KNOWLEDGE AND COMPLIANCE WITH STANDARD PRECAUTIONS AGAINST INFECTIONS AMONG UNDERGRADUATE NURSING STUDENTS OF UNIVERSITY OF BENIN, BENIN CITY

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OCTOBER, 2025

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IN PARTIAL FULFILMENT OF THE AWARD OF DEGREE OF BACHELOR OF NURSING SCIENCES (BNSC), FACULTY OF NURSING SCIENCES, UNIVERSITY OF BENIN, BENIN CITY

OCTOBER, 2025

DECLARATION

This is to declare that this research project titled "**KNOWLEDGE AND COMPLIANCE WITH**

STANDARD PRECAUTIONS AGAINST INFECTIONS AMONG UNDERGRADUATE NURSING STUDENTS OF UNIVERSITY OF BENIN, BENIN CITY, EDO STATE." was carried out by AKINTOMIDE MOTUNRAYO AYOMIPOSI. It is solely the result of my work except where acknowledged as being derived from other person(s) or resources.

MATRICULATION NUMBER: BMS2005058

FACULTY/COLLEGE: NURSING SCIENCES, COLLEGE OF MEDICAL SCIENCE, UNIVERSITY OF BENIN, BENIN CITY, EDO STATE.

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Date: _____

CERTIFICATION/APPROVAL

This is to certify that this research project titled" **KNOWLEDGE AND COMPLIANCE WITH STANDARD PRECAUTIONS AGAINST INFECTIONS AMONG UNDERGRADUATE NURSING STUDENTS OF UNIVERSITY OF BENIN, BENIN CITY, EDO STATE**" was carried out by **AKINTOMIDE MOTUNRAYO AYOMIPOSI** with Mat No. **BMS2005058** in the Faculty of Nursing Science, under the supervision of **DR. (MRS.) E. N OYANA .**

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ABSTRACT

Standard precautions are essential infection control practices that protect both healthcare workers and patients from the transmission of infectious diseases. Compliance with these precautions is particularly critical for nursing students, who are frequently exposed to clinical environments during their training. This study assessed the knowledge and compliance with standard precautions among undergraduate nursing students at the University of Benin, Benin City. A descriptive cross-sectional survey design was adopted. A total of 249 undergraduate nursing students from 200 to 500 levels were selected using a simple random sampling technique. Data were collected through a structured questionnaire and analyzed using the Statistical Package for the Social Sciences (SPSS) version 26.0. Descriptive statistics such as frequency, percentages, and mean scores were used, and a chi-square test was employed to assess the relationship between knowledge and compliance levels. Out of 249 questionnaires distributed, 246 were valid for analysis, resulting in a response rate of 98.8%. Findings revealed that 70.7% of students demonstrated good knowledge of standard precautions, while 29.3% had poor knowledge. Regarding compliance, 77% exhibited high compliance, and 23% showed low compliance. The major barriers identified were lack of personal protective equipment (mean = 3.2), time pressure in clinical settings, insufficient supervision, and inadequate training. Hypothesis testing revealed no statistically significant relationship between knowledge and compliance ($\chi^2 = 2.703$, $p = 0.100$). The study concluded that undergraduate nursing students generally possess good knowledge and demonstrate high compliance with standard precautions. However, knowledge alone does not guarantee compliance, as external factors such as resource availability and supervision play significant roles.It is recommended that continuous training programs, improved resource provision, and closer clinical supervision be instituted to enhance adherence to standard precautions among nursing students, thereby strengthening infection control practices within healthcare settings.

Keywords: Undergraduate Nursing, Standard Precautions, Knowledge, Compliance

DEDICATION

This work is dedicated to the Almighty Father, the One who kept me alive and made it possible for me to make it this far. His unending grace and mercy upon my life is immeasurable.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the study

The definition of standard precautions is "the minimum infection prevention practices that apply to all patient care, regardless of the patient's suspected or confirmed infectious status, in any setting where healthcare is delivered" (Wahab & Adie, 2021). Standard precautions are the bare minimum of infection prevention and control (IPC) procedures that all healthcare professionals should follow when caring for patients in all situations. Through the reduction of the risk of germs from known and unknown sources, they seek to safeguard patients and healthcare professionals. Standard precautions can stop germs from spreading from patients to healthcare providers and the environment if they are followed regularly (World Health Organization, 2021). Regardless of whether an illness is suspected or confirmed, standard precautions, as specified by the Centres for Disease Control and control (CDC), are the bare minimum of infection control procedures applied to all patient care. Hand hygiene, the right use of personal protection equipment (PPE), handling sharp objects safely, waste management, environmental cleaning, and respiratory hygiene are some of these measures. Every standard of care offers a roadmap for the attitudes, abilities, knowledge, and discernment required to practise safely. They elucidate the practice-related accountability and responsibility of each nurse. Preventing Healthcare Associated Infections (HCAI) is the goal of the standard of infection control (IC) precautions (Sayed et al., 2021).

One of the riskiest work environments is thought to be the healthcare industry. Medical personnel frequently come into contact with biological risks during their clinical work, which exposes them to a range of pathogens that might result in life-threatening infections. Because they provide

direct patient care, nurses are particularly susceptible to biological dangers (Da'seh et al., 2023). Health Care Workers (HCW) are in the forefront of public health efforts to stop the transmission of disease and provide medical care to exposed or afflicted individuals in the context of the global spread of novel diseases. Because HCWs are more likely to become infected themselves, it is essential to have a solid understanding of how to use Personal Protective Equipment (PPE) appropriately and to follow both Standard Precautions (SP) and Transmission-Based Precautions in order to stop the spread of infectious diseases (Bouchoucha et al., 2021). The Centres for Disease Control (CDC) included "universal precautions" in a new prevention concept in 1996 because medical history and physical examinations cannot reliably identify patients infected with these pathogens. These precautions are now replaced by "standard precautions," which are designed to be used for the care of all hospital patients regardless of their diagnosis or presumed infection status (Sayed et al.,

2021). In clinical settings where nursing students regularly provide patient care, the use of Standard Precaution (SPs) is very important. Reducing hospital-acquired infections (HAIs) and improving patient safety depend heavily on their understanding of and adherence to SPs (Centers for Disease Control and Prevention, 2022). Determining the reasons behind suboptimal adherence to SP implementation is crucial in order to equip future healthcare workers with the technical know-how and knowledge needed to apply SP in clinical practice as well as the ability to overcome any obstacles they may encounter in the demanding clinical settings linked to the widespread community transmission of emerging infectious diseases (Bouchoucha et al., 2021).

Several studies have indicated that nurses lack knowledge and compliance behaviour regarding standard precautions. Knowledge about standard precautions has been reported as a significant predictor for better compliance. Additionally, a number of studies have documented nurses' poor

or nonexistent adherence to recommended safeguards (Da'seh et al., 2023). Nursing students are an essential demographic to research because they play a crucial part in preventive efforts. By learning more about their knowledge, attitudes, and behaviour about infection control measures, programs to improve their performance can be developed (Sayed et al., 2021). A cross-sectional study done by Ayele et al. (2022) in Northwest Ethiopia showed that tte overall compliance of nursing students with standard precautions was low, with nearly half of the nursing students failing to comply with standard precautions. In another article on standard precautions by Wahab and Adie (2021), it was reported that nursing students typically have a high degree of awareness about common safety measures, especially when it comes to things like hand cleanliness and PPE use. Nonetheless, there are still gaps in several areas, like appropriate spill management and sharps disposal, which are crucial aspects of infection prevention. Understanding the current state of knowledge and compliance with SPs among undergraduate nursing students in tertiary institutions is imperative. Identifying existing gaps can inform the development of targeted interventions, such as curriculum enhancements and practical workshops, to improve adherence to SPs. This, in turn, will contribute to better infection control practices and the overall safety of both healthcare providers and patients.

1.2 Statement of research problem

One of the most significant issues facing healthcare systems around the world is infection, which also serves as a major contributor to morbidity and death in clinical, diagnostic, and therapeutic operations. Nursing students must do better when it comes to infection control measures because they are more likely to have infections throughout their clinical training (Sayed et al., 2021).

Standard precautions (SP) are crucial infection control strategies designed to protect patients and healthcare workers from infections linked to healthcare. Globally, the World Health Organization (WHO) has emphasized the importance of infection prevention and control (IPC) measures, including standard precautions, in healthcare settings. The WHO's Global Strategic Directions for Nursing and Midwifery 2021–2025 highlights the critical role of nurses and midwives in achieving universal health coverage and emphasizes the need for their education and training in IPC practices (WHO, 2021).

To reduce hospital-associated illnesses and shield patients and healthcare professionals from infectious agent exposure, knowledge of and adherence to SP are crucial. Health care personnel' occupational status and training location may have an impact on their understanding of SP, which may be related to the kind of training they received (Anuar et al., 2021). After learning the fundamentals of standard precautions, nursing students ought to be able to offer care for patients. However, during their training and acquisition of skills, nursing students are also more susceptible to any type of hospital-acquired infection. During their clinical education or training, nursing students are frequently exposed to a variety of pathogens, therefore it is their duty to protect oneself (Anuar et al., 2021). In order to guarantee that these ideas regarding standard precautions are comprehended and applied wherever healthcare is supplied, adequate training is necessary (Sayed et al., 2021). Healthcare workers and patients are at serious danger from the rising prevalence of HAIs, which continues to be a major public health concern. In order to avoid HAIs and guarantee patient safety, the WHO stresses the importance of following conventional precautions, such as hand cleanliness, the use of PPE, and the appropriate disposal of medical waste (World Health Organization, 2021).

Healthcare workers' adherence to basic precautions has been acknowledged as a successful strategy for preventing and controlling illnesses linked to healthcare for both patients and healthcare personnel. Compliance with the SP is a challenge because it is still not a prevalent practice, despite the fact that it reduces infections and protects healthcare personnel while they are providing care. The main cause of noncompliance with isolation and basic precautions is lack of knowledge (Anuar et al., 2021). Understanding the current level of knowledge and the extent of compliance among nursing students in tertiary institutions is vital to developing targeted interventions that promote safe practices. Therefore, this study seeks to investigate the knowledge and compliance levels of standard precautions among undergraduate nursing students in a tertiary institution, aiming to identify gaps and inform policy and educational improvements.

1.3 Objectives of the study

The general objective of the study is to assess the knowledge and compliance with standard precautions against infections among undergraduate nursing students in University of Benin.

The specific objectives of this study are to:

1. Assess the level of knowledge of standard precautions against infections among undergraduate nursing students at the University of Benin.
2. Determine the level of compliance with standard precautions against infections among undergraduate nursing students during clinical practice.
3. Identify barriers to the compliance with standard precautions against infections among undergraduate nursing students of University of Benin.

1.4 Research Questions

1. What is the level of knowledge of standard precautions against infection among undergraduate nursing students at the University of Benin?
2. What is the level of compliance with standard precautions against infections among undergraduate nursing students at the University of Benin during clinical practices?
3. What are the barriers to the compliance with standard precautions against infections among nursing students at University of Benin?

1.5 Research Hypothesis

1. There is no significant relationship between the knowledge of standard precautions and the compliance among undergraduate nursing students in the University of Benin.

1.6 Significance of the Study

To the Nursing Profession

This study is of great significance to the nursing profession as it provides evidence-based insight into the level of knowledge and compliance with standard precautions against infections among nursing students, who are the future workforce of the healthcare system. Understanding current gaps and strengths in knowledge and practice will guide nursing educators and administrators in designing more effective curricula, workshops, and clinical mentorship programs focused on infection prevention and control. Additionally, reinforcing adherence to standard precautions early in training helps instill professional values such as patient safety, accountability, and ethical care, which are core to nursing practice. The findings may also contribute to ongoing professional development strategies and support the global effort to reduce healthcare-associated

infections, in line with the World Health Organization's goals for nursing and midwifery (WHO, 2021).

To Healthcare Providers

For healthcare providers, including doctors, allied health professionals, and institutional managers, the results of this study serve as a critical reference for improving workplace safety and infection control practices. By identifying gaps in knowledge or compliance among student nurses, the study can prompt the implementation of targeted interventions such as in-service training, policy enforcement, and the provision of adequate resources like personal protective equipment (PPE). Strengthening infection control behavior among nursing students, who often work alongside experienced staff during clinical rotations, also promotes a culture of safety and inter-professional collaboration in the hospital environment. Ultimately, improved compliance with standard precautions minimizes occupational exposure risks and contributes to better patient outcomes and staff health.

To the Society

At the societal level, this study addresses a major public health concern: the transmission of infectious diseases within healthcare settings. By promoting better adherence to standard precautions among nursing students, the study contributes to reducing the incidence of preventable infections, thereby safeguarding the health of patients, families, and communities. The findings also reinforce public confidence in the healthcare system, as communities rely on well-trained and safety-conscious nurses for quality care. Moreover, a reduction in healthcare-associated infections can lead to significant cost savings for both individuals and health institutions, by lowering hospitalization rates and the burden on healthcare infrastructure.

1.7 Scope of study

This study is focused on assessing the knowledge and compliance of standard precautions among undergraduate nursing students of the University of Benin. The study is limited to undergraduate nursing students at the University of Benin from 200 level to 500 level.

