to be non-compliant, according to multivariate analysis. Low risk perception, weak supervisory support, and lack of feedback systems also contributed to poor adherence. While the study benefitted from a large sample size and strong methodological design, its reliance on self-reporting introduces social desirability bias and its findings may not reflect practices in private facilities.[15]

CHAPTER 3

METHODOLOGY

3.1: Study Area

This study was conducted in the University of Benin Teaching Hospital (UBTH), a tertiary referral and teaching hospital located at Ugbowo, Benin City Edo State, Nigeria. Edo State is one of the 6 Southern States in the 36 states of Nigeria with its capital in Benin City. It was created on August 27, 1991, following the division of the old Bendel State into Edo and Delta States. Edo State is bounded by Kogi State to the Northeast and North, Anambra to the East, Delta to the Southeast and South and Ondo to the West and Northwest; the Niger River flows along the state's eastern boundary. Edo State lies at elevations between 500 feet (150 metres) in the South and more than 1800 feet (550 metres) in the North and tropical rain forest covers most of the area. The State is largely inhabited by the Bini people and other ethnic groups including Esan, Owan, Estako and other tribes that reside in there.[25]

Benin City, the capital of Edo State, is one of West Africa's most historically significant urban centres. Located on a branch of the Benin River, it developed as a major transportation and commercial hub linking the Lagos axis to eastern and northern Nigeria, as well as serving as a gateway to towns and states such as Sapele and Okene. Benin City functions today as a centre of education, commerce, and craftsmanship. It hosts the University of Benin, established in 1970, which has contributed significantly to research and professional development in southern Nigeria. Its economy is diversified, encompassing agriculture—particularly oil palm, rubber, and timber—as well as manufacturing industries such as furniture making, sawmilling, and various processing

plants.[30]

University of Benin Teaching Hospital (UBTH) was officially opened on 12th May, 1973 and from an initial capacity of 360 beds, the hospital has expanded over the decades to a bed capacity of over 900 beds. UBTH holds multiple clinical and non-clinical departments and provides 24-hour emergency, surgical, obstetric, paediatric, laboratory and specialized services making it a typical representative of a typical Nigerian Tertiary hospital and an appropriate setting to study adherence to standard precautions.[26] UBTH has numerous clinical departments, covering major specialties like Surgery, Child Health, Obstetrics & Gynaecology, Internal Medicine, Radiology, Pathology (Haematology, Chemical Pathology, Microbiology), Anaesthesiology, Physiotherapy, Mental Health, Dentistry, Ophthalmology, Orthopaedics, Family Medicine, and Community Health.[29] An estimated number of healthcare workers was ascertained from the Human Resources Department and from the Association of resident doctors' chairman; there are 220 consultants, 444 resident doctors and 107 house officers making a total of 771 doctors. A total number of 630 nurses were ascertained from UBTH 2024 Annual Report. [31, 35]

3.2 Study Design

A descriptive cross-sectional study design was used for this study.

3.3 Study Duration

This study was carried out over 12 month period.

- Conceptualization and initial write-up: 5 months
- Data collection: 3 months

- Analysis: 2 months
- Final write up: 2 months

3.4 Study Population

In the context of the University of Benin Teaching Hospital (UBTH), this study focused on clinical staff (doctors and nurses) who represent the core healthcare workers directly involved in patient care and management. Doctors are primarily responsible for diagnosis and treatment decisions, while nurses provide frontline care, implement treatment plans, and continuously monitor patients. Focusing on these healthcare workers ensured the study captured those whose adherence to standard precautions has the greatest impact on patient safety and quality of care.

Limiting the comparison to doctors and nurses also improved feasibility and comparability. Including all healthcare workers, such as allied health professionals or laboratory staff would have introduced variability in roles, training, and patient contact, potentially complicating the assessment of adherence patterns. By concentrating on doctors and nurses, who share direct patient interaction and similar exposure risks, it allowed for clearer and more meaningful evaluation of adherence to standard precautions. Overall, narrowing the focus to doctors and nurses provided a representative, manageable, and methodologically defendable approach to assessing adherence to standard precautions among healthcare workers at UBTH.

3.5 Selection Criteria

Inclusion criteria:

- Doctors and nurses employed at UBTH and have worked there for at least 6 months.
- Those with direct patient contact.

Exclusion criteria:

- Those in Infection Control and Prevention Committee of UBTH.

3.6 SAMPLE SIZE DETERMINATION

The study population comprised of doctors and their subcategories and nurses and their subcategories at the University of Benin Teaching Hospital (UBTH), with estimated cadre populations of 735 doctors and 630 nurses, giving a total population of 1,365 healthcare workers.

To determine the minimum sample size, the Comparative formula for proportions was used [32]:

The sample size for this comparative cross-sectional study was determined using the formula for comparing two proportions:

$$n_1 = n_2 = \frac{2(Z\alpha_{/2}+Z\beta) \times P(1-P)}{(p_1 - p_2)^2}$$

Where $P = (p1 + p2)/2$

$Z\alpha_{/2} = 1.96$

$Z\beta = 0.84$

$p_1 = 33.27$

$p_2 = 36.43$

Where:

n = minimum sample size per group

$Z\alpha = 1.96$ (95% confidence level)

$Z\beta = 0.84$ (80% power)

p_1 = proportion of doctors compliant with standard precautions

p_2 = proportion of nurses compliant with standard precautions

Based on previous studies and to ensure feasibility, a clinically meaningful absolute difference of 9% in compliance with standard precautions between doctors and nurses was assumed.

Thus:

$p_1 = 0.34$

$p_2 = 0.43$

$$P = \frac{0.34+0.43}{2} = 0.385$$

$2(Z\alpha_{/2}+Z\beta) = 1.96 + 0.84 = 2.80$

$p_1 - p_2 = 0.34-0.43 = 0.09$

$$n = \frac{2 \times 2.80 \times 0.2368}{}$$

$(0.09)^2$

n = 163.7~ 164

$n_1 = n_2 == 164$

Total population = 328

Adjustment for non-response (10%)

ns = adjusted sample size

ns = calculated sample size + non-response rate

nr = non-response rate = 10% = 0.1

nr = 0.1x 328 = 32.8

n = calculated sample size = 328

ns = 328 + 32.8= 360.8

ns ~ 361

P(1-P) = 0.385 × 0.615 = 0.2368

Proportionate size allocation

$n_h = N_h / N \times n$

Where:

N_h = Population of each group = (Doctors: 771), (Nurses: 630)

N = Total population =1401

N = Total sample size = 361

$n_{doctors}$ = 771 / 1401 x 361

=198.67 ~ 199

N_{nurses} = 630 / 1401 x 361

= 162.33 ~ 162

- Doctors = 199
- Nurses = 162

3.7 Sampling Technique

For this study, a stratified, multistage sampling technique was employed to select participants from the population of doctors and nurses at UBTH.

Stage One

First, the study population was stratified by professional cadre—doctors and nurses—to ensure proportional representation of both groups. Within each stratum, eligibility criteria was applied to include full-time, clinically active healthcare workers with at least six months of experience, while excluding those in the infection prevention and control committee of the hospital.

Stage Two

Following this, participants were selected using simple random sampling. First, a list of doctors according to department and nurses based on the wards or units were they worked was formed after which each eligible individual was assigned a unique number and randomly chosen to participate. The total sample size was allocated proportionally to the size of each stratum, ensuring that the composition of the sample accurately reflects the healthcare workforce at UBTH.

Data Collection

- **Tools for data collection**: Data was obtained with the aid of a structured, self-administered questionnaire with close ended and open-ended questions that sought to answer the study objectives. The focus was on key standard precautions. The tool was adapted from the questionnaire used by the Department of Community Medicine and Primary care of Olabisu Onabajo University on Infection control and use of standard precautions among healthcare workers in primary health centres in sagamu local government, Nigeria.[33] The tool has 4 sections that comprised of :

  A. Socio-Demographic Data

  The socio-demographic data section helped determine which demographic characteristics are significant predictors of knowledge about or compliance with standard precautions with a total of 8 questions.

  B. Knowledge of Standard Precautions

  The section on knowledge assessed the general level of knowledge regarding standard precautions among doctors and nurses and if a significant difference exists between the two groups, if they have received formal training on standard precautions and if they are aware of the key components of standard precautions. These were determined by 12 questions in this section.

C. Adherence to Standard Precautions

The Compliance section measured the overall level of compliance with standard precautions among HCWs, compared compliance levels between doctors and nurses, and if there were any significant differences in compliance levels for specific standard precaution components with 10 questions in this section.

D. Barriers influencing standard precautions.

The barrier section sought to extract possible factors affecting compliance with standard precautions and how these factors differed between doctors and nurses with 7 questions in this section.