1.8 Operational definition of terms

Standard Precautions (SPs):

Refers to a set of infection prevention practices applied to the care of all patients, regardless of their diagnosis or presumed infection status. In this study, SPs include hand hygiene, use of personal protective equipment (PPE), respiratory hygiene, safe injection practices, and proper handling of contaminated equipment and surfaces.

Knowledge of Standard Precautions:

Refers to the accurate understanding and awareness of the components, importance, and appropriate application of standard precautions as demonstrated by the respondents. It will be measured using a structured questionnaire with questions assessing facts and principles related to infection control.

Compliance with Standard Precautions:

Refers to the extent to which undergraduate nursing students adhere to and consistently practice standard precautions during clinical training. Compliance will be evaluated based on self-reported practices measured through a standardized Likert-scale questionnaire.

Undergraduate Nursing Students:

These are students enrolled in the Bachelor of Nursing Science (BNSc) degree program at the University of Benin, Benin City, who are currently in their clinical years (typically 200–500 level) and have been exposed to clinical placements

CHAPTER TWO

LITERATURE REVIEW

This chapter reviewed several related literatures on knowledge and compliance with standard precautions against infections among undergraduate nursing students. This is reviewed under the following sub-headings; conceptual literature review, empirical literature review and theoretical literature review and summary.

2.1 Conceptual Review

2.1.1 Concept of Standard Precaution

Standard Precautions (SPs) are essential infection control practices intended to reduce the possibility of infectious agent transmission in medical environments. These precautions are essential for avoiding healthcare-associated infections (HAIs) and guaranteeing patient and healthcare professional safety (CDC, 2023). According to the WHO (2022), these measures are intended to safeguard patients and healthcare personnel against airborne, bloodborne, and contacttransmissible pathogens, guaranteeing a secure hospital setting. Since asymptomatic carriers can spread pathogens, SPs affect all patients, regardless of their illness state. Knowledge and compliance with SPs will protect and minimize rates of infection and is critical for minimizing and preventing hospital-acquired infections (Zeb & Ali, 2020).

Nursing students are essential to upholding and following these measures because they will be the future healthcare providers. Nonetheless, studies show that although nursing students generally have a high level of understanding about SPs, compliance varies because of a number of obstacles, such as a lack of resources, a perception of low risk, and a lack of institutional support (Wahab &

Adie, 2021). The purpose of SPs is to reduce the possibility of infection transmission in medical environments. By putting them into practice, healthcare professionals can safeguard themselves and their patients from possible diseases, such as bloodborne infections like HIV, hepatitis B, and hepatitis C (Al-Faouri et al., 2021). Hand hygiene, the use of personal protective equipment (PPE) (gloves, respiratory protection, eye or face shield, and apron), safe handling procedures for sharp objects and potentially contaminated materials, handling patient belongings to prevent health careassociated infections (HAIs), coughing label/respiratory hygiene, and other safety measures are all part of standard precautions (SP) measures, which are intended to protect both workers and professionals (Souza et al., 2019).

The increasing spread of HACIs has made it extremely important for healthcare workers (HCWs) to practise SPs, which, in short, include wearing personal protective equipment (PPE), taking care to protect themselves while handling all types of patients, including contact precautions and airborne precautions, taking specific care when treating high-risk individuals, increasing awareness about personal hygiene amongst patients, proper disposal of waste, safe injection practices as well as the procedure in case of needle-prick injury and ensuring not only the availability of the required equipment and hospital infrastructure, but also regularly monitoring the compliance of HCWs with SP guideline (Zeb & Ali, 2020). In order to stop the spread of pathogens, SPs include a number of preventative measures. The crucial elements consist of;

- Hand Hygiene: The most important infection prevention strategy is hand hygiene, which should be practiced both before and after patient contact (Al-Faouri et al., 2021). Despite its significance, time restrictions and skin sensitivity cause variable adherence to good hand hygiene (Ghabayen et al., 2023).

- Personal Protective Equipment (PPE): This consists of eye protection, face shields, gloves, masks, and gowns. Glove compliance is frequently good, whereas protective eyewear compliance is low (Siebers et al., 2023).
- Respiratory Hygiene and Cough Etiquette: This includes wearing masks, keeping a safe distance from infectious people, and covering the mouth and nose when coughing or sneezing (Topçu & Sert, 2023).
- Safe Injection Procedures: Demands that sharps be disposed of in containers that can withstand punctures and that sterile, single-use needles and syringes be used (Bouchoucha et al., 2021).
- Environmental Cleaning and Disinfection: To avoid cross-contamination, surfaces should be cleaned on a regular basis and biohazardous waste should be disposed of properly (WHO, 2022).
- Handling of Contaminated Equipment: Following patient use, all reusable medical equipment needs to be sterilised or disinfected (CDC, 2023).

2.1.2 Knowledge of Standard Precautions

Nursing students' knowledge of standard precautions (SPs) refers to their comprehension of infection control strategies intended to reduce the possibility of infectious agent transmission in medical environments. SPs serve as the cornerstone of infection control, safeguarding patients and healthcare personnel against airborne, bloodborne, and contact-transmissible pathogens (WHO, 2022). All standards of care provide a guide to the information, abilities, judgment and attitudes that are needed to practice safely. They define what each nurse is accountable and responsible for. Preventing HCAI is the goal of routine infection control (IC) practices (Sayed et al., 2021). Nursing students' knowledge of SPs has been evaluated in a number of studies.

Recognizing the importance of washing hands with soap and water or using alcohol-based hand rubs. Studies indicate that over 90% of nursing students understand the importance of hand hygiene, yet only 76.8% follow proper hand washing protocols consistently (Topçu & Sert, 2023). Hand washing, the use of barriers (such as gloves, gowns, caps, and masks), the use of devices for fetal external and internal monitoring, the insertion of intrauterine devices (IUDs), the insertion of cannulas and injections, and the clothing and equipment used during care are all examples of standard precautions. Environmental control measures include surface processing protocols and the proper disposal of sharp objects, such as needles (Sayed et al., 2021). Knowing when and how to wear gloves, masks, face shields, gowns, and eye protection and being aware that every syringe and needle needs to be used just once and disposed of appropriately is very vital. According to a cross-sectional study by Topçu and Sert (2023), there is a significant knowledge gap regarding injection safety, as only 38.6% of nursing students were aware that used needles should not be recapped. One of the biggest elements affecting nurses' understanding of SPs is formal infection prevention and control (IPC) education. Ghabayen et al. (2023) reported that nurses with more years of experience exhibit superior knowledge and compliance. Knowledge levels are also impacted by exposure to various hospital departments. For instance, nurses in infectious disease and critical care units are more likely to be aware of SPs than nurses in non-critical units (Al-

Faouri et al., 2021).

2.1.3 Compliance with Standard Precautions

To lower the danger of spreading infectious organisms in healthcare settings, healthcare professionals, especially nurses, must consistently and correctly implement infection prevention procedures. This is known as compliance with standard precautions (CDC, 2023). Compliance is

defined as the extent to which certain health care practices are implemented following known recommendations. Health care providers who follow standard precautions (SPs) have a one-third lower risk of HCAIs. However, an assessment conducted globally found that HCWs' compliance with SPs is below 50%, which is unsatisfactory (Ayele et al., 2022). Healthcare workers' adherence to basic precautions has been acknowledged as a successful strategy for preventing and controlling illnesses linked to healthcare for both patients and healthcare personnel. Compliance with the SP is a challenge because it is still not a prevalent practice, despite the fact that it reduces infections and protects healthcare personnel while they are providing care. The main cause of noncompliance with isolation and basic precautions is ignorance. Lack of time, lack of understanding, a poor lifetime learning process, recklessness or the audacity to engage in risky behavior, inadequate equipment, and protective gear are additional factors that lead to low compliance among general health care workers (Anuar et al., 2021). The practice of SPs can be influenced by a variety of elements, including information, training, refresher courses, management oversight, continuing education sessions, and the workplace. Although each organization has its own infection control policy and SPs are crucial components of infection management, research has revealed significant prevalence of HCAIs. There are other additional factors linked to a lack of understanding and behaviors. Some of them are departmental, some are organizational, and some are interpersonal. According to studies, over 80% of HCWs had never attended an educational session on SPs before, and over 80% of them want to undergo SP training (Zeb & Ali, 2020). Generally, occurrences like the frequency of sharp injuries, adherence to PPE use, and best practices for hand hygiene are reported in order to monitor and evaluate SPs compliance. These reports, however, are unable to pinpoint the reasons behind non-compliance with SPs (Van Gulik et al., 2021).

2.1.4 Role of Nursing Education in Infection Control

Nursing education is essential to infection control because it gives aspiring nurses the attitudes, abilities, and knowledge they need to stop illnesses from spreading in hospital environments. By ensuring that nurses comprehend and follow infection prevention techniques, transmission-based precautions, and Standard Precautions, proper education eventually lowers healthcare-associated infections (WHO, 2022). Since nurses are on the front lines of infection control, their IPC education is essential to patient safety and the standard of healthcare. With their continuous patient contact and care, nurses are the most valuable members of the healthcare workforce. The knowledge, skills, and attitudes (KSA) required of student nurses entering this field are necessary to identify, avoid, and handle infection prevention and control (IPC) issues in clinical settings. One major worry is the possibility of healthcare-associated infections (HCAIs) (Amavasi & Zimmerman, 2023).

Nursing education matters a lot in infection control as it bridges the gap between knowledge and practice. Many nurses find it difficult to put infection control concepts into practice in actual clinical situations. Standard Precautions and transmission-based precautions are more frequently followed when education and training are organised (Amavasi & Zimmerman, 2023). Also, it lowers the spread of infections in medical facilities. It is beneficial to teach infection management in nursing school in order to lower the infection rate and prevent nosocomial infections. Nurses around the world are on the front lines of treating patients who are infected as medical professionals. Furthermore, the largest percentage of any nation's health workforce consists of nursing students, who will eventually become healthcare professionals. According to the nursing curriculum, nursing students are required to do clinical practice, which entails spending a large amount of time interacting with patients. Nursing students are more likely than

nurses to be exposed to infectious pathogens during this time because they are less experienced with clinical procedures and safety accident preparation. Therefore, infection control education is essential for establishing the groundwork for nursing college students to enhance their practical infection control skills, which are necessary in the clinical setting (Kim et al., 2020).

2.1.5 Barriers to Knowledge and Compliance of Standard Precautions

The World Health Organization (WHO) reports that more than three million healthcare professionals contract occupational infections annually while working in healthcare institutions. Occupational safety and the prevalence of infectious diseases are neglected and underreported in low- and middle-income countries (LMICs), which are resource-constrained, disease-endemic, and have high infection burdens and a high risk of HCAIs. The complexity and lack of standardized criteria to diagnose infections also contribute to the lack of HCAI surveillance systems, and LMICs lack surveillance systems to register and monitor occupational infections (Sharma & Bachani, 2023). In order to reduce the risk of healthcare-associated infections (HCAIs) in both patients and healthcare personnel, Standard Precautions (SPs) are essential to infection control. Although nurses are essential in carrying out these safety measures, many of them encounter major obstacles that have an impact on their degree of compliance and understanding. Due to structural, institutional, and human issues, compliance rates are still uneven even with sufficient theoretical understanding (Ghabayen et al., 2023). Gaining an understanding of these obstacles is crucial to strengthening patient safety and infection control tactics.

Variations in SP knowledge are caused by inconsistent training between nursing programs. The absence of structured infection control curricula in certain nursing schools leads to a lack of comprehension and poor recall of SP concepts (Al-Faouri et al., 2021). Only 60% of nursing

programs in Jordan offered formal SP teaching, according to a study, which left many nurses illprepared for infection control issues in the real world (Da'seh et al., 2023). Access to crucial SP knowledge is restricted in several hospitals and nursing schools because of a lack of current infection control guidelines, textbooks, and digital resources (Sharma & Bachani, 2023). According to a study conducted in Nepal, 35% of nursing schools lacked access to appropriate learning resources on infection prevention, which resulted in knowledge gaps (Thapa & Kaphle, 2021). Without ongoing education, infection control knowledge gradually deteriorates.

One of the biggest obstacles to compliance, particularly in environments with limited resources, is inadequate access to gloves, masks, and hand sanitisers. Research by Alah et al. (2021) reported that 37.7% of healthcare workers cited PPE shortages as a major impediment to proper use. High workload and lack of time can prevent adherence to SPs. Alah et al. (2021) also noted that 23.9% of participants identified work overload and time limitations as barriers. Another cross-sectional study by Ayele et al. (2022) conducted in Ethiopia concluded that nursing students who perceived workplace climate as safe were found to be 2.15 times more likely to be compliant with standard precautions than those who perceived the workplace as unsafe.

2.2 Theoretical Review

2.2.1 The Theory of Planned Behavior (TPB)

The theoretical framework for this study will be based on the Theory of Planned Behavior (TPB) developed by Icek Ajzen (1991). The Theory of Planned Behavior (TPB), developed by Icek Ajzen (1991), is a psychological framework used to predict human behaviors, particularly in healthrelated settings. TPB states that an individual’s intention to perform a specific behavior is determined by three core factors: attitude, subjective norms, and perceived behavioral control

(PBC) (Ajzen, 1991). TPB offers an organised framework for comprehending why undergraduate nursing students follow (or disregard) infection control procedures in the setting of SPs. Nursing students' intention to follow SPs depends on their personal convictions, peer pressure, and perception of their capacity to follow the rules because they are still forming professional habits (Hagger et al., 2022). In order to explain nursing students' understanding and adherence to Standard Precautions, this theoretical study employs the three fundamental TPB constructs of attitude, subjective norms, and perceived behavioural control (PBC)

TPB suggests that an individual's desire to engage in a behaviour is shaped by three interconnected factors (Ajzen, 1991)

1. Attitude Toward the Behavior: This refers to a student's positive or negative evaluation of performing standard precautions. If a nursing student believes that complying with SPs reduces infection risk and protects both the patient and themselves, they will likely develop a positive attitude and intent to comply. It has been demonstrated that educational interventions, such as simulation exercises and infection control training, enhance students' attitudes towards SP adherence (Hagger et al., 2022
2. Subjective Norms: This involves perceived social pressure to perform or not perform the behavior. If clinical instructors, nurses, and peers expect the student to comply with SPs, and those expectations are important to the student, compliance becomes more likely. While students who think SPs are time-consuming, inconvenient, or unnecessary may ignore them, those who think they lower infection risks are more likely to comply (Ghabayen et al., 2023).
3. Perceived Behavioral Control: This refers to the perception of ease or difficulty in performing the behavior, which reflects past experiences and anticipated obstacles. If

students feel confident in their ability to follow SPs and believe they have access to adequate PPE, training, and time, their perceived control will increase — leading to stronger behavioral intention and action.

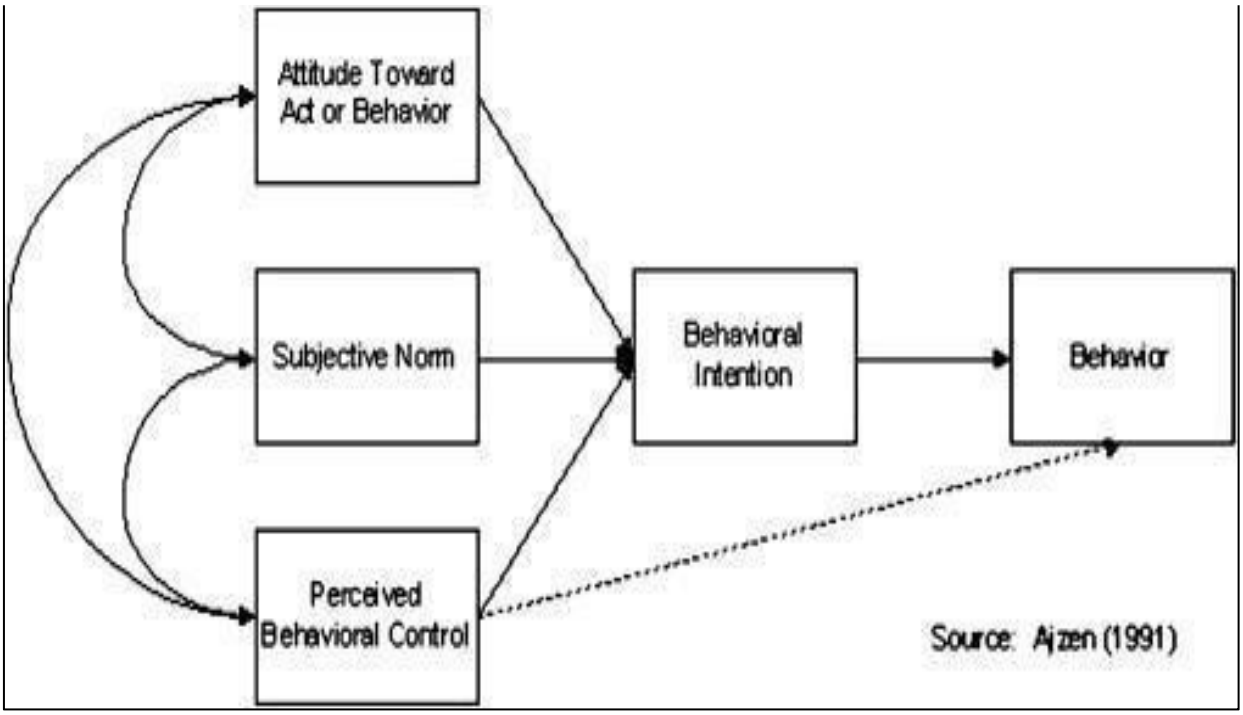

Figure 1: Theory of Planned Behavior (TPB)

2.2.2 Application of the Theory

The Theory of Planned Behavior (TPB) serves as a guiding framework for understanding the psychological and social determinants that influence the behavior of nursing students regarding standard precautions. This theory is particularly relevant to the study's objectives as it links knowledge, intention, and actual behavior with perceived control and social expectations. Firstly, the objective to assess the level of knowledge of standard precautions among undergraduate

nursing students aligns with the attitudinal component of TPB. Attitudes are shaped by knowledge and beliefs; thus, understanding what students know about standard precautions informs how they evaluate and value such practices. A strong knowledge base contributes to the formation of positive attitudes, which in turn enhances the intention to comply with infection control practices.

Secondly, the objective to evaluate the level of compliance with standard precautions during clinical practice directly corresponds to the behavioral intention and actual behavior in the TPB model. Compliance is seen as the end result of an intention that has been shaped by the student's attitude, the perceived expectations of others (subjective norms), and the student's confidence in their ability to carry out these behaviors (perceived behavioral control). For example, if a student believes that clinical supervisors and peers expect them to adhere to standard precautions and they feel capable of doing so effectively, they are more likely to comply consistently in practice.

Lastly, the objective to identify barriers to compliance with standard precautions is closely linked to the TPB component of perceived behavioral control. Barriers such as inadequate access to personal protective equipment, time pressure, or lack of institutional support may reduce students' perceived ability to follow precautions, even when they have the knowledge and intention to do so. Identifying these barriers helps reveal the practical and psychological constraints that may prevent the translation of intention into action, offering key insights for designing effective interventions.

2.3 Empirical Review

2.3.1 The level of knowledge of standard precautions against infections among undergraduate nursing students

In a study conducted by Lopes et al. (2023), the researchers explored nursing students' knowledge and compliance with standard precautions (SPs). The descriptive and quantitative study involved 161 nursing students, with data collected via an electronic form between September and October 2020. The objective was to assess how well nursing students understood and adhered to SPs. The results revealed that the students demonstrated satisfactory knowledge and compliance with SPs, with scores surpassing half of the maximum possible score. While the students acknowledged that SPs extend beyond the care of patients diagnosed with infections or in the incubation period, they focused primarily on protecting the healthcare team rather than safeguarding patients. Hand hygiene and the use of gloves during procedures involving potentially contaminated biological material were the most commonly adopted measures among the students. The study also found that compliance with SPs was higher among students in the later stages of their nursing education, highlighting the importance of integrating continuous infection prevention education throughout the nursing curriculum.

The strengths of this study include its relatively large sample size (161 participants), its use of an electronic survey, which may have facilitated easy and widespread data collection, and its focus on a relevant issue in healthcare. However, a limitation of the study is its cross-sectional design, which limits the ability to infer causal relationships. Additionally, the study did not delve deeply into the factors influencing students' understanding and behavior towards SPs, such as specific pedagogical approaches or institutional support. A knowledge gap identified in this study is the

need for more targeted interventions to improve the understanding and implementation of SPs, especially in the earlier years of nursing education.

Similarly, Mohammedi & Landelle (2023) conducted a comprehensive literature review to examine the knowledge and practice of standard precautions and hand hygiene (HH) among nursing students. The review analyzed 81 articles published between January 2010 and April 2021, focusing on knowledge, practice, and hygiene teaching techniques. The study aimed to understand the overall landscape of SP and hand hygiene education. The findings indicated that nursing students had moderate knowledge of hand hygiene and standard precautions, with alcohol-based hand rubs not being widely known. Compliance with hand hygiene and SPs was also found to be moderate. The review further highlighted that a variety of pedagogical techniques were employed in hygiene training programs, but no single method was found to be clearly superior. The authors concluded that enhancing nursing education through innovative pedagogical techniques, including the use of new technologies and multimodal approaches, is essential for improving the knowledge and practice of SPs and HH.

A strength of this review is its broad scope, encompassing 81 studies and providing an overall assessment of the state of knowledge and practice regarding SPs and HH. However, the limitation lies in the lack of primary data collection and the inability to control for study quality across the reviewed articles. Another weakness is the lack of a clear recommendation on which pedagogical approach is most effective for teaching SPs, given the diversity in teaching methods identified. A knowledge gap revealed by this study is the need for further research into the specific pedagogical techniques that best improve nursing students' adherence to SPs and hand hygiene practices.

In another study, Livshiz-Riven, Hurvitz, and Tomer (2022) investigated the knowledge and behavioral intentions regarding standard precautions among students in various healthcare disciplines. This cross-sectional study, conducted at a public university in Israel, involved 259 students from healthcare fields such as nursing, emergency medicine for paramedics, physiotherapy, and medicine. The study aimed to explore students' intentions to adhere to SPs and the factors influencing these intentions. The results revealed that students in different healthcare fields exhibited distinct patterns of knowledge and behavior. Nursing students, in particular, reported higher intent to adhere to SPs, such as proper hand hygiene, use of personal protective equipment, and decontamination practices. The study further identified that students' knowledge and behavior were influenced by their perceptions of mentors as role models and their sense of personal responsibility for microbiological safety.

The strengths of this study include the involvement of students from multiple healthcare disciplines, which provided a broader understanding of SP knowledge and intentions. The study's use of a structured questionnaire allowed for clear measurement of students' intentions and behaviors. However, a weakness of the study is its cross-sectional design, which prevents the establishment of causal relationships. Additionally, the study did not consider the impact of institutional policies or environmental factors on SP adherence. A knowledge gap identified in this study is the need for more research on how mentorship and role modeling in clinical settings influence students' adherence to infection control practices.

In a study conducted by Sharma & Bachani (2023), the researchers assessed and compared the knowledge, attitude, and practice of standard precautions (SPs) among medical and nursing students in Central India. This cross-sectional study, involving 600 participants from medical and nursing colleges, also examined students' knowledge of post-exposure management and the

barriers to compliance with SPs. The findings revealed that a significant proportion of students, particularly medical students, lacked a clear understanding of SPs and post-exposure prophylaxis. While knowledge of hand hygiene was good, its implementation was suboptimal, with less than 30% of students consistently practicing proper hand hygiene. Additionally, 64% of participants believed that alcohol-based hand rubs could replace handwashing, even when hands were visibly soiled. The study identified several barriers to compliance with SPs, including high workload, poor knowledge, and misconceptions about personal protective equipment (PPE). The authors concluded that there is a significant gap between theoretical knowledge and practical implementation of SPs, emphasizing the need for dedicated curriculum improvements and handson training to bridge the "know-do" gap among future healthcare professionals.

The strengths of this study include its large sample size of 600 participants, which provides a robust representation of both medical and nursing students. The study also comprehensively examined various aspects of SPs, from knowledge to attitudes and practices. However, a limitation is its cross-sectional design, which limits the ability to draw causal inferences. The study also relied on self-reported data, which may be subject to biases. A knowledge gap identified in the study is the need for more targeted educational interventions and hands-on training to address the practical application of SPs, particularly in relation to post-exposure management and misconceptions about PPE.

Similarly, a study conducted by Nalunkuma et al. (2021) assessed the knowledge of Infection Prevention and Control (IPC) among health professional students at Makerere University College of Health Sciences in Uganda. The cross-sectional online survey included 202 students, with a mean age of 24.43 years. The study found that male students made up the majority of the sample (63.37%), and a significant portion of participants (49.50%) relied on only one source of

information for IPC. Students in the later years of study, particularly years three, four, and five, demonstrated higher knowledge scores compared to those in the first year. This suggests that IPC education should begin early in students' academic careers, as increasing knowledge in the later years of study may not be sufficient to fully address gaps. The study emphasized that while knowledge on IPC was generally good, additional focus on topics like hand hygiene is necessary. The study's strengths include its focus on a specific student population at a major university, providing valuable insights into the progression of IPC knowledge over time. A limitation, however, is the reliance on a single source of information for assessing IPC knowledge, which could affect the validity of the findings. Additionally, the study's cross-sectional design precludes the ability to assess changes in knowledge over time or to identify causal relationships. A knowledge gap identified is the need for more comprehensive education about IPC practices, including hand hygiene, from the very start of students' academic careers.

In a study by El-Saaidi et al. (2021), the researchers explored infection control knowledge, attitudes, and practices among students in public dental schools in Egypt. The study, which involved 1,776 dental students, found that while the majority of students demonstrated good infection control attitudes and practices, their knowledge of infection control was notably low. Female students tended to score higher in self-protection and sterilization practices than their male counterparts, and fourth-year students showed better infection control practices than fifth-year students. The study also highlighted that a significant proportion of students had experienced needle or sharps injuries, and approximately 30% had not received a complete hepatitis B vaccination. The researchers recommended introducing refresher training on infection control before graduation, particularly focusing on injury prevention and post-exposure protocols, to reduce risks during clinical training.