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- **Pretesting:** The tool was validated via field testing by selecting 10% of the sample population from similar tertiary hospital. Responses was analysed for comprehension issues, reliability indicators and time taken to complete the tool.
- **Method of data collection:** The pre-tested structured questionnaires were self-administered at UBTH. The respondents were allowed to answer the questionnaires in or around their working environment or offices where they felt safe and their privacy was ensured. Informed consent was obtained from the respondents and they were assured of confidentiality.

3.8 Data Analysis, Scoring And Measurement Of Variables

3.8.1 Scoring System And Measurement Of Variables

3.8.1.1 Knowledge of Standard Precautions

The scoring protocol employed a binary system. One point was awarded for each correctly identified option within a multiple-select question, and zero points were awarded for any option that was incorrectly selected or omitted. The same binary principle (1 point for correct, 0 points for incorrect) applied to dichotomous (yes/no) questions. The total correct responses were summed up and converted to percentage scores. The percentage score less than 60% was categorised as Poor knowledge, >60% was categorised as Good knowledge.[35]

3.8.1.2 Compliance/Adherence to Standard Precautions

The Linkert scale response was used to assess the participants' level of compliance with standard precautions where 1= Never, 2= Rarely, 3= Sometimes, 4= Most of the time and 5= Always. The total correct responses were summed up and converted to percentage scores. The percentage score less than 60% was categorised as Poor compliance and >60% was categorised as Good compliance [34, 35]

3.9 Statistical Analysis

The data collected was checked for completeness, coded, and analysed using SPSS. Data gathered was collated and screened for completeness before scoring.. Univariate analysis summarized the study population and individual variables. Demographic characteristics which are categorical such as sex, and job description, were presented

using frequencies, percentages as appropriate. Age, years of experience, and average working hours were summarized as mean/median with measures of central tendency. Knowledge, compliance, and barriers, were also summarized as frequencies, proportions and means/medians as appropriate.

Bivariate analysis examined relationships between participant characteristics and knowledge and compliance/adherence to standard precautions. Associations between categorical variables were tested using Chi-square, while differences in means of continuous variables across groups were assessed with t-tests. Chi-square was also used to identify the relationship between knowledge and compliance witg standard precaution among HCW. A p-value of less than 0.05 was considered statistically significant and results were presented in tables and charts for clarity.

Multivariate analysis using Multinomial logistic regression was used to identify significant predictors of knowledge and compliance with SP among study participants.

Results were presented using frequency distribution tables, contingency tables, charts and prose.

3.10 Ethical Considerations

Ethical approval and permission to carry out the study was obtained from the Health Research Ethics Committee of the University of Benin Teaching Hospital. Permission was obtained from the various ward and unit heads in clinical areas concerned.

Informed consent was also taken from the respondents before administering the questionnaires. The respondents were informed that they had the right to withdraw from the study at any time and that withdrawal posed no loss or harm.

3.11 Limitations Of Study

- This study relied on self-reported data and may have been limited by errors such as an over-estimation of adherence due to recall bias. To overcome this bias, all questions were simple, clear and specific.
- These results may have limited applicability to smaller or private institutions.

CHAPTER FOUR

RESULTS

In this study, a total of 370 healthcare workers comprising of 199 Doctors and 171 Nurses were studied. The results are presented in the following sections.

SECTION A: Socio-demographic characteristics of respondents

SECTION B: Knowledge of Standard Precautions

SECTION C: Compliance with Standard Precautions

SECTION D: Determinants influencing adherence to standard precautions

SECTION A

SOCIODEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Table 1: Socio-demographic Characteristics of Respondents

Variables(n=370)	Doctors Freq (%) (n=199)	Nurses Freq (%) (n=171)
Sex(n=370)		
Male	117 (31.6)	11 (3.0)
Female	82 (22.2)	160 (43.2)
Age Group (years) (n=370)		
20-29	56 (15.1)	62 (16.7)
30-39	90 (24.3)	43 (11.6)
40-49	41 (11.1)	37 (10.0)
50-59	12 (3.2)	29 (7.8)1
>60	0 (0.0)	0 (0.0)
Mean ± Sd Age (years)	35.10 +/- 8.03	36.18 +/- 11.01
Marital Status (n=370)		
Single	97 (26.2)	65 (17.6)
Married	99 (26.8)	98 (26.5)
Divorced	0 (0.0)	2 (0.5)
Widowed	1 (0.3)	3 (0.8)
Separated	0 (0.0)	1 (0.3)
Unknown Marital Status	2 (0.5)	2 (0.5)
Tribe (n=370)		
Edo	50 (13.5)	76 (20.5)
Esan	28 (7.6)	27 (7.3)
Igbo	48 (13.0)	34 (9.2)
Yoruba	13 (3.5)	4 (1.1)
Hausa	2 (0.5)	1 (0.3)
Urhobo	13 (3.5)	9 (2.4)
Others	45 (12.2)	20 (5.4)
Religion (n=366)		
Christianity	194 (53.0)	166 (45.4)
Islam	2 (0.5)	4 (1.1)

Table 1 presents the socio-demographic characteristics of the 370 healthcare workers who participated in the study. There were 242 females which accounted for 65.4% of the total sample which was a significant amount. 117(31.6%) of the population were male doctors while 160(43.2%) were female nurses.

The findings showed that the majority of doctors were within the economically active age group of 30–39 years (22.9%). The nurses were majorly within the 20-29 years age group (17.3%) however for both cadres of healthcare workers, fewer respondents were aged 50 years and above.

Findings showed that doctors had a higher number of single 97(26.2%) and married 99(26.8%) persons as compared to nurses while nurses had a higher number of divorced 2(0.6%), widowed 3(0.8%) or separated 1(0.3%) persons.

Christianity was observed to be the predominant religion among respondents.

Table 2: Occupational Characteristics of Respondents Contd

Variables	Doctors Freq (%) (n=199)	Nurses Freq (%) (n=171)
Years of Experience (n=366)		
<1	8 (2.2)	3 (0.8)
1-5	75 (20.5)	77 (21.0)
6-10	59 (16.1)	21 (5.7)
11-20	45 (12.3)	46 (12.6)
> 20	8 (2.1)	24 (6.5)
Time since last training on IPC(n=244)		
Compliant	79 (32.4)	82 (33.6)
At Risk	18 (7.4)	21 (8.6)
High Risk	14 (5.7)	30 (12.3)

Compliant (<1Year), At Risk (1-2 Years), High Risk (>2 Years) Compliant (<1year). At Risk (1-2years). High Risk (>2years)

Table 2b: Occupational Characteristics of Respondents

Variables(n=370)	Frequency	Percent
Doctors(n=199)		
Consultants	33	16.6
Senior Registrars	53	26.6
Junior Registrars	69	34.7
House Officers	44	22.1
Nurses(n=171)		
Director	1	0.6
Deputy Director of Nursing	6	3.5
Assistant Director of Nursing	14	8.2
Chief Nursing Officer	33	19.3
Assistant Chief Nursing Officer	11	6.4
Principal Nursing Officer	3	1.8
Senior Nursing Officer	38	22.2
Nursing officer I	18	10.5
Nursing Officer II	16	9.4
Administrative	2	1.2
Health Assistants	3	1.8
Interns	26	15.2

Table 2 presents the occupational characteristics of respondents with a higher proportion health care workers having received IPC training occurring within the 1-5 years group (20.5% and 21.0% for doctors and nurses respectively.

Nurses were observed to be the most compliant with renewing yearly trainings (33.6%).

Table 2b presents the professional characteristics of respondents. Doctors constituted the largest proportion of respondents. 34.7% (69) of doctors were junior registrars followed by the senior registrars 26.6% (53). For Nurses, the job position with the highest value was Senor Nursing officer 38(22.2%) followed by Chief Nursing Officer 33(19.3%). The rest of the values are present in the table.

SECTION B

KNOWLEDGE OF STANDARD PRECAUTIONS

Table 3: Correct Knowledge of Standard Precautions among Study Participants cont.

Variable	Correct	
	Doctors Freq (%) (n=199)	**Nurses Freq (%) (n=171)**
Hand Hygiene/Washing	190 (95.5)	160 (93.6)
Use of personal protective equipment	178 (89.4)	139 (81.3)
Safe injection practices	170 (85.4)	132 (77.2)
Cleaning and disinfecting patient contact surfaces	161 (80.9)	128 (74.9)
Cough Etiquette	139 (69.8)	89 (52.0)
Before contact with a patient	173 (86.9)	143 (83.6)
Between patient contact	153 (76.9)	115 (67.3)
Immediately after removing gloves	154 (77.4)	127 (74.3)
After touching body fluids	156 (78.9)	126 (73.7)
Needle prick/sharps injury	186 (93.5)	144 (84.2)
Splash of contaminated fluids on the eye	175 (87.9)	137 (80.1)
Inhalation	169 (84.9)	108 (63.2)
Talking to patients	88 (44.2)	66 (38.6)
Touching patients	135 (67.8)	92 (53.8)

Table 3b: Correct Knowledge of Standard Precautions among Study Participants cont.