The strengths of this study include its large sample size (1,776 participants) and its focus on a critical area of healthcare, namely infection control in dental students. The study's large sample makes the results more generalizable to similar student populations. However, a limitation is that the study did not assess the underlying reasons for the low level of infection control knowledge, which could provide more insight into the gaps in education. A knowledge gap identified is the need for more specific training on injury prevention and post-exposure protocols before graduation.

Ankita & Ipsa (2021) conducted a study to assess first-year medical students' knowledge of standard precautions (SPs) and identify gaps in their understanding of infection prevention. The study, which surveyed first-year medical students, found that while most students had heard of SPs, many misconceptions persisted. A significant portion of students (83.1%) believed that SPs were solely for the protection of healthcare workers, and 23.2% thought that SPs should only be applied to patients diagnosed with infections. Despite high awareness about hand hygiene (96.5%) and respiratory hygiene (97.2%), 14.1% of students believed that personal protective equipment (PPE) could be shared, and 57% thought that needles should be recapped after use. The study concluded that there were substantial gaps in students' understanding of SPs and suggested that continuous medical education and skills assessment be integrated into the curriculum to address these gaps before students' early clinical exposure.

The strengths of this study include its focus on first-year medical students, offering a baseline understanding of their knowledge of SPs. The study identified important misconceptions, which could help shape future educational strategies. A limitation of the study is that it only assessed first-year students, so the findings may not reflect the knowledge and practices of students in later stages of their education. Additionally, the study's cross-sectional design does not allow for

the assessment of changes over time. A knowledge gap identified in this study is the need for continued education and skills assessment throughout medical training to ensure students' understanding of SPs aligns with clinical practice.

2.3.2 The level of compliance with standard precautions against infections among undergraduate nursing students during clinical practice.

In a study conducted by Ayele et al. (2022), the researchers assessed compliance with standard precautions (SPs) and the factors influencing compliance among undergraduate nursing students in government universities in the Amhara region of northwest Ethiopia. This cross-sectional study, conducted between April and May 2021, included 423 nursing students selected via simple random sampling. The study found that only 56.3% of students exhibited good compliance with SPs, a relatively low percentage given the significance of these practices in preventing healthcareassociated infections. The study identified several factors associated with better compliance, including good knowledge of SPs, a perceived safe workplace climate, and recent participation in training or seminars related to SPs. These findings suggest that while the knowledge of nursing students regarding infection control practices may be adequate, additional efforts in creating safe healthcare environments and reinforcing regular training programs are needed to enhance compliance and reduce the risk of infections in clinical settings.

The study's strengths include its large sample size and focus on identifying factors that influence compliance. However, the cross-sectional design limits the ability to establish causality, and the self-reported nature of the data could introduce bias. A knowledge gap identified in this study is the need to explore how specific interventions, such as improved training programs and changes to workplace climate, may directly influence students' compliance with SPs.

Similarly, Anuar et al. (2021) conducted a study at Universiti Sains Malaysia to compare the knowledge and compliance with SPs between diploma and degree nursing students. The study involved 134 nursing students, who completed self-administered questionnaires. The results revealed that both groups of students had good knowledge of SPs, with diploma students scoring an average of 14.7 and degree students scoring 15.4 out of a possible higher score. Compliance with SPs was also high among both groups, with diploma students demonstrating the highest compliance in hand hygiene after contact with potentially contaminated substances, while degree students showed the highest compliance in hand hygiene after contact with different patients.

However, the study found no significant correlation between knowledge and compliance with SPs, although the duration of practical training was found to be a significant factor influencing compliance. This suggests that hands-on experience plays a crucial role in translating theoretical knowledge into practice, highlighting the importance of incorporating longer and more frequent practical training sessions into nursing curricula to enhance compliance.

The strengths of this study include its comparison between diploma and degree nursing students, which offers valuable insights into how education level influences SP compliance. A limitation is the study's reliance on self-reported data, which may not accurately reflect actual compliance. A knowledge gap identified is the need to further explore the impact of practical training duration and its integration into nursing education to ensure students can consistently apply their knowledge in real-world settings.

In another study, Bouchoucha et al. (2021) explored the self-reported compliance with SPs among undergraduate nursing students in Australia, with a focus on the psychosocial factors influencing adherence. The study surveyed 321 nursing students using validated instruments, including the Compliance with Standard Precautions Scale (CSPS) and the Factors Influencing

Adherence to Standard Precautions Scale–Student version (FIASPS-SV). The results showed that the overall self-reported compliance with infection prevention practices, including the use of personal protective equipment (PPE), disposal of sharps, and decontamination of equipment, was relatively high, ranging from 69% to 83%. The study identified leadership and contextual cues as the key psychosocial factors influencing compliance. The analysis revealed that strong leadership within the clinical environment, including effective role modeling by supervisors, had a significant positive impact on students' adherence to infection prevention and control practices. This finding emphasizes the critical role of clinical leadership in ensuring that nursing students not only acquire the necessary knowledge but also adhere to infection control guidelines during their clinical practice.

The strengths of this study include its comprehensive assessment of both psychosocial factors and compliance, highlighting the importance of leadership and role modeling in clinical environments. However, the study's reliance on self-reported data limits the ability to confirm the accuracy of students' adherence to SPs. A knowledge gap identified in the study is the need for further exploration into how leadership training for clinical supervisors can be integrated into nursing curricula to enhance SP compliance among students.

In a study by Wahab & Adie (2021), the authors explored the knowledge and compliance of standard precautions (SPs) among undergraduate nursing students at a Malaysian public university in Pahang. The study utilized a cross-sectional design, with participants completing an online survey assessing their knowledge and adherence to SPs. The findings revealed that nursing students demonstrated high levels of knowledge (90.9%) and compliance (91.8%) with SPs, indicating a solid understanding of infection prevention protocols. However, the study identified significant associations between certain factors and students' knowledge and

compliance. Age, year of study, and clinical posting experience were all found to be significantly associated with knowledge, while age alone was associated with compliance. Moreover, a positive correlation was observed between knowledge and compliance, suggesting that students who were more knowledgeable about SPs were more likely to adhere to them. Despite the high scores, the study emphasized the need for continuous efforts to further enhance students' compliance with these critical practices, especially in the context of the COVID-19 pandemic, which heightens the risk of healthcare-associated infections.

The strengths of this study include its large sample size and its use of online surveys to gather data efficiently. However, the study's cross-sectional design limits its ability to establish causal relationships between knowledge and compliance. A gap identified in the study is the need to explore other factors, such as attitudes towards infection control, which may further influence SP compliance. Future research could also examine the impact of ongoing training and exposure to real-world clinical environments on improving adherence.

Similarly, in a study by Joseph et al. (2024), the authors investigated the knowledge and adherence to SPs among student nurses in a secondary healthcare facility in Kaduna State, Nigeria. The study employed a descriptive cross-sectional design, utilizing a census approach to include all 105 student nurses on clinical placement. The results showed that while a majority of the student nurses (72.5%) had received training on SPs, and 76.2% demonstrated adequate knowledge, adherence to these practices was considerably lower at 40%. The study highlighted several factors influencing adherence, including previous exposure to needle stick injuries, which was significantly associated with adherence ($p = 0.022$). The findings revealed a clear discrepancy between knowledge and adherence, indicating that while students understood the importance of SPs, other factors such as clinical environment conditions and perhaps attitudes

towards infection control practices could be hindering their compliance. The study underlined the need to address these factors, suggesting that knowledge alone may not be sufficient to ensure high adherence to SPs.

The study's strengths include its use of a census approach, which ensured the inclusion of all relevant participants. However, the study's cross-sectional nature means it cannot establish causality. A knowledge gap identified in this study is the need to further explore how clinical environment conditions and student attitudes towards infection control practices can impact adherence. Future research could explore intervention strategies aimed at improving compliance, such as fostering a stronger infection control culture within clinical settings.

2.3.3 The barriers to the compliance with standard precautions against infections among undergraduate nursing students.

The study by van Gulik et al. (2021) explored the compliance of Thai nursing students with standard precautions (SPs) and identified factors that influence their adherence to infection prevention and control practices. This cross-sectional study surveyed 533 nursing students from a tertiary nursing school in Bangkok, Thailand. The results revealed an average compliance rate of 68.5%, with significant variations across different dimensions of SPs. Notably, most students (91.2%) used water alone for handwashing, and 57.2% reused surgical masks, indicating suboptimal adherence to some critical infection control measures. Interestingly, fourth-year students exhibited higher compliance in preventing cross-infection from person-to-person, while second-year students had better compliance in the disposal of sharps.

The study also assessed several factors influencing adherence to SPs. "Contextual cues" emerged as the factor with the greatest influence on students' adherence (M = 3.41), while "Practice Culture" and "Justification" were identified as having minimal impact. Furthermore, the role of

leadership was particularly important for fourth-year students, who emphasized its significance in promoting adherence. The study concluded that to improve compliance, greater emphasis should be placed on SPs during theoretical sessions, regular monitoring of hand hygiene, and more visible leadership in clinical placements. This approach would help students translate their theoretical knowledge into consistent practice.

Strengths of this study include its large sample size and its ability to capture a wide range of factors influencing SP adherence. However, the study's cross-sectional nature limits its capacity to establish causality between the identified factors and students' adherence. A knowledge gap identified in the study is the need for further research into how various instructional methods and the clinical environment contribute to the consistency of SP practices. Future research could investigate intervention strategies, including enhancing leadership roles in clinical settings and reinforcing hand hygiene education, to improve compliance among nursing students.

The study conducted by Bouchoucha et al. (2021) on the validation of the "Factors Influencing Adherence to Standard Precautions Scale – Student Version" (FIASP-SV) offers several strengths. One key strength is the robust psychometric validation of the FIASP-SV tool, which demonstrated good internal reliability ($\alpha = 0.66$ -- 0.80), indicating that the tool is dependable and appropriate for use with nursing students. This validation is essential because it provides a reliable instrument for future research into factors influencing adherence to standard precautions (SPs) among nursing students, which can help develop targeted interventions and educational strategies. Additionally, the study's focus on differentiating the factors influencing adherence between nursing students and registered nurses is another notable strength, as it highlights the need for student-specific measures and contributes to the development of more accurate assessments of SP compliance among different healthcare professional groups.

However, the study has some limitations. One potential weakness is that the research focused solely on the validation of a specific tool, which may not provide in-depth insights into the broader contextual factors that influence SP adherence. While the validation of the FIASP-SV is valuable, the study could have explored additional factors, such as environmental or institutional influences, which may also affect adherence to SPs. Furthermore, since the study was centered on the validation of an instrument rather than examining its practical application in real clinical settings, the generalizability of the results may be limited to specific populations or contexts. Future studies could benefit from applying the FIASP-SV in various clinical environments to assess its effectiveness in different healthcare settings.

Similarly, the study by Park et al. (2021) on psychiatric nurses' awareness and compliance with SPs offers a significant strength in identifying awareness as a key factor influencing compliance. The study provides valuable insights into the correlation between awareness and adherence, particularly in the context of psychiatric nursing, where infection control measures are often underemphasized. The focus on the impact of the COVID-19 pandemic on infection control practices adds to the relevance of the study, especially given the increased emphasis on infection prevention during global health crises.

However, a potential limitation of this study is the relatively small sample size, with only 134 valid responses from a total of 160 surveyed psychiatric nurses. This may limit the representativeness of the findings and their applicability to a broader population of psychiatric nurses. Additionally, the study does not explore other potential factors influencing compliance, such as institutional policies, available resources, or nurse-patient interactions, which may also play a critical role in adherence to SPs. Further research with larger sample sizes and a more

comprehensive exploration of influencing factors would enhance the generalizability and depth of the findings.

In the study conducted by Hamed et al. (2021), the authors investigated barriers to infection control routine practices and explored problem-solving strategies among nursing students and instructors in Eastern Canada. The study's strengths lie in its large and diverse sample of 577 nursing students and 20 instructors across three nursing schools, providing a broad perspective on the challenges encountered in infection control practices. One of the key findings was the identification of common barriers, such as high workload, negative role models, and inconvenient locations for alcohol-based hand rub dispensers, which may limit adherence to infection control measures.

Another strength of the study is its focus on problem-solving strategies, revealing a significant association between nursing students' confidence in applying these strategies and their training in routine infection control practices. This suggests that targeted training and awareness programs could improve the ability of students to overcome these barriers and enhance adherence to infection control measures.

However, a potential weakness of the study is the relatively low percentage of students (21.1% to 30.2%) who used problem-solving strategies despite encountering significant barriers. This suggests that other factors—such as a lack of motivation or institutional support—may hinder the application of problem-solving approaches. Additionally, the study was cross-sectional in design, which limits the ability to draw causal conclusions about the effectiveness of problem-solving strategies or training interventions. Future research could consider longitudinal designs to examine whether increased training and awareness result in sustained improvements in infection control practices.

In a related study, Getachew et al. (2022) assessed compliance with standard precautions among undergraduate nursing students in the Amhara region of Northwest Ethiopia. The study's strengths include its use of a simple random sampling technique and a relatively large sample size of 423 nursing students from governmental universities, enhancing the representativeness of the findings. One of the key outcomes of the study was that 56.3% of students demonstrated good compliance with standard precautions, with factors such as knowledge of standard precautions, a perceived safe workplace climate, and recent training or seminars being significantly associated with better compliance. These findings underscore the importance of enhancing training and fostering a safe clinical environment to improve adherence to infection control practices.

However, one potential weakness of this study is the relatively low compliance rate (56.3%) observed, suggesting that despite adequate knowledge and training, additional factors—such as organizational culture, workload, and institutional support—may play a role in adherence to standard precautions. Moreover, the cross-sectional design of the study limits the ability to assess the impact of long-term training or the effectiveness of specific interventions. Further studies could explore these factors in greater depth and employ longitudinal designs to track changes in compliance over time, providing a clearer picture of how to improve infection control practices among nursing students in various settings.

2.4 Summary of Literature Review

The conceptual review explores the fundamental aspects of Standard Precautions (SPs), which are essential infection control practices aimed at minimizing the risk of transmitting infectious agents in healthcare settings. It underscores that while nursing students generally possess

substantial knowledge about SPs—including hand hygiene, use of personal protective equipment (PPE), safe injection practices, and environmental cleaning—compliance remains inconsistent. Various studies attribute this gap to several barriers such as lack of resources, insufficient institutional support, high workload, and limited access to refresher training. The review also stresses the critical role of nursing education in bridging the gap between theoretical knowledge and practical application. Through structured education and clinical exposure, nursing students can develop the necessary competencies and attitudes to adhere to SPs effectively, ultimately enhancing patient and healthcare worker safety.

The theoretical review is anchored in the Theory of Planned Behavior (TPB) by Icek Ajzen, which serves as the study's guiding framework. TPB explains behavior as being influenced by three interconnected components: attitude toward the behavior (e.g., belief in the importance of SPs), subjective norms (e.g., peer and instructor expectations), and perceived behavioral control (e.g., confidence in one's ability to carry out SPs despite challenges). This framework helps to understand not just whether students know about SPs, but also whether they intend and feel empowered to comply with them. The application of TPB is particularly useful in identifying the psychological and practical barriers that may prevent students from translating knowledge into action. By addressing these components, interventions can be designed to promote stronger adherence to infection control practices among future nurses.

CHAPTER THREE

RESEARCH METHODOLOGY

This chapter outlines the research methodology employed in conducting the study. Each aspect of the research methodology will be discussed in the corresponding subsections, covering topics such as research design, research setting, target population, sampling technique, validity of instructions, reliability testing, data collection methods, data analysis, and ethical considerations.

3.1 Research Design

McCombes (2022) explains that a research design is a strategy for answering your research question using empirical data and includes selecting methods for data collection and analysis in a way that aligns with the research aims. It involves structuring the study in a way that ensures valid, reliable, and unbiased answers to the research questions by integrating the study components like methodology, data collection, and analysis. For this study, a descriptive cross-

sectional survey design was employed. A descriptive cross-sectional study is a type of observational research method used to collect data from a population at a single point in time. It aims to describe the prevalence or characteristics of a specific outcome or condition within that population, without establishing cause-and-effect relationships. This design is appropriate as it allows for the collection of data at a single point in time from a sample that represents the larger population of nursing students

3.2 Research Setting

The research setting, as defined by Koswara (2022) and Trondle et al. (2021), encompasses the physical, social, and cultural environment in which data collection occurs within a study. The setting for this study was at the Faculty of Nursing sciences, College of Medical Sciences, University of Benin. Located in Ovia North-East Local Government Area of Edo State, Nigeria, the University of Benin was founded in 1970, starting as the Institute of Technology and later changing to the University of Benin by the National University Commission (NUC). The University of Benin is one of the largest and most prestigious universities in Nigeria, with a reputation for academic excellence. The university has over 40,000 students enrolled every year, both full-time and part-time, shared among its 13 faculties, which include Law, Engineering, Agriculture, Management Sciences, Arts, Physical Sciences, Environmental Sciences, Social Sciences, Pharmacy, Life Sciences, College of Medical Sciences, and Education. The university has approximately 73 departments organized within these faculties. The Nursing Department is housed within the College of Medical Sciences at the University of Benin. The department offers undergraduate and postgraduate programs in nursing, preparing students for careers in healthcare.

The departments have state-of-the-art facilities, including nursing skills laboratories, simulation centers, and clinical placement opportunities in affiliated hospitals and healthcare facilities.

3.3 Target Population

The target population is a group of people or items about which researchers wish to make broad generalisations (Rahman et al., 2022). The study population for this research consists of 200 to 500 level undergraduate students in the Nursing department of the institution. These respondents have already learned about the SP during their first year and have experienced clinical postings. The study focuses on exploring the level of knowledge and compliance to standard perception both in the classroom and clinical settings.

3.4 Sample Size

Sample is a proportion of a population which also refers to the number of subjects or participants recruited and to which the study findings will be generalised. The sample for the study consists of nursing students currently in 200 to 500 levels of study.

Academic Level of Study	Number of Nursing Students
200	171
300	191
400	183
500	164
	709

Cochran's sample size formula for infinite populations is given by:

$$n_0 = Z^2 pq / (e)^2$$

Cochran's sample size formula for finite populations is given by:

$$n = n_0 / (1 + (n_0 - 1) / N)$$

Where:

- **n** = Sample size
- **Z** = Z-score (depends on confidence level; for 95% confidence level, Z=1.96)
- **p** = Estimated proportion of the population with the characteristic of interest
- **e** = Margin of error (typically **0.05** or **5%**)
- **N** = population

Step 1: Calculate for an infinite population

- Z = 1.96 (for 95% confidence)
- p = 0.5 (maximum variability)
- e = 0.05 (assuming a 5% margin of error)
- q = 1- p = 0.5 $n_0 = Z^2\ pq\ /\ (e)^2$ $n_0 = 1.96^2\ \ 0.5*0.5\ /\ (0.5)^2$

$n_0 = 384$

Step 2: Adjust for a finite population (since N = 709)

Use the finite population correction formula:

$n\ =\ n_0\ /\ (1\ +\ (n_0\ -\ 1)\ /\ N)$

n = 384 / (1+ (384 - 1) / 709)

n = 237.2 n

= 249 students

In order to achieve a 95% confidence level in population size chosen, Cochran (1977) provides a simplified formula to calculate sample sizes.

3.5 Sampling Technique

A simple random technique was employed to select participants for this study. This method ensured that each individual in the target population had an equal and independent chance of being chosen thereby minimising selection bias.

Inclusion Criteria: This study focused on nursing students currently in 200 to 500 levels of study. The study's inclusion criteria were; voluntary study participation and being in the practical training period. Nursing students in their first year of the study programme were excluded from this study because of lack of clinical experience and no existing knowledge on SPs.

3.6 Instrument for Data Collection

Data was collected using a structured questionnaire designed to evaluate the knowledge and compliance of standard precautions among nursing students. The instrument combined dichotomous, multiple-choice, and Likert-scale questions to comprehensively assess both objective knowledge and subjective experiences of nursing students regarding standard precautions. It was designed to facilitate quantitative analysis and inform targeted interventions in nursing education and practice.

The questionnaire was divided into:

Section A (Demographic Information): This section gathered background data closed-ended, multiple choice and dichotomous questions (Yes/No). These variables helped in understanding the participant profile and assessing relationships between demographic factors and infection control practices. It comprises of 5 questions relating to Age, Gender, Level of Study, Formal education and Clinical participation.

Section B (Knowledge of Standard Precautions): This section determined theoretical knowledge through closed-ended, multiple-choice questions. It includes 6 questions to assess the level of understanding of standard precautions.

Section C (Compliance with Standard Precautions): This part assessed students' self-reported practice using a 4-point Likert-type scale (Always, Often, Rarely, Never). The scale enabled measurement of frequency and consistency in infection control behavior. It includes 7 questions regarding adherence to SPs in the clinical settings.

Section D (Barriers to Compliance): This section explored perceived obstacles to adherence with infection control protocols using a 4-point Likert scale with the following options: Strongly Agree, Agree, Disagree, Strongly Disagree to gauge the extent of agreement with statements. It contains 5 questions on hindrances to compliance of SPs.

In this study, the independent variables include; Knowledge of standard precautions and demographic factors while the dependent variables include; Compliance with standard precautions, perceived barriers to compliance.

3.7 Validity of Instrument

Validity refers to the degree to which a tool measures what it claims to measure. Validity of the questionnaire and instruments was established through face and content validity criteria by the supervisor.

Face validity refers to the extent to which a test or measurement tools appears to measure what it is opposed to measure, based on a superficial examination. It is the most basic and least scientific form of validity assessment, relying on subjective judgement rather than empirical testing. This was assessed by presenting the questionnaire to a small group of potential respondents in the

field of nursing and infection control. This process involved asking them whether they believe the items are suitable and appear to measure the relevant aspects of knowledge, compliance, and barriers to standard precautions. This also ensured that the questionnaire includes items such as "I find it easy to understand the questions" and "The questions are relevant to understanding infection control practices."

Content validity refers to the extent to which a measurement tool or test covers the entire range of the construct it is intended to measure. This ensured that the questionnaire items adequately cover all factors influencing knowledge, compliance, and barriers to standard precautions, including hand hygiene, use of personal protective equipment, safe injection practices, and reporting breaches.

3.8 Reliability of Instrument

This was used to evaluate if items on the scale measure the same construct. This measured the stability of the instrument over time by administering the same questionnaire to the same respondents at two different points in time and then correlating the scores. This helped to assess the degree of agreement among different raters/observers as this is more relevant when subjective judgement is involved. The reliability of the questionnaire was assessed using Cronbach’s Alpha to measure internal consistency. A pilot test was conducted with a small sample (n=30) of nursing students from Benson Idahosa Institution who are not part of the main study. The results was compared using Cronbach's alpha to determine internal consistency, with a reliability coefficient of 0.76 or higher considered acceptable.

3.9 Method of Data Collection

Eligible participants was identified and approached. The study was introduced to them, and those interested were briefed on the study's purpose, procedures, and ethical considerations. Written informed consent was also be obtained from participants before any data collection begins. This ensured that participants understand their rights and the voluntary nature of their involvement. Participants was guided on how to fill out the questionnaire, and assistance provided when necessary. Responses was collected and stored to ensure data integrity. Each questionnaire completion session lasted 3-5 minutes.

3.10 Method of Data Analysis

Data was analysed using both descriptive and inferential statistics. Each completed copy of the questionnaire was examined for consistency and completeness of variables. After manually classifying the questionnaire, the collected data was transferred into an Excel spreadsheet program. The Statistical Package for the Social Sciences (SPSS) software version 25 was employed for data analysis. Descriptive statistics (such as frequencies, percentages, means, and standard deviations) was used to summarise the demographic characteristics. Inferential statistics, such as chi-square tests and logistic regression analysis, was conducted to explore associations between demographic factors. Test results will be significant at a P-value lesser than 0.05 alpha.

3.11 Ethical Consideration

Ethical considerations in research refer to the principles and guidelines that govern the conduct of research involving human subjects. These considerations ensure that the rights, dignity, and

welfare of participants are protected throughout the research process. Key ethical principles include:

Informed consent: Participants provided written consent after being fully informed about the study's purpose, procedures, risks, and benefits.

Privacy and confidentiality: Participant information were kept confidential and stored securely. Data was anonymized by assigning codes instead of using personal identifiers.

Compliance with regulation and guidelines: Participants were informed that their involvement was voluntary and that they could withdraw at any time without any negative consequences.

Ethical use of data: Ethical approval was sought from the Research Ethics Committee, College of Medical Sciences, University of Benin before data collection begins.

Non-maleficence: Care was taken to avoid causing harm or discomfort to participants during data collection, and their well-being prioritised at all times.

Non-plagiarism: There was correct referencing and citation of different sources. Proper paraphrasing was also ensured.

CHAPTER FOUR

RESULT AND FINDINGS

This chapter deals with the representation of data collected from respondents on the Assessment of Knowledge and Compliance with Standard Precautions against Infections Among Undergraduate Nursing Students of University of Benin, Benin City. A total of 249 questionnaires were distributed to 200 to 500 level undergraduate students in the Nursing

department in University Benin City out of which 246 was properly filled and valid for data analysis, giving a response rate of 98.8.

Table 4.1: Socio-demographic characteristics of respondents

Variable	Frequency (n = 246)	Percent (%)
Age		
18-20	58	23.6
21-23	102	41.5
24-26	63	25.6
27 years and above	23	9.3
Gender		
Male	72	29.3
Female	174	70.7
Year of study 2nd year	60	24.4
3rd year	72	29.3
4th year	66	26.8
5th year	48	19.5
Have you received formal training in infection control or standard precautions?		
Yes	198	80.5
No	48	19.5
Have you participated in any clinical practice or internships?		
Yes	216	87.8
No	30	12.2

Table 4.1 shows the socio-demographic profile of the respondents (n = 246), highlighting variations in age, gender, academic level, and exposure to infection control training and clinical practice. The majority of respondents were within the age group of 21–23 years (41.5%), followed by those aged 24–26 years (25.6%), 18–20 years (23.6%), and 27 years and above (9.3%). In terms of gender distribution, females (70.7%) were more represented than males (29.3%), reflecting the gender composition commonly seen in the nursing profession. Regarding academic level, students in their 3rd year constituted the highest proportion (29.3%), followed by

those in 4th year (26.8%), 2nd year (24.4%), and 5th year (19.5%). A significant majority (80.5%) reported having received formal training in infection control or standard precautions, while 19.5% had not. Furthermore, 87.8% of respondents had participated in clinical practice or internships, whereas 12.2% had no prior clinical experience. These findings provide an overview of the participants' demographic and educational background, as well as their exposure to infection prevention protocols.