Variable	Correct	
	Doctors Freq (%) (n=199)	**Nurses Freq (%) (n=171)**
Standard precautions apply only to blood exposure.	178 (89.4)	131 (76.6)
Sterile gloves are the most effective method of preventing infection.	148 (77.9)	76 (44.4)
Gloves replace hand hygiene	171 (86.5)	125 (73.0)
Disinfection of Patient-care Surfaces after use	188 (94.5)	157 (91.8)
Indications for Standard Precautions	183 (96.3)	164 (95.9)

Table 3 shows the response of participants to various questions on standard precautions. Majority of the doctors 190(95.5%) and nurses 160(93.6%) correctly responded that hand hygiene/washing is regarded as standard precaution. More nurses than doctors did not consider use of PPE [32(18.7%) vs. 21(10.6%)] and safe injection practices [39(22.8%) vs. 29(14.6%) as standard precautions. With regards to the indications for hand hygiene, majority of the doctors and nurses correctly identified the indications for hand hygiene. On potential ways of exposure to infectious agents more doctors than nurses respectively identified needle stick injuries (93.5% > 84.2), splash of body fluids(87.9% > 80.1), inhalation(84.9 > 63.2%) and touching of patients as ways of exposure (67.8 > 53.8%). Still on knowledge of standard precautions, table 3b shows the response of doctors and nurses to questions on when to observe standard precautions. A larger number nurses 40(22.4%) compared to doctors 21(10.6%) did not know that standard precautions do not only apply when there is exposure to blood of patients. Similarly, more nurses 46(27.0%) than doctors 51(22.1%) did not know that wearing gloves does not eliminate the need for hand washing.

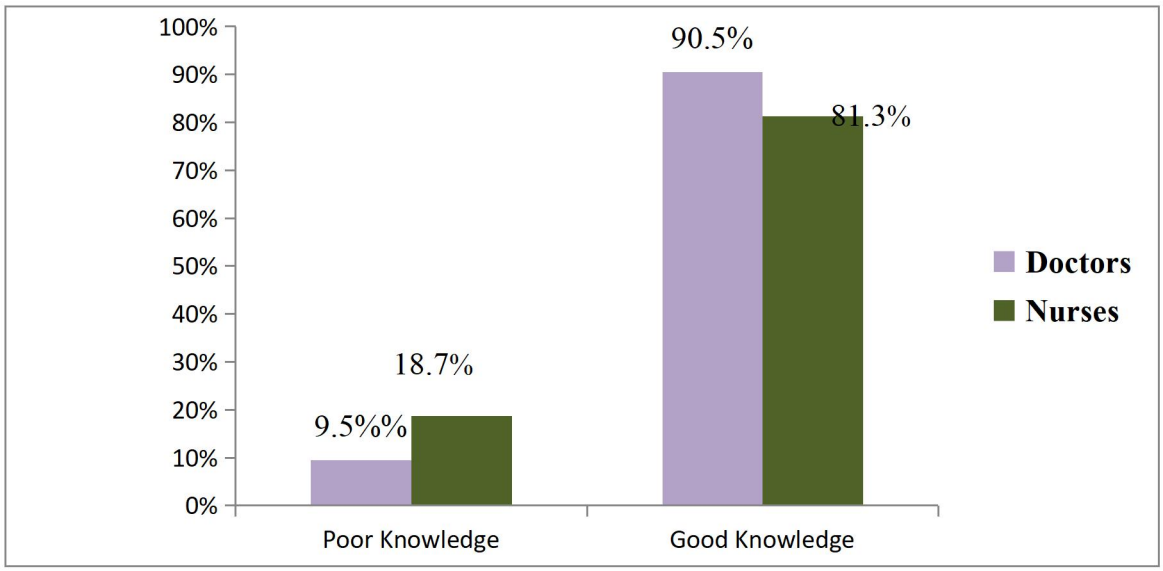

Figure 1: Bar Chart on Level of Knowledge Standard Precautions

Figure 1 displays the composite knowledge score of the healthcare workers. Findings showed that significantly more doctors (90.5%) had good knowledge compared to nurses (81.3%) (p=0.01).

Table 4: Socio-demographics Associated with Knowledge of Doctors

Variable (n=199)	Knowledge		Test Statistics	p-value
	Poor Freq (%)	Good Freq (%)		
Gender(n=199)				
Male	15 (7.5)	102 (51.3)	χ^2 =3.522	0.061
Female	4 (2.0)	78 (39.2)		
Age (n=191)				
20-29	6 (3.0)	50 (25.1)	χ^2 =3.207	0.361
30-39	11 (5.5)	79 (39.7)		
40-49	1 (0.5)	40 (20.1)		
50-59	1 (0.5)	11 (5.5)		
> 60	0 (0.0)	0 (0.0)		
Marital Status (n=197)				
Single	13 (6.6)	84 (42.6)	χ^2 =3.138	0.208
Married	6 (3.0)	93 (47.3)		
Divorced	0 (0.0)	0 (0.0)		
Widowed	0 (0.0)	1 (0.5)		
Separated	0 (0.0)	0 (0.0)		
Religion (n=196)				
Christianity	19 (9.7)	175 (89.3)	χ^2 =0.217	0.641
Islam	0 (0.0)	2 (1.0)		
Years of Experience (n=195)				
<1	1 (0.5)	7 (3.6)	χ^2 =4.705	0.453
1-5	11 (5.6)	64 (32.8)		
6-10	4 (2.1)	55 (28.2)		
11-20	2 (1.0)	43 (22.1)		
21-30	1 (0.5)	5 (2.6)		
31-40	0 (0.0)	2 (1.0)		
>40	0 (0.0)	0 (0.0)		
Time since last training (n=111)				
Compliant	8 (7.2)	71 (64.0)	χ^2 =3.492	0.174
At Risk	0 (0.0)	18 (16.2)		
High Risk	0 (0.0)	14 (12.6)		

Table 4 presents the association between socio-demographic characteristics and knowledge of standard precautions among doctors. The findings showed that the majority of doctors possessed good knowledge across all socio-demographic categories assessed. Male doctors recorded a higher proportion of good knowledge, with 102 (51.3%) respondents, compared to

females with 78 (39.2%). However, gender was not statistically significantly associated with knowledge among doctors (, p = 0.061), although the result was close to the level of significance. Regarding age distribution, respondents aged 30–39 years constituted the highest proportion with good knowledge, accounting for 79 (39.7%), followed by those aged 20–29 years with 50 (25.1%). Nevertheless, there was no statistically significant association between age and knowledge (p = 0.361). In terms of marital status, married doctors had the highest proportion with good knowledge, accounting for 93 (47.3%), while single doctors accounted for 84 (42.6%). Marital status was not significantly associated with knowledge (p = 0.208). Overall, none of the socio-demographic variables assessed among doctors showed statistical significance (p > 0.05). This suggests that knowledge of standard precautions among doctors was generally high and fairly consistent across socio-demographic groups.

Table 5: Socio-demographics Associated with Knowledge of Nurses

Variable (n=171)	Knowledge		Test Statistics	p-value
	Poor Freq (%)	Good Freq (%)		
Gender(n=171)				
Male	4 (2.3)	7 (4.1)	χ^2 =2.408	0.121
Female	28 (16.4)	132 (77.2)		
Age (n=171)				
20-29	11 (6.4)	51 (29.8)	χ^2 =0.797	0.850
30-39	8 (4.7)	35 (20.5)		
40-49	6 (3.5)	31 (18.1)		
50-59	7 (4.1)	22 (12.9)		
> 60	0 (0.0)	0 (0.0)		
Marital Status (n=169)				
Single	12 (6.6)	53 (42.6)	χ^2 =5.416	0.247
Married	17 (3.0)	81 (47.2)		
Divorced	0 (0.0)	2 (1.2)		
Widowed	1 (0.6)	2 (1.2)		
Separated	1 (0.6)	0 (0.0)		
Religion (n=170)				
Christianity	31 (18.2)	135 (79.4)	χ^2 =0.102	0.749
Islam	1 (0.6)	3 (1.8)		
Years of Experience (n=171)				
<1	0 (0.0)	3 (3.6)	χ^2 =3.272	0.774
1-5	16 (9.4)	61 (35.7)		
6-10	4 (2.3)	17 (9.9)		
11-20	10 (1.0)	36 (22.1)		
21-30	1 (0.6)	16 (9.4)		
31-40	1 (0.6)	5 (2.9)		
>40	0 (0.0)	1 (0.6)		
Time since last training (n=133)				
Compliant	15 (11.2)	67 (50.4)	χ^2 =0.535	0.765
At Risk	5 (3.8)	16 (12.0)		
High Risk	7 (5.3)	23 (17.3)		

Table 5 depicts the association between socio-demographic characteristics and knowledge of standard precautions among nurses. The findings demonstrated that the majority of nurses had good knowledge of standard precautions across all socio-demographic categories. Female nurses constituted the largest proportion with good knowledge, accounting for 132 (77.2%),

while male nurses accounted for 7 (4.1%). However, the association between gender and knowledge was not statistically significant (p = 0.121). In relation to age, nurses aged 20–29 years recorded the highest proportion with good knowledge, accounting for 51 (29.8%), followed by those aged 30–39 years with 35 (20.5%). Nevertheless, age was not significantly associated with knowledge among nurses (p = 0.850). Regarding marital status, married nurses had the highest proportion with good knowledge, accounting for 81 (47.2%), while single nurses accounted for 53 (42.6%). Despite this variation, marital status did not show a statistically significant association with knowledge (p = 0.247). In total, none of the socio-demographic variables assessed among doctors showed statistical significance (p > 0.05). This implies that knowledge of standard precautions among nurses was generally good and evenly distributed across the different socio-demographic groups assessed in the study.