Answering Research Questions

Research Question 1: What is the level of knowledge of of standard precautions against infections among undergraduate nursing students at the University of Benin?

Items	Frequency (%)	Correct	Wrong	Mean	Remark
Which of the following are part of the standard precautions for infection control?		(78.0)	(22.0)	1.8	Good
Hand hygiene	(4.9)				
Use of personal protective equipment (PPE) like gloves, masks, and gowns	(7.3)				
Safe injection practices	(4.1)				
Sterilization of equipment	(5.7)				
All of the above	(78.0)				
Standard precautions are designed to protect healthcare workers from Airborne infections only	(8.1)	174 (70.7%)	72 (29.3%)	1.7	Good
Bloodborne pathogens only	(13.0)				
All patients, regardless of diagnosis	(70.7)				
Only patients with known infections	(8.1)				
When should gloves be worn during patient care?					
Only when handling blood and body fluids	(11.4)	165 (67.1%)	81 (32.9%)	1.7	Good
When touching any patient or patient's environment	(67.1)				
Only during surgeries or invasive procedures	(12.6)				
Only when caring for patients diagnosed with infections	(8.9)				
What is the correct sequence for donning personal protective equipment (PPE)? Gloves, mask, gown	(8.5)	158 (64.2%)	88 (35.8%)	1.6	Good
Gown, gloves, mask	(14.2)				
Gown, mask, gloves	(64.2)				
Mask, gown, gloves	(13.0)				

Table 4.2: The Knowledge of Standard Precautions

Items	Frequency (%)	Correct	Wrong	Mean	Remark
How frequently should hands be washed or sanitized during patient care?					
Only after touching blood or body fluids	(7.3)	182 (74.0%)	64 (26.0%)	1.7	Good
Before and after patient contact, after touching contaminated objects	(74.0)				
Once at the beginning of a shift	(11.0)				
When visibly dirty only	(7.7)				
The purpose of standard precautions is to					
Prevent the spread of infections	(11.4)	190 (77.2%)	56 (22.8%)	1.8	Good
Prevent the spread of infections	(8.5)				
Protect healthcare workers only	(77.2)				
Both protect patients and healthcare workers	(4.9)				
	Grand Mean			**1.7**	**Good**

Table 4.2 Cont'd

Mean cut-off = 1.5

Table 4.2 presents the level of knowledge of standard precautions against infections among undergraduate nursing students (n = 246) and demonstrates generally good understanding across all assessed domains.

When asked which measures comprise standard precautions, the vast majority correctly identified "All of the above" (hand hygiene, PPE use, safe injection practices, and equipment sterilization) with 78.0% selecting this option, while smaller proportions chose individual components only (hand hygiene 4.9%, PPE 7.3%, safe injection 4.1%, sterilization 5.7%).

Regarding the scope of standard precautions, 70.7% recognized that these precautions apply to all patients regardless of diagnosis, whereas 8.1% mistakenly thought they protect against airborne infections only, and 13.0% believed they cover bloodborne pathogens only. This item yielded a mean score of 1.7 (on a scale where lower is better) and was graded as "Good." On the timing of glove use, two-thirds (67.1%) correctly indicated that gloves should be worn whenever touching any patient or their environment; however, 11.4% restricted glove use to handling blood/body fluids and another 12.6% to surgeries only. This question also produced a mean of 1.7 ("Good"). For the correct donning sequence of PPE, 64.2% chose the proper order (gown, mask, gloves), while 8.5% reversed gloves and mask, 14.2% gown then gloves then mask, and 13.0% mask first. The mean score here was 1.6, again falling within the "Good" range. Hand hygiene frequency was best answered by 74.0% of respondents, who knew that hands must be cleaned before and after patient contact and after touching contaminated objects; only 7.3% limited washing to after handling blood/body fluids, 11.0% washed just at shift start, and 7.7% only when visibly soiled (mean = 1.7, "Good"). Finally, when asked the overarching purpose of standard precautions, 77.2% correctly acknowledged that they serve to both prevent infection spread and protect healthcare workers, with smaller percentages thinking the aim was solely infection prevention (11.4%) or only protecting workers (8.5%). This item achieved the highest mean of 1.8 ("Good"). Overall, the grand mean knowledge score of 1.7 indicates that undergraduate nursing students at the

University of Benin possess a generally good level of knowledge regarding standard precautions.

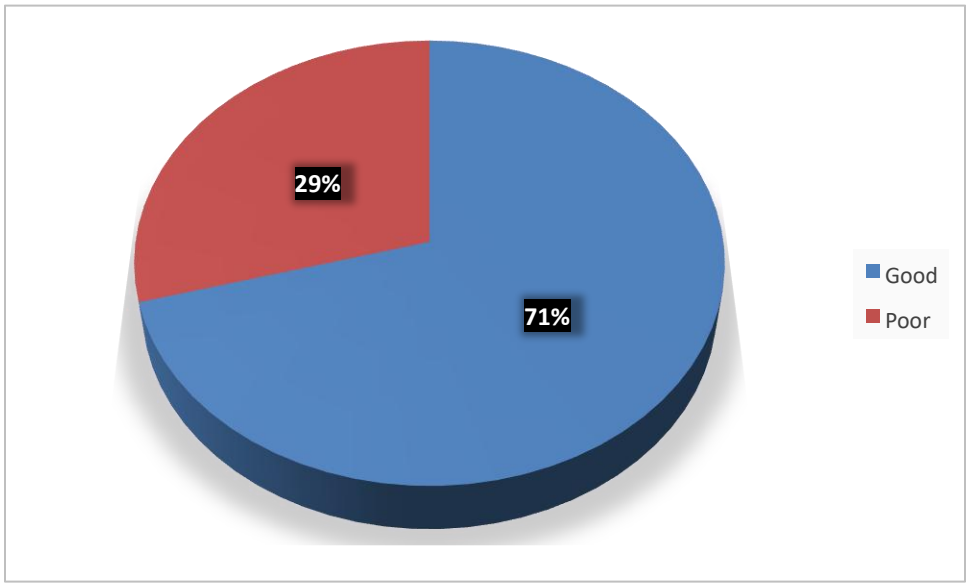

Figure 4.1: Pie chart showing the Knowledge of Standard Precautions

Figure 4.1 illustrates the overall knowledge of standard precautions against infections among undergraduate nursing students. The chart shows that 174(70.7) of the students demonstrated a good level of knowledge, while 72(29.3) had poor knowledge. This indicates that the majority of students possess a satisfactory understanding of standard precautions, although nearly one-third may require further education and reinforcement in this area.

Research Question 2: What is the level of compliance with standard precautions against infections among undergraduate nursing students at the University of Benin during clinical practices?

Items	Always	Often	Rarely	Never	Mean	Remark
wash my hands or use hand sanitizer before and after patient care	(53.7)	(31.7)	(10.2)	(4.5)	3.3	High
wear gloves when required (e.g., during procedures involving blood or bodily fluids).	(59.0)	(24.4)	(11.4)	(5.3)	3.4	High
dispose of used needles and sharps in the appropriate containers.	(63.0)	(21.1)	(9.3)	(6.5)	3.4	High
wear a mask when performing procedures that may generate splashes or droplets.	(40.7)	(32.5)	(16.3)	(10.6)	3.0	High
wear protective gowns when necessary, during patient care or procedures.	(37.4)	(31.3)	(20.7)	(10.6)	3.0	High
ensure that patients and their surroundings are kept clean and free from contamination.	(48.8)	(33.3)	(12.2)	(5.7)	3.3	High
report breaches in standard precautions (e.g., needlestick injuries, equipment failures).	(32.5)	(30.5)	(24.4)	(12.6)	2.8	High
				Grand Mean	**3.1**	**High**

Table 4.3: The Compliance with Standard Precautions

Mean cut-off = 2.5

Table 4.2 present the level of compliance with standard precautions against infections among undergraduate nursing students at the University of Benin during clinical practices. The data reveals a generally high adherence across all measured items based on a Likert scale. The highest mean compliance was observed in the disposal of used needles and sharps in appropriate

containers and the use of gloves when required, both with a mean score of 3.4. This was followed by hand hygiene before and after patient care and ensuring cleanliness of patient surroundings, each with a mean of 3.3. Wearing masks and protective gowns during procedures had a slightly lower mean of 3.0, while the lowest compliance was in reporting breaches in standard precautions, with a mean of 2.8. Despite this variation, all items recorded mean scores above the cut-off point of 2.5, resulting in a grand mean of 3.1, indicating an overall high level of compliance among the students.

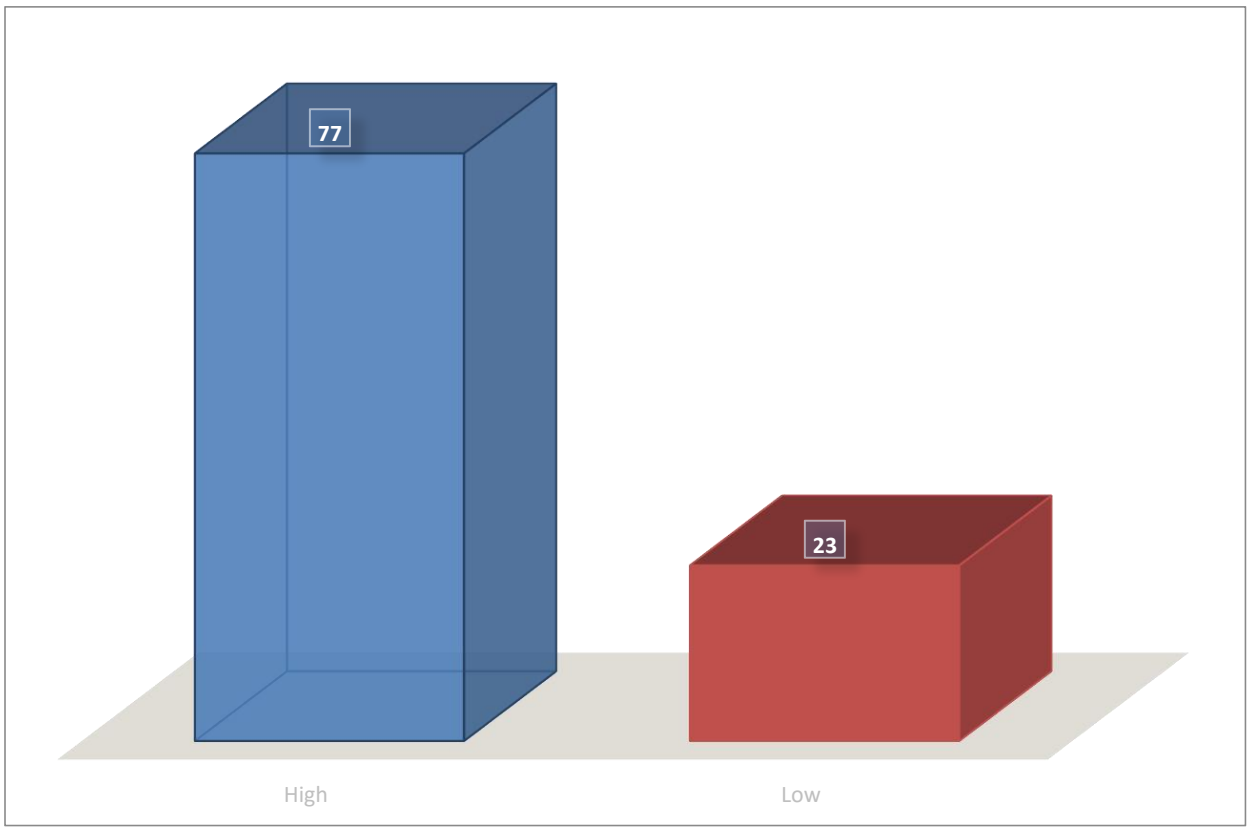

Figure 4.2: Bar chart showing the Compliance with Standard Precautions

Figure 4.2 illustrates the level of compliance with standard precautions against infections among undergraduate nursing students. The chart reveals that 190(77) of the students demonstrated high compliance, while 56(23) showed low compliance. This indicates that the majority of students

adhere well to standard precautions during clinical practice, though a notable minority may benefit from further training and supervision.