Table 6: Predictors of Knowledge among Respondents

Variables	B (regression coefficient)	p-value	Odds Ratio	95% C.I for Odds Ratio	
				Lower	Upper
Age	-0.049	0.196	0.952	0.884	1.026
Sex					
Male	-1.559	**0.022**	0.210	0.055	0.799
Female*			1		
Religion					
Christian	-19.483	0.999	0.000	0.000	0.000
Islam*			1		
Occupational Position					
Doctors	2.201	**0.001**	9.030	2.342	34.813
Nurses*			1		
Job Experience (In Years)	0.060	0.148	1.062	0.979	1.151
Time since last Training (In Years)	0.084	0.265	1.087	0.939	1.260
Marital Status					
Never Married	0.234	0.660	1.264	0.445	3.586
Ever Married			1		

**The Reference Category, *R^2 = 0.7% - 1.3%, C.I = Confidence Interval, Bold =p<0.05 Outcome: Good Knowledge*

Table 6 presents the binary logistic regression results for predictors of good knowledge. The model explained 7% of the variance (Nagelkerke R^2 = 0.14: Cox and Snell R^2 = 0.07). After adjustment for all other variables, Sex and Occupational position were the only significant independent predictors. For every increase in the number of males, respondents were -1.559 times less likely to have good knowledge (Odds Ratio= 0.210, C.I: 0.055 - 0.799, p=0.022) indicating that males were significantly less likely to have poor knowledge. However, for every increase in the number of doctors, respondents were 2.201 times likely to have good knowledge. (Odds Ratio= 9.030, C.I: 2.342- 34.813, p=0.001) indicating that doctors were significantly more likely to have good knowledge.

SECTION C

COMPLIANCE WITH STANDARD PRECAUTIONS

Table 7: Compliance with Standard Precautions

Variables	Doctors Freq (%)	Nurses Freq (%)
Compliance With Standard Precaution during patient care (N=366)		
Always	78 (21.3)	111 (30.3)
Most of the time	94 (25.7)	41 (11.2)
Sometimes	19 (5.2)	16 (4.4)
Rarely	1 (0.3)	1 (0.3)
Never	4 (1.1)	1 (0.3)
Hand hygiene performed only after direct patient contact (N=356)		
Always	44 (12.4)	66 (18.5)
Most of the time	55 (15.4)	37 (10.4)
Sometimes	21 (5.9)	13 (3.7)
Rarely	26 (7.3)	11 (3.1)
Never	42 (11.8)	41 (11.5)
Hand hygiene before contact with a patient (N=359)		
Always	69 (19.2)	91 (25.3)
Most of the time	36 (10.0)	37 (10.3)
Sometimes	52 (14.5)	30 (8.4)
Rarely	29 (8.1)	9 (2.5)
Never	5 (1.4)	1 (0.3)
Hand hygiene after contact with patients or body fluids (N=364)		
Always	157 (43.1)	147 (40.4)
Most of the time	26 (7.1)	13 (3.6)
Sometimes	7 (1.9)	7 (1.9)
Rarely	2 (0.5)	2 (0.5)
Never	2 (0.5)	1 (0.3)

Table 7b: Compliance with Standard Precautions contd

Variables	Doctors Freq (%)	Nurses Freq (%)
Hand Washing following glove removal (N=362)		
Always	130 (35.9)	136 (37.6)
Most of the time	48 (13.3)	18 (5.0)
Sometimes	15 (4.1)	11 (3.0)
Rarely	0 (0.0)	1 (0.3)
Never	1 (0.3)	2 (0.6)
Glove use during contact with body fluid (N=363)		
Always	147 (40.5)	135 (37.2)
Most of the time	35 (9.6)	23 (6.3)
Sometimes	9 (2.5)	4 (1.1)
Rarely	1 (0.3)	3 (0.8)
Never	2 (0.6)	4 (1.1)
Needle recapping before disposal (N=362)		
Always	92 (25.4)	46 (12.7)
Most of the time	39 (10.8)	12 (3.3)
Sometimes	22 (6.1)	11 (3.0)
Rarely	14 (3.9)	11 (3.0)
Never	26 (7.2)	89 (24.6)
Sharps disposal in sharp box (N=363)		
Always	151 (41.5)	128 (35.2)
Most of the time	28 (7.7)	26 (7.2)
Sometimes	10 (2.7)	6 (1.7)
Rarely	2 (0.6)	6 (1.7)
Never	2 (0.6)	4 (1.1)

Table 7c: Compliance with Standard Precautions contd

Variables	Doctors Freq (%)	Nurses Freq (%)
Use of available personal protective equipment (N=364)		
Always	106 (29.1)	112(30.8)
Most of the time	59 (16.2)	34 (9.3)
Sometimes	25 (6.9)	18 (4.9)
Rarely	3 (0.8)	4 (1.1)
Never	1 (0.3)	2 (0.5)
Never	1 (0.3)	8 (2.2)
Facemask use during contact with patients (N=362)		
Always	28 (7.7)	55 (15.2)
Most of the time	40 (11.0)	43 (11.9)
Sometimes	100 (27.6)	60 (16.6)
Rarely	21 (5.8)	8 (2.2)
Never	4 (1.1)	3 (0.8)
Use of protective barriers during procedures with splash risk (N=365)		
Always	53 (14.5)	76 (20.8)
Most of the time	45 (12.3)	30 (8.2)
Sometimes	55 (15.1)	42 (11.5)
Rarely	30 (8.2)	14 (3.8)
Never	12 (3.3)	8 (2.2)

The self-reported compliance with standard precautions when carrying out patient care is shown in table 7-7c. Majority of the doctors and nurses reported that they observe complete standard precautions always, most of the time and sometimes. But the proportion of nurses 111(30.3 %) reporting that they always comply was statistically significantly higher than doctors 78(21.3%). The proportion of nurses and doctors who do not practice hand hygiene only when they touch a patient was low with doctors reporting 26(7.3%) and 42(11.8%) nurses reporting 11(3.1%) and 41(11.5%) respectively for rarely and never. More nurses 66(18.5%) than doctors 44(12.4%) reported always performing hand hygiene only when they touch a patient. More nurses 91(25.3%) always practiced hand hygiene before touching a

patient compared to doctors 69(19.2%). Majority of the doctors and nurses always washed their hands or washed it most times after contact with blood or body fluids. Majority of the doctors 130(35.9%) and nurses 136(37.6%) would wash their hands after taking off their gloves but nurses were more likely to do this always compared to doctors. On needle recapping before disposal, majority of doctors always 92(25.4%) did this as compared to nurses 46(12.7%)

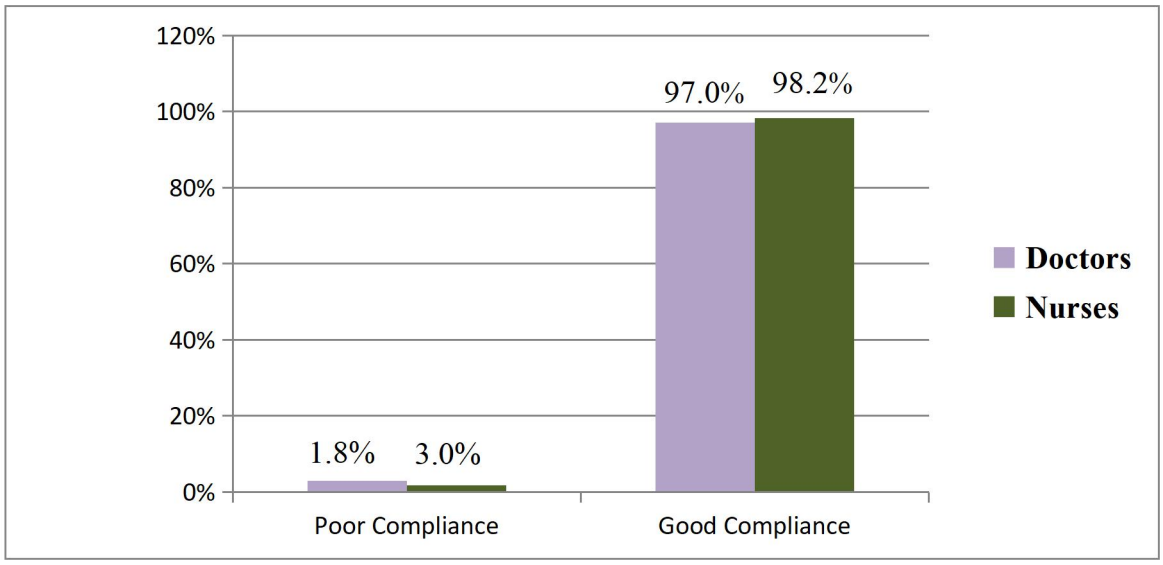

Figure 2: A Bar Chart on Compliance Levels

Figure 2 presents the composite compliance score of respondents. The findings revealed that a majority of respondents demonstrated good compliance with standard precautions with Doctors and Nurses reporting 191(97.0%) and 167(98.2%)

Table 8: Socio-demographics Associated with Compliance of Doctors

Variable (n=199)	Compliance		Test Statistics	p-value
	Poor Freq (%)	Good Freq (%)		
Gender(n=199)				
Male	4 (2.0)	113 (56.8)	χ^2 =1.597	0.206
Female	4 (2.0)	78 (39.2)		
Age (n=191)				
20-29	4 (2.0)	52 (26.1)	χ^2 =0.581	0.901
30-39	2 (1.0)	80 (40.2)		
40-49	1 (0.5)	40 (20.1)		
50-59	0 (0.0)	12 (6.0)		
> 60	0 (0.0)	0 (0.0)		
Marital Status (n=195)				
Single	2 (1.0)	93 (47.7)	χ^2 =0.192	0.908
Married	3 (1.5)	96 (49.2)		
Divorced	0 (0.0)	1 (0.5)		
Widowed	0 (0.0)	0 (0.0)		
Separated	0 (0.0)	0 (0.0)		
Religion (n=196)				
Christianity	8 (4.0)	186 (93.5)	χ^2 =0.064	0.800
Islam	0 (0.0)	2 (1.0)		
Years of Experience (n=195)				
<1	0 (0.0)	8 (4.1)	χ^2 =2.296	0.807
1-5	4 (2.1)	70 (36.3)		
6-10	1 (0.5)	57 (29.5)		
11-20	1 (0.5)	44 (22.8)		
21-30	0 (0.0)	6 (3.1)		
31-40	0 (0.0)	2 (1.0)		
>40	0 (0.0)	0 (0.0)		
Time since last training (n=110)				
Compliant	2 (1.8)	77 (70.0)	χ^2 =0.799	0.671
At Risk	0 (0.0)	17 (15.5)		
High Risk	0 (0.0)	14 (12.7)		
Knowledge (n=199)				
Poor	0 (0.0)	19 (9.6)	X^2 =0.661	0.416
Good	6 (3.0)	172 (87.3)		

Table 8 presents the association between socio-demographic characteristics and compliance with standard precautions among doctors. The findings revealed that the majority of doctors demonstrated good compliance across all socio-demographic categories assessed. Among male doctors, 113 (56.8%) had good compliance while only 4 (2.0%) had poor compliance. Similarly, among female doctors, 78 (39.2%) demonstrated good compliance while 4 (2.0%) had poor compliance. However, there was no statistically significant association between gender and compliance among doctors ($p = 0.206$), indicating that compliance levels were relatively similar between male and female doctors. In relation to age, doctors aged 30–39 years had the highest proportion of good compliance, with 80 (40.2%) respondents, followed by those aged 20–29 years with 52 (26.1%). Nonetheless, the association between age and compliance was not statistically significant ($p = 0.901$). Christianity was the predominant religion among respondents, and most Christian doctors demonstrated good compliance., however religion was not significantly associated with compliance ($p = 0.800$). Furthermore, the association between knowledge and compliance among doctors was not statistically significant (, $p = 0.416$), despite the majority of respondents with good knowledge demonstrating good compliance. In General, none of the socio-demographic variables assessed among doctors were statistically significant ($p > 0.05$).

Table 9: Socio-demographics Associated with Compliance of Nurses

Variable (n=171)	Compliance		Test Statistics	p-value
	Poor Freq (%)	Good Freq (%)		
Gender(n=171)				
Male	1 (0.6)	10 (5.8)	χ^2 =3.641	0.056
Female	3 (1.8)	157 (91.8)		
Age (n=171)				
20-29	1 (0.6)	61 (35.6)	χ^2 =5.833	0.120
30-39	1 (0.6)	42 (24.6)		
40-49	0 (0.0)	37 (21.6)		
50-59	2 (1.2)	27 (15.8)		
> 60	0 (0.0)	0 (0.0)		
Marital Status (n=169)				
Single	1 (0.6)	64 (37.8)	χ^2 =0.174	0.996
Married	3 (1.8)	95 (56.2)		
Divorced	0 (0.0)	2 (1.2)		
Widowed	0 (0.0)	3 (1.8)		
Separated	0 (0.0)	1 (0.6)		
Religion (n=170)				
Christianity	4 (2.4)	162 (95.2)	χ^2 =0.074	0.786
Islam	0 (0.0)	4 (2.4)		
Years of Experience (n=171)				
<1	0 (0.0)	3 (1.8)	χ^2 =2.721	0.843
1-5	2 (1.2)	75 (43.8)		
6-10	0 (0.0)	21 (12.3)		
11-20	2 (1.2)	44 (25.7)		
21-30	0 (0.0)	17 (9.9)		
31-40	0 (0.0)	6 (3.5)		
>40	0 (0.0)	1 (0.6)		
Time since last training (n=133)				
Compliant	3 (2.2)	79 (59.4)	χ^2 =1.872	0.392
At Risk	1 (0.8)	20 (15.0)		
High Risk	0 (0.0)	30 (22.6)		
Knowledge (n=171)				
Poor	2 (1.2)	30 (17.5)	χ^2 =4.575	0.032
Good	2 (1.2)	137 (80.1)		

Table 9 shows the association between socio-demographic characteristics and compliance with standard precautions among nurses. The results indicate that the majority of nurses demonstrated good compliance irrespective of their socio-demographic characteristics. Female nurses constituted the highest proportion of respondents with good compliance, accounting for 157 (91.8%), while only 3 (1.8%) had poor compliance. Male nurses accounted for 10 (5.8%) with good compliance and 1 (0.6%) with poor compliance. The relationship between gender and compliance approached statistical significance but was not statistically significant ($\chi^2 = 3.641$, $p = 0.056$), as the p-value was slightly above the 0.05 level of significance. Concerning age, nurses aged 20–29 years recorded the highest proportion with good compliance, 61 (35.6%), followed by those aged 30–39 years with 42 (24.6%). However, there was no statistically significant association between age and compliance ($\chi^2 = 5.833$, $p = 0.120$). Similarly, years of experience did not show any statistically significant association with compliance among nurses ($\chi^2 = 2.721$, $p = 0.843$), although respondents with 1–5 years of experience recorded the highest level of good compliance. Time since last training also did not demonstrate a statistically significant association with compliance ($\chi^2 = 1.872$, $p = 0.392$). In contrast, knowledge level was found to be significantly associated with compliance among nurses ($\chi^2 = 4.575$, $p = 0.032$). Nurses with good knowledge had better compliance levels compared to those with poor knowledge. Since the p-value was less than 0.05, knowledge was considered statistically significant in relation to compliance among nurses. Overall, knowledge was the only variable that showed a statistically significant association with compliance among nurses.