Items	Strongly Agree	Agree	Disagree	Strongly Disagree	Mean	Remark
There is often a lack of personal protective equipment (PPE) in clinical settings.	(44.7)	(34.6)	(12.2)	(8.5)	3.2	Barrier
The clinical environment is sometimes too rushed, leading to neglecting standard precautions.	(40.7)	(36.6)	(13.8)	(8.9)	3.1	Barrier
feel confident in my ability to adhere to standard precautions during clinical practice.	(24.4)	(40.7)	(24.4)	(10.6)	2.8	Barrier
Lack of supervision or feedback on infection control practices affects my adherence to standard precautions.	(38.6)	(36.6)	(16.3)	(8.5)	3.1	Barrier
There is insufficient education or training on standard precautions during the nursing program.	(34.6)	(32.5)	(20.3)	(12.6)	2.9	Barrier
				Grand Mean	**3.0**	Barrier

Table 4.4: The Barriers to Compliance with Standard Precautions

Research Question 3: What are the barriers to the compliance with standard precautions against infections among nursing students at University of Benin?

Mean cut-off = 2.5

Table 4.4 analysis on the barriers to compliance with standard precautions against infections among nursing students at the University of Benin, based on a Likert scale (1–4) with a mean cutoff of 2.5, reveals a grand mean of 3.0, indicating that all listed items are perceived as significant barriers. The highest-rated barrier, with a mean score of 3.2, was “There is often a lack of personal protective equipment (PPE) in clinical settings,” highlighting resource limitations as a major challenge. This was followed by “The clinical environment is sometimes too rushed, leading to neglecting standard precautions” and “Lack of supervision or feedback on infection control practices affects my adherence to standard precautions,” both with mean scores of 3.1, indicating operational and supervisory issues. “There is insufficient education or training on standard precautions during the nursing program” had a mean of 2.9, while “I feel confident in my ability to adhere to standard precautions during clinical practice” scored the lowest at 2.8, yet still qualified as a barrier. These findings underscore the need for improved resource provision, clinical supervision, and training to enhance compliance with standard precautions among nursing students.

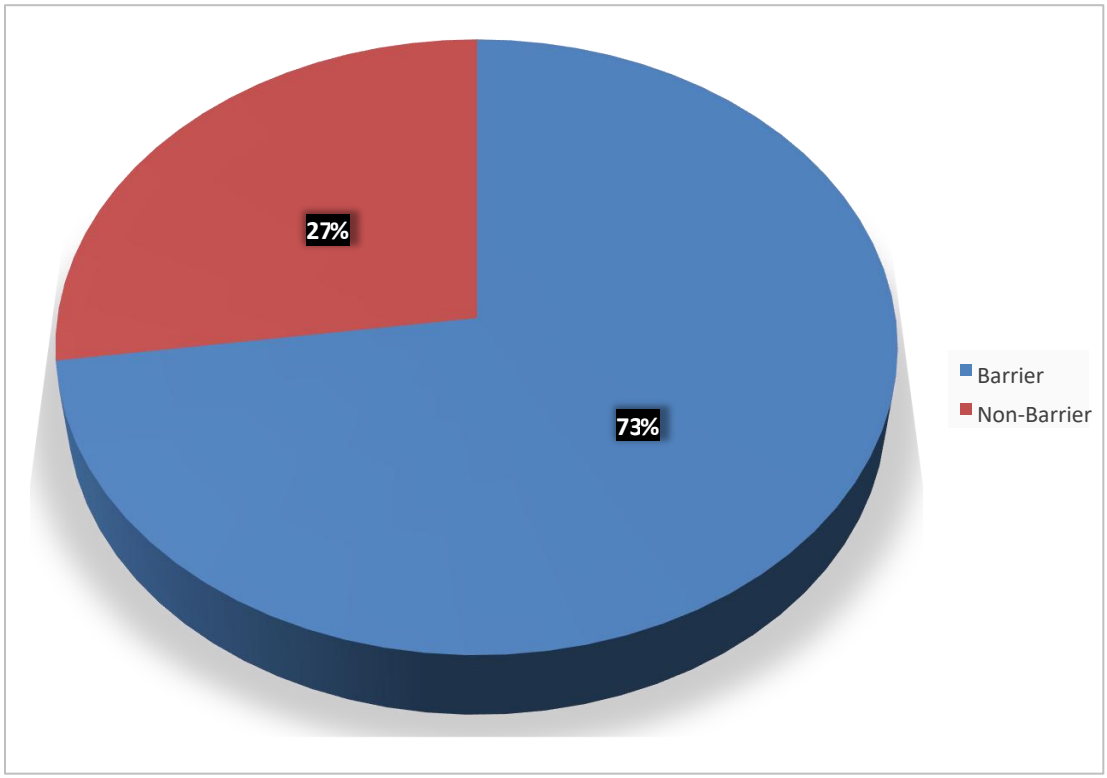

Figure 4.3: Pie chart showing the barriers to Compliance with Standard Precautions Figure 4.1 presents the barriers to compliance with standard precautions against infections among undergraduate nursing students. It shows that 179(72.8) of the respondents identified the presence of barriers, while only 67(27.2) reported no barriers. This indicates that a majority of students experience challenges that may hinder full adherence to standard precautionary measures during clinical practice.

Hypothesis Testing

There is no significant relationship between the knowledge of standard precautions and the compliance among undergraduate nursing students in the University of Benin. **Table 4.5: Relationship between the level of knowledge standard precautions and the compliance among undergraduate nursing students**

Compliance	Knowledge		Test Statistics (χ^2)	df	P value	Decision
	Good	**Poor**				
High	174(70.7)	72(29.3)	2.703297	1	0.100141	**Accepted**
Low	190(77.2)	56(22.8)				

Table 4.5 shows no significant relationship between undergraduate nursing students' level of knowledge and their compliance with standard precautions, with a chi-square value of 2.703, degrees of freedom (df) = 1, and a p-value of 0.100. Among those with high compliance, 70.7% had good knowledge while 29.3% had poor knowledge. Conversely, among those with low compliance, 77.2% had good knowledge and 22.8% had poor knowledge. The null hypothesis was accepted, indicating that there is no statistically significant association between knowledge level and compliance.

CHAPTER FIVE

DISCUSSION OF FINDINGS

This chapter discusses the major findings of the research compared with the literature reviewed, the implication for nursing, summary, conclusion, Recommendations and Suggestions for further Studies.

5.1. Discussion of major Findings

The study discusses the assessment of the Knowledge and Compliance with Standard Precautions Against Infections Among Undergraduate Nursing Students of University of Benin, Benin City**.** The socio-demographic characteristics of the study participants reveal important insights about the sample population and align with several findings from previous research in the field. The age distribution shows that the majority of respondents (41.5%) were between 21-23 years, followed by 24-26 years (25.6%), with smaller proportions in the 18-20 years (23.6%) and 27 years and above (9.3%) categories. This age distribution is comparable to Nalunkuma et al.'s (2021) study, which reported a mean age of 24.43 years among health professional students. Gender distribution indicates a predominance of female students (70.7%) compared to male students (29.3%). This finding differs from Nalunkuma et al.'s (2021) study, which reported a male majority (63.37%), but aligns more closely with traditional nursing demographics. The gender disparity observed here reflects the general trend in nursing education, as noted in El-Saaidi et al.'s (2021) study, which found that female students often demonstrated better infection control practices. The distribution across academic years shows a relatively balanced representation: 3rd year students constituted the largest group (29.3%), followed by 4th year (26.8%), 2nd year (24.4%), and 5th year (19.5%).

This distribution enables meaningful comparison with studies like Livshiz-Riven, Hurvitz, and Tomer's (2022) research, which found that students in different years exhibited distinct patterns of knowledge and behavior regarding standard precautions. A significant majority of respondents (80.5%) reported receiving formal training in infection control or standard precautions, while 19.5% had not. This high percentage of trained students aligns with Joseph et al.'s (2024) findings, where 72.5% of student nurses had received SP training. Similarly, clinical practice experience was reported by 87.8% of respondents, with only 12.2% lacking such exposure. This extensive clinical exposure is particularly relevant when considered alongside Anuar et al.'s (2021) findings, which emphasized the importance of practical training duration in improving SP compliance. The high proportion of students with both formal training and clinical experience suggests good preparation for infection control practices, similar to Wahab & Adie's (2021) study, which found associations between clinical posting experience and knowledge levels. However, as noted in Sharma & Bachani's (2023) research, such training does not always translate to optimal implementation of standard precautions, highlighting the need to examine other factors affecting compliance. These demographic characteristics provide important context for understanding the study's findings regarding knowledge, compliance, and barriers to standard precautions implementation. The sample's diverse representation across academic years and high proportion of trained students suggests that the findings offer valuable insights into SP practices among nursing students at different stages of their education.

The Knowledge of Standard Precautions

The findings revealed a predominantly positive trend, with 70.7% of students demonstrating good knowledge while 29.3% showed poor knowledge. These findings align with several recent studies in the field, particularly Lopes et al. (2023), who similarly found satisfactory knowledge

levels among nursing students with scores exceeding half of the maximum possible score. A detailed analysis of specific knowledge components showed that 78% of students correctly identified all elements of standard precautions, including hand hygiene, PPE use, safe injection practices, and equipment sterilization. This comprehensive understanding aligns with the findings of Mohammedi & Landelle (2023), who reported moderate to good knowledge levels among nursing students in their literature review. However, similar to Sharma & Bachani's (2023) observations, there remains a potential gap between theoretical knowledge and practical implementation that requires attention. The study revealed that 70.7% of students correctly understood that SPs apply to all patients regardless of diagnosis. This finding presents a more positive picture compared to Ankita & Ipsa's (2021) study, where a concerning 23.2% of students incorrectly believed SPs should only be applied to patients with diagnosed infections. Regarding specific SP components, 67.1% correctly identified appropriate glove usage scenarios, 74% demonstrated proper understanding of hand hygiene timing, and 64.2% knew the correct sequence for donning PPE. While these results are comparable to Wahab & Adie's (2021) findings of high knowledge levels (90.9%) among Malaysian nursing students, they exceed the findings of El-Saaidi et al. (2021), who reported notably lower infection control knowledge among dental students. The overall good knowledge level (grand mean of 1.7) suggests effective educational strategies, though the presence of knowledge gaps among 29.3% of students indicates room for improvement. These findings reinforce Nalunkuma et al.'s (2021) observation that knowledge tends to improve in later years of study, suggesting the importance of strong foundational education with continuous reinforcement throughout the nursing program. The results also support Ayele et al.'s (2022) recommendations for enhancing SP knowledge through regular training programs and consistent reinforcement of infection prevention practices.

Compliance with Standard Precautions

The findings reveal 77% of the respondents demonstrating high compliance. This finding aligns with Wahab & Adie's (2021) study, which reported high compliance rates (91.8%) among Malaysian nursing students. However, it contrasts with Joseph et al.'s (2024) findings in Nigeria, where only 40% of students showed adequate adherence despite good knowledge levels. Looking at specific SP components, the highest compliance was observed in sharps disposal (63% "always" compliant) and glove usage (59% "always" compliant). This finding parallels Lopes et al.'s (2023) study, which identified glove use during procedures involving potentially contaminated biological material as one of the most commonly adopted measures. Hand hygiene compliance was also notably high, with 53.7% of students reporting consistent practice before and after patient care. This finding supports Anuar et al.'s (2021) results, which showed high hand hygiene compliance among both diploma and degree nursing students, particularly after contact with potentially contaminated substances. However, lower compliance rates were observed in areas such as reporting breaches in standard precautions (32.5% "always" compliant) and wearing protective gowns (37.4% "always" compliant). This mirrors findings from Ayele et al.'s (2022) Ethiopian study, where only 56.3% of students exhibited good overall compliance with SPs. The use of masks during procedures that may generate splashes showed moderate compliance (40.7% "always" compliant). This finding is particularly relevant when considered alongside Bouchoucha et al.'s

(2021) Australian study, which found that personal protective equipment use ranged from 69% to 83%. Environmental cleanliness maintenance showed strong compliance (48.8% "always" compliant), suggesting good awareness of the broader aspects of infection control. This aligns with Livshiz-Riven, Hurvitz, and Tomer's (2022) findings regarding students' understanding of

decontamination practices. The 23% of students showing low compliance raises concerns similar to those identified in van Gulik et al.'s (2021) Thai study, where suboptimal adherence to critical infection control measures was observed. This suggests a need for targeted interventions to improve compliance among this subset of students. These findings underscore the importance of continuous reinforcement of SP practices throughout nursing education, as supported by multiple studies in the literature review. The results also highlight areas requiring additional attention in training programs, particularly in reporting breaches and consistent use of protective equipment.