Table 10: Predictors of Compliance among Respondents

Variables	B (regression coefficient)	p-value	Odds Ratio	95% C.I for Odds Ratio	
				Lower	Upper
Age(Years)	-0.051	0.595	0.950	0.787	1.147
Sex					
Male	-0.620	0.662	0.538	0.033	8.692
Female*			1		
Religion					
Christian	-17.314	0.999	0.000	0.000	0.000
Islam*			1		
Occupational Position					
Doctors	0.548	0.707	1.730	0.099	30.173
Nurses*			1		
Job Experience (In Years)	0.265	0.725	1.303	0.298	5.696
Time since last Training (In Years)	16.285	0.996	118150 14.291	0.000	0.000
Knowledge					
Poor	-1.390	0.169	0.249	0.034	1.806
Good*			1		
Marital Status					
Never Married	-0.628	0.631	0.533	0.041	6.925
Ever Married			1		

**The Reference Category, *R^2 = 0.2% - 1.1%, C.I = Confidence Interval, Bold =p<0.05 Outcome: Good Compliance*

Table 9 presents the binary logistic regression results for predictors of poor compliance. The model explained 19% of the variance (Nagelkerke R^2 = 0.105 Cox and Snell R^2 = 0.02). After adjustment for all other variables, there was no significant independent predictor. (p>0.05)

SECTION D

DETERMINANTS OF ADHERENCE TO STANDARD PRECAUTIONS

Table 11: Barriers to Compliance with Standard Precautions

Variables	Doctors	Nurses	Test Statistics	p-value
	Yes Freq (%) (n=199)	Yes Freq (%) (n=171)		
Lack of personal protective Equipment	190 (95.5)	156 (91.2)	χ^2 =5.065	0.024
Inadequate water/soap supply	174 (87.4)	136 (79.5)	χ^2 =6.866	0.009
Inadequate supply of hand gloves	172 (86.4)	149 (87.1)	χ^2 =0.022	0.883
Lack of training/enough information on standard precautions	135 (67.8)	132 (77.2)	χ^2 =3.370	0.066
Emergency situations	113 (56.8)	103 (60.2)	χ^2 =0.215	0.643
Protective equipment being uncomfortable for health care workers	91 (45.7)	70 (40.9)	χ^2 =1.010	0.315
Protective equipment being uncomfortable for patients	73 (36.7)	71 (41.5)	χ^2 =0.807	0.807

Table 4 illustrates reports factors the respondents felt were barriers to compliance with standard precautions. . Majority of the respondents 346 (95.1%) considered lack of PPE a barrier but significantly more nurses 8.8% compared to doctors 4.5% did not think this was a barrier. This was statistically significant (p=0.024)

Significantly more doctors (87.4 %) compared to nurses (79.5%) felt inadequate water supply and soap was a barrier to compliance with standard precautions. This difference was statistically significant (p=0.009).

There was no significant difference in the proportion of doctors and nurses who considered, inadequate supply of hand gloves, Lack of training, emergency situations, and protective equipment being uncomfortable for health-care workers or patients (p>0.05)

There was no statistically significant association between what respondents felt were barriers and their level of compliance (p>0.05).

Table 12: Predictors of Barriers of Compliance with Standard Precautions

Variables	B (regression coefficient	p-value	Odds Ratio	95% C.I for Odds Ratio	
				Lower	Upper
Age(Years)	-1.351	0.066	0.259	0.061	1.093
Sex					
Male	-1.314	0.230	0.269	0.031	2.294
Female*			1		
Occupational Position					
Doctors	0.106	0.929	1.111	0.110	11.229
Nurses*			1		
Job Experience	0.917	0.189	2.503	0.636	9.842
Knowledge					
Poor	-0.718	0.475	0.488	0.068	3.498
Good*			1		
Lack of personal protective Equipment					
Yes	-17.841	0.998	0.000	0.000	0.000
No*			1		
Inadequate water/soap supply					
Yes	0.072	0.960	1.074	0.064	18.124
No*			1		
Inadequate supply of hand gloves					
Yes	1.796	0.188	6.024	0.416	87.185
No*			1		
Lack of training/enough information on standard precautions					
Yes	-2.539	0.120	0.079	0.003	1.940
No*			1		
Emergency situations					
Yes	0.150	0.882	1.162	0.160	8.450
No*			1		
Protective equipment being uncomfortable for health care workers					
Yes	19.403	0.995	26694	0.000	
			6009.5		0.000
No*					

Protective equipment being uncomfortable for patients					
Yes	-2.430	0.058	0.088	0.007	1.087
No*			1		

**The Reference Category, *R^2 = 0.6% - 3.5%%, C.I = Confidence Interval, Bold =p<0.05 Outcome: Poor Compliance*

Table 4c presents the binary logistic regression results for predictors of barriers to compliance with Standard Precautions. The model explained 29% of the variance (Nagelkerke R^2 = 0.35: Cox and Snell R^2 = 0.06). After adjustment for all other variables, there was no significant independent predictor.

CHAPTER FIVE

DISCUSSION

This cross-sectional study assessed and compared the knowledge of standard precautions, the level of adherence to standard precautions and the determinants of compliance with standard precaution among healthcare workers in the University of Benin Teaching Hospital with the main focus on doctors and nurses. A total of three hundred and seventy healthcare workers participated in the study comprising of one hundred and ninety nine doctors and one hundred and seventy one nurses. The majority were female, a large proportion was christians, and the predominant ethnic group was Edo. The level of knowledge among both cadres of healthcare workers was above the desired level (good knowledge) accounting for a large proportion of respondents which translated to an equally good level (greater than sixty percent) of compliance with nurses have a slightly higher level of compliance with the reverse being the case in terms of knowledge.

With regards to the first objective, findings showed that both doctors and nurses in UBTH demonstrated a relatively high level of knowledge of standard precautions, although doctors appeared to possess better knowledge when compared with nurses. The composite knowledge score revealed that a significantly larger proportion of doctors possessed good knowledge compared to nurses. This disparity may be attributed to differences in the depth and focus of medical school training. Medical school curricula often place a stronger emphasis on the theoretical and pathological basis of infection prevention, including the specific indications for each precaution. Furthermore, doctors, particularly those in the senior registrar and consultant roles, may have more frequent exposure to continuing medical education that reinforces these guidelines. Nurses, while highly skilled in practical application, may sometimes have less emphasis on the theoretical frameworks during routine in-service training, focusing instead on procedural checklists.

The findings from this study are similar to reports from a study conducted among healthcare workers in Addis Ababa, Ethiopia where doctors demonstrated better knowledge scores compared with nurses.[15] However, the findings contrast with a study in conducted Enugu Metropolis South East Nigeria where knowledge of standard precautions was reported to be lower amongst doctors.[12]

The higher knowledge level among doctors is beneficial as they often lead clinical teams and make diagnostic and interventional decisions that require an understanding of infection risk. However, the significant knowledge gap means that nurses, who spend the most continuous time at the bedside, may not be fully equipped with the theoretical rationale, potentially leading to inconsistent application of precautions and increased risk of nosocomial infections. The knowledge gaps identified indicate the need for continuous education and retraining tailored to address the specific theoretical gaps identified in nurses.

Another finding revealed that a significantly larger proportion of doctors correctly identified needle prick injuries, splash of contaminated fluids, and inhalation as potential exposure routes. They also demonstrated better understanding of performing hand hygiene between patient contacts. This finding likely reflects the greater clinical exposure of doctors to high-risk procedures (e.g., suturing, central line placement, intubation) where sharps injuries and fluid splashes are imminent threats. Their training emphasizes the "at-risk" nature of these procedures. Conversely, nurses, who perform more prolonged, low-risk contact (e.g., bathing, feeding, turning patients), may perceive their daily tasks as less likely to result in direct blood or fluid exposure, leading to a lower perceived need to identify these specific routes. However, some gaps still existed regarding respiratory hygiene and environmental infection control for both cadre of healthcare workers.

These findings are similar to a study done in Katsina State, Borno State and Abuja where doctors performed better than nurses in these aspects[37]. Contrasting findings were found in an Australian study where many senior doctors had limited knowledge of correct IPC practices as compared to nurses[38]. The superior knowledge among doctors about high-risk exposure routes is critical, as they perform the majority of invasive procedures. However, the comparative deficit among nurses regarding hand hygiene between patient contacts is concerning because nurses have the highest frequency of sequential patient interactions, making them a key vector for cross-transmission if their knowledge is incomplete. To curb this, a targeted “Five Moments of Hand Hygiene" refresher training specifically for the nursing cadre, using visual prompts (posters, badges) at points of care should be implemented.

Key knowledge gaps were observed in a significantly larger proportion of nurses who incorrectly believed that standard precautions apply only to blood exposure (and not other body fluids) and that wearing gloves eliminates the need for hand washing. These misconceptions may stem from an over-simplification of protocols during nursing training especially as majority of those in the nursing cadre have less than 5 years’ work experience thus explaining why they may still have this impression. The glove-hand washing misconception is a classic cognitive error where PPE is viewed as a barrier that "protects me" rather than a measure that also prevents environmental contamination. Nurses, who wear gloves more frequently and for longer durations, may be more susceptible to this false sense of security. Similar findings were observed in a study done in Katsina State, Borno State and Abuja[37]. However, the Saudi Arabian critical care study found no significant difference in this aspect between doctors and nurses[39].

These misconceptions increase the risk of cross contamination as pathogens on glove surface are transferred to other surfaces when hands are not washed after glove removal. This suggests that during IPC campaigns or refresher training, these misconceptions should be

addressed. Sink with soap and water should also be made accessible at every glove disposal bin.

The binary logistic regression analysis produced a finding that being male and being a doctor was significantly associated with a less likelihood and higher likelihood respectively of having good knowledge, when controlling for other variables. This finding complements the results in of the study which showed that doctors had a significantly higher proportion of good knowledge compared with nurses. A plausible explanation for the higher likelihood of good knowledge among doctors may be related to the nature of medical training and continuous professional development. Doctors undergo prolonged undergraduate and postgraduate training, with substantial emphasis on infection prevention, patient safety, occupational health, and evidence-based clinical practice. The present study also demonstrated that doctors generally performed better across most knowledge domains, including hand hygiene indications, routes of exposure to infectious agents, and misconceptions regarding standard precautions. These factors may contribute to their higher knowledge levels. The finding that males were less likely to have good knowledge may be explained by differences in professional composition and engagement with infection prevention activities. In this study, females constituted the majority of respondents and were predominantly nurses, a cadre that routinely engages in direct patient care activities requiring continuous application of standard precautions. Female healthcare workers may therefore have more frequent exposure to practical infection prevention measures and institutional training activities. The finding is consistent with a study conducted in Addis Ababa, Ethiopia, where doctors were more likely than nurses and other healthcare workers to demonstrate adequate knowledge of standard precautions and infection prevention practices.[15] The Nigerian National Study found that female gender was a significant predictor of good knowledge but did not find that being a male independently predicted poor knowledge[37].

From a public health perspective, these findings are highly significant. Knowledge of standard precautions forms the foundation for safe clinical practice and effective infection prevention and control. Healthcare workers with inadequate knowledge are more likely to engage in unsafe practices that increase the risk of healthcare-associated infections, occupational exposure to blood-borne pathogens such as HIV, hepatitis B, and hepatitis C, and the transmission of antimicrobial-resistant organisms. Identifying groups that are less likely to possess good knowledge enables hospital management and policymakers to design targeted educational interventions aimed at improving infection prevention competencies among healthcare workers. Ultimately, strengthening knowledge contributes to improved patient safety, reduced healthcare costs, enhanced quality of care, and better occupational health outcomes. Based on these findings, it is recommended that UBTH should implement regular, cadre-specific and gender-sensitive infection prevention and control training programmes, with particular emphasis on healthcare workers identified as being at increased risk of poor knowledge, while ensuring continuous professional education and periodic knowledge assessments for all staff.

With regards to adherence to standard precautions, the findings from this study showed that both doctors and nurses demonstrated good compliance, although nurses appeared to demonstrate slightly better compliance in selected components of standard precautions especially in regards to recapping needles. Compliance varied across specific components, with nurses appearing to demonstrate better adherence regarding hand hygiene before patient contact and use of protective equipment during procedures involving possible splashes of blood or body fluids. These differences may be related to the fact that nurses spend longer periods in direct patient care and are often more involved in bedside procedures requiring continuous patient contact. In contrast, doctors may experience time constraints due to ward

rounds, emergency procedures and completing clinical responsibilities which may influence consistent adherence to some infection prevention practices.
A cross-sectional study done in the Niger Delta University Teaching Hospital, Bayelsa State and Bingham University Teaching Hospital, Jos, Plateau State contrasted the study's findings where nurses exhibited lower compliance levels[8]. The implication of these findings is important because suboptimal compliance with standard precautions increases the risk of healthcare associated infections, occupational injuries and transmission of infectious diseases among healthcare workers and patients.
The hospital should strengthen institutional monitoring systems and ensure adequate availability of personal protective equipment for healthcare workers.

Knowledge levels were found to be significantly associated with compliance among nurses but no such association was found among doctors. This association suggests that for nurses, theoretical knowledge directly translates to practice, likely due to the structured nature of nursing roles where protocols are followed systematically once understood. For doctors, compliance may be influenced more by other factors such as time pressure, perceived urgency of clinical situations, peer behaviour, and workload rather than knowledge alone. A doctor may know the correct precaution but choose to skip it during an emergency—a behavioural decision not mediated by knowledge deficits.

The Saudi Arabian critical care study found that nurses' compliance varied significantly according to age, clinical experience and attendance at training courses while doctors did not show the same associations[39].

This study also assessed barriers influencing adherence to standard precautions among doctors and nurses. A larger proportion of doctors than nurses identified lack of PPE and

inadequate water/soap supply as barriers to compliance and this was statistically significant. Other barriers identified include inadequate availability of heavy workload, emergency situations, high temperature environment and inadequate institutional support for infection prevention practices. These barriers may reflect infrastructural and organizational challenges that commonly affect infection prevention practices in resource-limited healthcare settings. During emergency situations and periods of increased workload, doctors and nurses may prioritize urgent patient care over complete adherence to standard precautions. The findings are consistent with previous studies conducted in healthcare facilities in Ekiti State, Nnamdi Azikwe University Teaching Hospital (NAUTH) where inadequate personal protective equipment, poor water supply, increased workload and insufficient infection prevention training were identified as barriers to compliance with standard precautions[23,24]. These findings suggest that barriers to adherence are multifactorial and may involve both individual and institutional factors. Even where knowledge of standard precautions is relatively good, poor institutional support may undermine sustained compliance among doctors and nurses. Periodic infection prevention training, supportive supervision and improved healthcare facility resources should be prioritized to strengthen compliance with standard precautions among healthcare workers.

CONCLUSION

The study revealed that healthcare workers in the University of Benin Teaching Hospital (UBTH) possessed relatively good knowledge and adherence regarding standard precautions, although doctors demonstrated better knowledge while nurses appeared to show better compliance in selected components of standard precautions. Important gaps still existed regarding some aspects of infection prevention, particularly respiratory hygiene, environmental infection control and consistent use of some personal protective equipment. The study further identified knowledge level, years of professional experience, previous infection prevention training and availability of personal protective equipment as important determinants influencing compliance with standard precautions.

RECOMMENDATIONS

To the Healthcare Workers

- Standard precautions should consistently be applied to all patients irrespective of perceived infection risk.
- Attend infection and prevention and control training when available and regularly.

To the Hospital Management of the University of Benin Teaching Hospital

- Regular refresher infection prevention and control training should be organized for all healthcare workers.
- Hospital management should ensure continuous availability of personal protective equipment.
- Supportive supervision and institutional monitoring of compliance with standard precautions should be strengthened.

To the Edo State Government and the Edo State Ministry of Health

- Adequate budgetary allocation should also be made for the continuous provision of PPEs, hand hygiene facilities and other infection prevention materials needed for safe clinical practice.
- Regular state-wide capacity building programmes, workshops and refresher trainings on standard precautions and infection prevention practices should be organized for healthcare workers in all healthcare institution.

To the Federal Ministry of Health

- National Infection Prevention and control policies should be strengthened by ensuring strict implementation of standard precaution guidelines across all healthcare institutions in Nigeria.
- The ministry should collaborate with professional bodies such as the Nigerian Medical Association and the National Association of Nigerian Nurses and Midwives to organize regular continuing professional development programmes focused on infection prevention and control practices for healthcare workers worldwide.

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APPENDIX I

QUESTIONNAIRE

ASSESSING THE KNOWLEDGE, COMPLIANCE AND BARRIERS IN RESPECT TO STANDARD PRECAUTIONS AMONG HEALTHCARE WORKERS IN UBTH.

I am a 600 level student of the University of Benin, Benin City and this study aims at assessing the knowledge, compliance and barriers to standard precautions among healthcare workers in UBTH. All information given will be treated as confidential. Please mark and fill any areas as appropriate, Thank you.

A. SOCIODEMOGRAPHIC CHARACTERISTICS

1. Sex: Male ( ) Female ( )
2. Age: _____
3. Religion: Christian ( ) Islam ( ) Traditional ( )
4. Marital Status: Single ( ) Married ( ) Divorced ( ) Widow/Widower ( ) Separated ( )
5. Ethnicity: Edo ( ) Esan ( ) Igbo( ) Yoruba ( ) Hausa( ) Urhobo ( ) Others_____
6. Job Description: Doctor ( ) Nurse ( )
7. Job Position: _____
8. Years of Experience: _____
9. Department and/or Unit/Ward: _____

B. KNOWLEDGE OF STANDARD PRECAUTIONS

10. Have you ever heard of standard precautions? Yes ( ) No ( )

11. If yes, what is your source of information (**Multiple Choices Allowed**) a. In school ( ) b. Pre-employment Orientation ( ) c. Post-employment training ( ) d. Mass Media ( ) e. From Co-workers ( ) f. Others _____

12. Have you ever received trainings on standard precautions? Yes ( ) No ( )

13. How long ago did you receive your last training _____

14. Which of the following is regarded as Standard Precautions? (**Multiple Choices Allowed**) a. Hand Hygiene/Washing ( ) b. Use of personal protective equipment ( ) c. Safe injection practices ( ) d. Cleaning and Disinfecting patient contact surfaces ( ) e. Cough Etiquette ( )

15. For which of the following should standard precautions be followed? a. All Hospitalized patients ( ) b. When the patient has a known or suspected infection ( ) c. at the discretion of the healthcare worker ( )

16. According to Standard Precautions, hand washing is performed (**Multiple Choices Allowed**) a. Before contact with the patient ( ) b. between patient contact ( ) c. immediately after removing gloves ( ) d. After touching body fluids e.g. blood, urine, sweat ( )