The Barriers to Compliance with Standard Precautions

The findings of the study reveal that a significant majority (72.8%) of undergraduate nursing students at the University of Benin face barriers to compliance with standard precautions (SPs). This finding aligns with the challenges identified in Hamed et al.'s (2021) Canadian study, which highlighted multiple obstacles to infection control practices among nursing students. Resource limitations emerged as a primary barrier, with 79.3% of respondents (44.7% strongly agree, 34.6% agree) reporting inadequate availability of personal protective equipment (PPE). This finding resonates with Sharma & Bachani's (2023) study in Central India, which identified poor access to PPE as a significant obstacle to SP compliance. Time pressure in clinical settings was identified as another major barrier, with 77.3% of students (40.7% strongly agree, 36.6% agree) indicating that rushed environments lead to SP neglect. This mirrors van Gulik et al.'s (2021) findings in Thailand, where workload pressures were found to compromise adherence to infection control measures. Regarding confidence in SP adherence, 65.1% of students (24.4% strongly agree,

40.7% agree) expressed concerns about their ability to maintain compliance. This finding parallels Getachew et al.'s (2022) Ethiopian study, which emphasized the relationship between

perceived self-efficacy and SP compliance. Supervision and feedback issues were reported by 75.2% of respondents (38.6% strongly agree, 36.6% agree) as affecting their adherence. This aligns with Bouchoucha et al.'s (2021) Australian research, which highlighted the critical role of leadership and contextual cues in promoting SP compliance. Educational gaps were identified by 67.1% of students (34.6% strongly agree, 32.5% agree) as a barrier, suggesting insufficient training during their nursing program. This finding corresponds with Park et al.'s (2021) study, which emphasized the importance of comprehensive education in improving SP awareness and compliance. The overall mean score of 3.0 indicates that these barriers significantly impact students' ability to maintain consistent SP compliance. This comprehensive barrier assessment aligns with Joseph et al.'s (2024) Nigerian study, which demonstrated how multiple factors can create a gap between knowledge and actual practice of SPs. These findings underscore the need for multi-faceted interventions to address barriers to SP compliance, as suggested by Bouchoucha et al.'s (2021) validation study of the FIASP-SV tool. The results indicate that improvements in resource availability, time management, supervision, and education are crucial for enhancing SP compliance among nursing students.

5.2 Implication to nurses

The findings of this study have several important implications for nursing practice, particularly regarding the adherence to standard precautions (SPs) as a key component of infection prevention and control. Firstly, the high level of knowledge observed among the majority of undergraduate nursing students suggests that foundational nursing education is effectively conveying the theoretical aspects of standard precautions. However, the gap between knowledge and actual compliance, as evidenced by the 23% of students with low adherence levels,

highlights the need for nurses both in training and in practice to place greater emphasis on translating theoretical knowledge into consistent clinical behavior.

For practicing nurses, the results underscore the importance of serving as role models and mentors to student nurses. Experienced nurses must demonstrate high standards of SP adherence in clinical settings, thereby reinforcing proper practices through observation and guided participation. This is particularly critical in environments where resource limitations and time pressures challenge consistent SP application. Nurses must advocate for safe staffing levels and adequate provision of personal protective equipment (PPE), recognizing that their ability to comply with SPs directly influences both patient safety and their own well-being.

The study also emphasizes the role of continuing education and institutional support. Nurses need to engage in regular training updates to refresh and deepen their understanding of infection control measures. Hospital administrators and nursing leaders should facilitate ongoing professional development and implement supportive supervision mechanisms that provide constructive feedback and encourage adherence to safety protocols.

Furthermore, the findings on barriers such as inadequate supervision, limited resources, and lack of confidence in maintaining compliance point to systemic challenges that require collaborative solutions. Nurses must be proactive in identifying these issues and participating in quality improvement initiatives aimed at strengthening infection control practices. Ultimately, the study calls for a culture of safety in nursing environments—one that prioritizes standard precautions not as optional guidelines but as essential, life-saving practices embedded in everyday patient care.

5.3 Summary

This study assessed the knowledge and compliance with standard precautions against infections among undergraduate nursing students at the University of Benin, Benin City. The findings revealed that a majority of the students possessed good knowledge of standard precautions, indicating that infection prevention concepts are well-integrated into their academic curriculum. However, despite this high level of knowledge, compliance with standard precautions was moderate, with a significant number of students failing to consistently apply these practices in clinical settings.

The study further identified key barriers to compliance, including lack of resources such as personal protective equipment (PPE), inadequate supervision, and limited opportunities for handson practice. These challenges suggest that institutional and systemic factors play a significant role in influencing the ability of student nurses to adhere to safety protocols.

Overall, the study highlights the critical need for improved strategies to bridge the gap between knowledge and practice. Strengthening mentorship, ensuring resource availability, and reinforcing infection control measures through continuous training and supportive supervision are essential steps toward enhancing compliance. The findings underscore the importance of fostering a safety culture within healthcare environments to protect both patients and healthcare workers from preventable infections.

5.4 Conclusion

In conclusion, this study has shown that while undergraduate nursing students at the University of Benin demonstrate a high level of knowledge regarding standard precautions, their compliance in clinical practice remains suboptimal. This discrepancy highlights the gap between theoretical

knowledge and practical application, influenced by various barriers such as lack of adequate personal protective equipment, insufficient supervision, and limited practical exposure.

To address this issue, there is a pressing need for healthcare institutions and nursing training programs to implement targeted interventions that reinforce the importance of infection prevention practices. These should include regular training, provision of necessary materials, supportive supervision, and the creation of an enabling clinical environment. By doing so, both patient safety and the protection of healthcare workers can be significantly improved, ultimately enhancing the quality of healthcare delivery.

5.5 Limitations of study

Despite the relevance of the findings, this study is not without limitations. Firstly, the study was limited to undergraduate nursing students at the University of Benin, which may restrict the generalizability of the results to nursing students in other institutions or regions.

Secondly, the use of a self-administered questionnaire may have introduced response bias, as participants might have provided socially desirable answers rather than reflecting their actual practices and perceptions.

5.6 Recommendations

Based on the findings of this study on the assessment of knowledge and compliance with standard precautions against infections among undergraduate nursing students of the University of Benin, the following recommendations are made:

- Nursing institutions should incorporate more practical and interactive sessions on standard precautions into the curriculum. Regular workshops and refresher training

programs should be organized to reinforce knowledge and proper application of standard precautions.

- Clinical instructors and ward supervisors should actively monitor students during clinical postings to ensure compliance with infection control practices. Constructive feedback should be provided regularly.
- The management of health institutions should ensure that standard precaution materials such as gloves, hand sanitizers, personal protective equipment (PPE), and proper waste disposal facilities are readily available and accessible to nursing students during clinical practice.
- Institutional efforts should be made to address the common barriers to compliance, such as inadequate supply of protective equipment and poor supervision. Policies that promote a safe and supportive clinical environment should be strengthened.
- Awareness campaigns and peer-led initiatives should be promoted to encourage a positive attitude toward adherence to standard precautions. Emphasis should be placed on the importance of protecting oneself and others from healthcare-associated infections.

5.7 Suggestion for Further study

This study provides valuable insights into the knowledge and compliance with standard precautions against infections among undergraduate nursing students; however, it also highlights areas that warrant further investigation. Future studies could explore the following:

- Conducting comparative research involving multiple nursing schools or universities could help identify institutional differences in training, supervision, and resource availability, which may influence compliance levels.

- A longitudinal approach could assess how knowledge and compliance with standard precautions evolve as students' progress through their training and transition into professional practice.
- Future research could evaluate the effectiveness of targeted interventions such as simulation-based training, e-learning modules, or peer mentoring on improving knowledge and compliance with standard precautions.
- Employing qualitative methods such as interviews or focus group discussions would provide deeper insight into students' personal experiences, perceptions, and the sociocultural factors influencing adherence to standard precautions.
- Further studies could investigate how specific clinical settings (e.g., surgical wards, emergency units) and institutional policies impact students' ability and motivation to adhere to infection control practices.

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APPENDIX 1

QUESTIONNAIRE

Dear Correspondent,

I am **AKINTOMIDE MOTUNRAYO AYOMIPOSI**; a 500L student in the above-named institution and I invite you to take part in this research study, which aims to explore, "**The knowledge and compliance with standard precautions against infections among nursing students in a tertiary institution"**. This study will contribute to evidence-based practice by identifying factors impacting compliance and areas for training development, bridging the gap between theoretical knowledge, practical application and fostering a culture of safety in healthcare settings.

Your participation in this study is completely voluntary. You are free to withdraw at any point during the questionnaire without any consequences. All information you provide will remain confidential and anonymous. This will take approximately 3-5 minutes of your time

Section A: Demographic Information

Please provide the following demographic information:

1. Age: ☐ 18-20 years ☐ 21-23 years ☐ 24-26 years ☐ 27 years and above
2. Gender: ☐ Male ☐ Female
3. Year of Study: ☐ 2nd year ☐ 3rd year ☐ 4th year ☐ 5th year
4. Have you received formal training in infection control or standard precautions?

   ☐ Yes ☐ No
5. Have you participated in any clinical practice or internships?

☐ Yes ☐ No

Section B: Knowledge of Standard Precautions

This section aims to assess your understanding of standard precautions. Please indicate your response to each statement.

1. Which of the following are part of the standard precautions for infection control? (Select all that apply) ☐ Hand hygiene ☐ Use of personal protective equipment (PPE) like gloves, masks, and gowns ☐ Safe injection practices ☐ Sterilization of equipment ☐ All of the above

2. Standard precautions are designed to protect healthcare workers from: ☐ Airborne infections only ☐ Bloodborne pathogens only ☐ All patients, regardless of diagnosis ☐ Only patients with known infections
3. When should gloves be worn during patient care? ☐ Only when handling blood and body fluids ☐ When touching any patient or patient's environment ☐ Only during surgeries or invasive procedures ☐ Only when caring for patients diagnosed with infections
4. What is the correct sequence for donning personal protective equipment (PPE)? ☐ Gloves, mask, gown ☐ Gown, gloves, mask ☐ Gown, mask, gloves ☐ Mask, gown, gloves

5. How frequently should hands be washed or sanitized during patient care?

☐ Only after touching blood or body fluids ☐ Before and after patient contact, after touching contaminated objects ☐ Once at the beginning of a shift ☐ When visibly dirty only

6. The purpose of standard precautions is to: ☐ Prevent the spread of infections ☐ Protect the patient only ☐ Protect healthcare workers only ☐ Both protect patients and healthcare workers

Section C: Compliance with Standard Precautions

This section assesses your personal practice and adherence to standard precautions. Please indicate how often you perform the following actions using the scale provided.

Use the following scale to answer the questions:

Items	Always	Often	Rarely	Never
I wash my hands or use hand sanitizer before and after patient care.				
I wear gloves when required (e.g., during procedures involving blood or bodily fluids).				
I dispose of used needles and sharps in the appropriate containers.				
I wear a mask when performing procedures that may generate splashes or droplets.				
I wear protective gowns when necessary during patient care or procedures.				
I wear protective gowns when necessary during patient care or procedures.				
I ensure that patients and their surroundings are kept clean and free from contamination.				
I report breaches in standard precautions (e.g., needlestick injuries, equipment failures).				

Section D: Barriers to Compliance with Standard Precautions

Please indicate the extent to which you agree with the following statements. Use the scale below to answer.

Strongly Agree = 4, Agree = 3, Disagree = 2, Strongly Disagree = 1

Items	Strongly Agree	Agree	Disagree	Strongly Disagree
There is often a lack of personal protective equipment (PPE) in clinical settings.				
The clinical environment is sometimes too rushed, leading to neglecting standard precautions.				
I feel confident in my ability to adhere to standard precautions during clinical practice.				
Lack of supervision or feedback on infection control practices affects my adherence to standard precautions. There is insufficient education or training on standard precautions during the nursing program.				

RELIABILITY OF INSTRUMENT

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No. of Items
0.71	0.70	30

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Which of the following are part of the standard precautions for infection control?	53.4931	15.077	-.047	.701
Standard precautions are designed to protect healthcare workers from:	54.1111	15.302	.204	.210
When should gloves be worn during patient care?	53.4167	15.126	-.061	.185
What is the correct sequence for donning personal protective equipment (PPE)?	87.3188	27.590	-.123	.099
How frequently should hands be washed or sanitized during patient care?	87.4813	26.138	.053	.092
The purpose of standard precautions is to:	53.4931	15.077	-.047	.565
I wash my hands or use hand sanitizer before and after patient care.	53.2986	14.141	.055	.196
I wear gloves when required (e.g., during procedures involving blood or bodily fluids).	87.3188	27.590	-.123	.099
I dispose of used needles and sharps in the appropriate containers.	87.3188	27.590	-.123	.099
I wear a mask when performing procedures that may generate splashes or droplets.	87.4813	26.138	.053	.092
I wear protective gowns when necessary during patient care or procedures.	53.4931	15.077	-.047	.165
I ensure that patients and their surroundings are kept clean and free from contamination.	87.2313	27.034	-.044	.078
I report breaches in standard precautions (e.g., needlestick injuries, equipment failures).	87.3188	27.590	-.123	.099
There is often a lack of personal protective equipment (PPE) in clinical settings.	87.3188	27.590	-.123	.099
The clinical environment is sometimes too rushed, leading to neglecting standard precautions.	87.4813	26.138	.053	.092
I feel confident in my ability to adhere to standard precautions during clinical practice.	53.4931	15.077	-.047	.165
Lack of supervision or feedback on infection control practices affects my adherence to standard precautions.	87.4500	25.582	.125	.071
There is insufficient education or training on standard precautions during the nursing program.	87.3188	27.590	-.123	.099

Comment: The reliability analysis using Cronbach's Alpha, yielding a result of 0.71, for the overall scale. Additionally, the Cronbach's Alpha of 0.52 when the items are standardized. These values suggest a good level of internal consistency among the items in this scale.