17. Standard Precautions applies only when there is exposure to the blood of patients and not the other body fluids of the patient? Yes ( ) No ( )

18. Use of Sterile Gloves is the most effective method of preventing infections? Yes ( ) No ( )

19. Does wearing gloves eliminate the need to wash hands? Yes ( ) No ( )

20. Should surfaces be cleaned with appropriate disinfectants after use? Yes ( ) No( )

21. Potential ways of exposure to infectious agents include? (**Multiple Choices Allowed**)

a. Needle prick/Sharp injury ( ) b. Splash of contaminated fluids on the eye ( )

c. Inhalation ( ) d. Talking to Patients ( ) e. Touching Patients ( )

C. COMPLIANCE/ADHERENCE TO STANDARD PRECAUTIONS

Please tick one option for questions 22-33

S/N	Compliance	5 Always	4 Most of the time	3 Sometimes	2 Rarely	1 Never
22.	I observe complete standard precautions while carrying out my duties of patient care					
23.	I practice hand hygiene only if I touch a patient					
24.	I practice hand hygiene before contact with a patient					
25.	I practice hand hygiene after contact with patients or their body fluids eg blood, sweat, urine					
26.	I wash hands after removing gloves					
27.	I wear gloves when in contact with patients' body fluids					
28.	I recap used needles before disposing them.					
29.	I drop sharps (needles, blades) in the sharp box after use.					
30.	I use the available personal protective equipment					
31.	I make sure instruments to be reused on multiple patients are sterile before use.					
32.	I always use a face mask when in contact with patients					
33.	I always wear goggles and gowns/aprons in procedures					

	where there could be splashes of body fluids					

D. BARRIERS AND FACTORS AFFECTING COMPLIANCE WITH STANDARD PRECAUTIONS

Which of the following are barriers to compliance with standard precautions?

S/N	Barrier/Challenge	Yes	No
34.	Lack of personal protective equipment		
35.	Inadequate water/soap supply		
36.	Inadequate supply of hand gloves		
37.	Lack of training/ enough information on standard precautions		
38.	Emergency situations		
39.	Protective Equipment being uncomfortable for health workers		
40.	Protective Equipment being uncomfortable for patients		

Please, state any other Factors or problems that could affect adherence to standard precautions not stated above in the box below.

Thank you for your time and patience

APPENDIX II

INFORMED CONSENT FORM

TITLE OF RESEARCH: A COMPARATIVE STUDY ON ADHERENCE TO STANDARD PRECAUTIONS AMONGST HEALTHCARE WORKERS IN UNIVERSITY OF BENIN TEACHING HOSPITAL.

NAMES AND AFFILIATIONS OF INVESTIGATORS:

Ehinomen Obehi Sadoh

Department of Public Health and Community Medicine,

University of Benin Teaching Hospital,

PMB 111,

Benin City,

Edo State.

Email: obehisadoh@gmail.com

PURPOSE OF RESEARCH: To assess the knowledge, adherence and determinants of standard precautions amongst healthcare workers in UBTH with a view of improving adherence to Standard Precautions among healthcare workers in UBTH.

PROCEDURES INVOLVED IN THE STUDY: In this study, questions will be asked regarding the knowledge, adherence and factors influencing standard precautions among healthcare workers in UBTH.

CONFIDENTIALITY: All data collected will be treated with utmost confidentiality. Healthcare Workers who volunteer to participate in this study will be given a unique study

number, and data will be collected. Participants' information will be stored safely secured by codes in computers using only the study identification number. All those handling data will not at any time reveal participants' identity.

FINANCIAL COMPENSATION: There shall be no monetary compensation for participation

In this study.

VOLUNTARY PARTICIPATION: Your participation in this study is entirely voluntary. If

you desire to withdraw from this study at any time, no punitive measures will be meted against you for your withdrawal. Your refusal to participate or withdraw from the study will not involve any negative consequences or loss of benefits to which you are otherwise entitled.

RISK: It is not expected that any harm will come to you because of your participation in this study. The study does not entail any activity that would harm you.

BENEFIT: The study will help to assess the knowledge, adherence and determinants of standard precautions amongst healthcare workers in UBTH.

FINANCIAL SPONSORSHIP: This study will be sponsored by the principal investigator.

The investigator may be contacted in case you have any clarifications to make.

The under-listed may be contacted in case you have any clarifications to make.

Ehinomen Obehi Sadoh

Department of Public Health and Community Medicine,

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Email: obehisadoh@gmail.com

Cell: +2348073214095

OR

Ethics and Research Committee,

University of Benin Teaching Hospital

Phone Number: +234 802 352 1840

APPENDIX III

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. (Mrs) I.N Ize-Iyamu

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/1486549127262

PROPOSAL TITLE: "A COMPARATIVE STUDY ON THE ADHERENCE TO STANDARD PRECAUTIONS BY HEALTH CARE WORKERS IN THE UNIVERSITY OF BENIN TEACHING HOSPITAL"

PRINCIPAL INVESTIGATOR(S): EHINOMEN OBEHI SADOH

DEPARTMENT/INSTITUTION: DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE, SCHOOL OF MEDICINE, UNIVERSITY OF BENIN, BENIN CITY, EDO STATE, NIGERIA

DATE CONSIDERED: JANUARY 27TH, 2026

DECISION OF THE COMMITTEE: APPROVED

THIS APPROVAL DATES 27/01/2026 TO 26/01/2027. 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..... 27/1/2026

SUPERVISOR (S): PROF OBEHI OKOJIE, DR MOKOGWU NDUBUISI

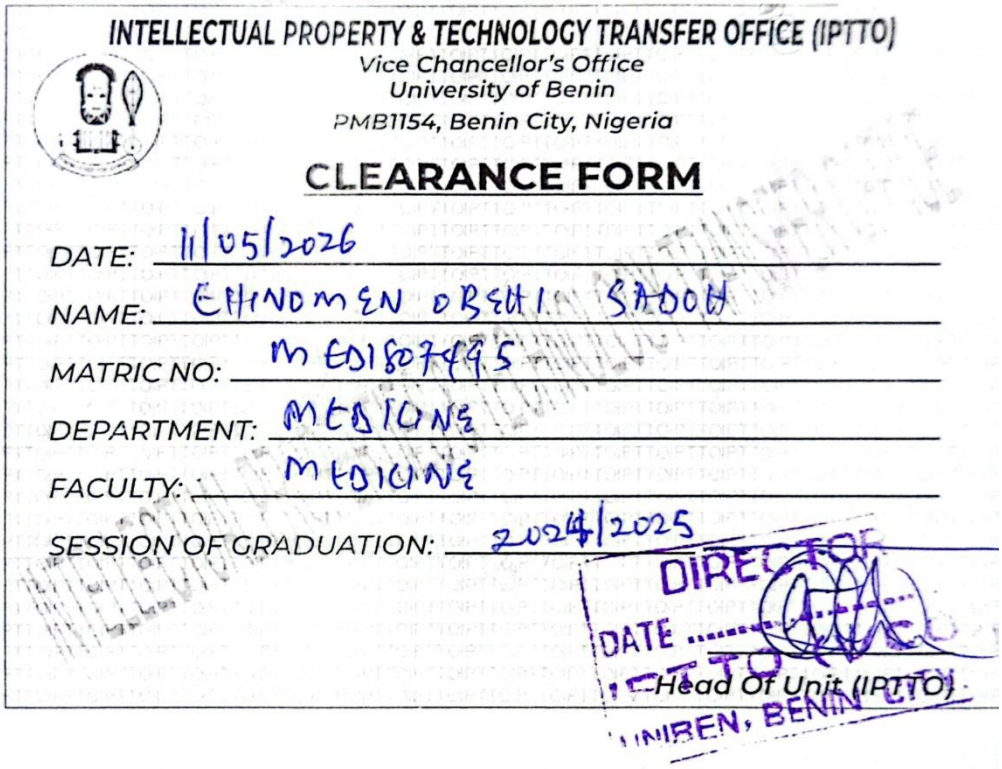
DECLARATION BY INVESTIGATOR(S):

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 and **you are to furnish the committee with the research activities at the completion of the study**. 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 report 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..... 30/01/26

APPENDIX IV



INTELLECTUAL PROPERTY & TECHNOLOGY TRANSFER OFFICE (IPTTO)

Vice Chancellor's Office
University of Benin
PMB1154, Benin City, Nigeria

CLEARANCE FORM

DATE: 11/05/2026

NAME: EHINOMEN OBEHI SADOH

MATRIC NO: M ED180749.5

DEPARTMENT: MEDICINE

FACULTY: MEDICINE

SESSION OF GRADUATION: 2024/2025

DIRECTOR
DATE .....
Head Of Unit (IPTTO)
UNIBEN, BENIN CITY