**Original Research Article**

**Compliance with universal standard precautions and perceived influencing factors among nurses in a tertiary institution in Edo State.**

**Abstract**

***Background:*** *Standard precautions are meant to reduce the risk of transmission of pathogens from both recognized and unrecognized sources.*

***Objective****: This study assessed compliance with universal standard precautions among nurses at the University of Benin Teaching Hospital(UBTH), Benin city and identified influencing factors.*

***Methods:*** *A descriptive survey was conducted among 257 nurses selected using random sampling across six wards at UBTH (response rate:90%). Data was collected using a validated self-structured questionnaire (reliability: 0.81). Descriptive statistics were used to analyze the data.*

***Result:*** *Nurses demonstrated a moderate level of knowledge (mean correct response:74.3%) and generally good compliance with universal standard precautions. However, non-compliance was noted in practices such as shaking linens. Key influencing factors included unavailability of personal preventive equipment (PPE), hospital policies, years of practice and nurses’ attitudes.*

***Conclusion:*** *This study revealed that nurses at UBTH have moderate knowledge and good overall compliance with universal standard precautions among nurses at UBTH, with several modifiable institutional and attitudinal barriers affecting compliance.*

**KEY WORDS:** compliance, universal standard precaution, knowledge, nurses, infection control.

**Background**

Standard precautions aim to reduce the transmission risk of pathogens from both recognized and unrecognized sources, forming basic infection control measures in patient care. The Centers for Disease Control (CDC) recommends their consistent use for all patients, regardless of their known infection status1. Adherence to these precautions is crucial in reducing hospital-associated infections, as compliance minimizes exposure to blood and body fluid microorganisms.2 The term “standard precautions” has evolved from “universal precautions,” expanding the scope to include all body fluids that might contain harmful microorganisms.3–7

The CDC advises standard precautions such as hand washing, the use of protective barriers (gloves, gowns, and face shields), the proper disposal of sharps, and health care workers' immunization to prevent infection transmission. These measures are vital for doctors, nurses, patients and healthcare support staff who interact with patients or body fluids. Additionally, injury prevention from sharp objects is emphasized.6–9

Hospital-acquired infections are a significant global health concern, causing morbidity, mortality, and increased healthcare costs. Nurses are particularly at risk of needle-stick injuries and blood-borne pathogens due to their frequent contact with patient.7 Despite detailed guidelines and training, compliance with standard precautions varies among nurses globally, leading to insufficient infection control practices. Approximately three million nurses worldwide face percutaneous exposure to blood-borne pathogens annually, highlighting the importance of adhering to universal precautions.5

Nurses, the largest group of healthcare workers, play a pivotal role in infection control because of their extensive patient contact.6 Their exposure to blood-borne infections from pathogens such as HIV, hepatitis B, and hepatitis C underscores the need for stringent compliance with standard precautions to protect themselves, their families, and patients.9–11

This study aims to assess nurses' compliance with standard precautions in a tertiary hospital in Benin city, identify high exposure risk, and identify factors that influence compliance with universal standard precautions and varying compliance levels reported worldwide,4,12–15. Improved compliance can significantly reduce nosocomial infection burdens and increase patient care quality.

**Methods**

**Study design**

This research utilized a survey design, specifically a descriptive survey,

**Study population**

It was conducted among nurses at the University of Benin Teaching Hospital (UBTH) in Benin city, Edo State.

**Study area**

UBTH, established in 1973, is a tertiary healthcare facility associated with the University of Benin that provides secondary and tertiary care, training for healthcare professionals, and research opportunities16. The target population comprised 720 nurses employed at UBTH. The hospital has 23 units, including four for maternal and child healthcare, with a total of 620 bed spaces and 451 nurse-midwives.
**Sample size determination**

The sample size was determined via Taro Yamane's formula17,

n = $\frac{N}{1+N(e)2}$

 n = sample size to be calculated

N =Total number of nurses in UBTH

e = margin of error (usually 5% or 0.05)

n $=\frac{720}{1+720(0.05)^{2}}$ = 257

Adjusting for a 10% non-response rate: $\frac{N}{1−0.10}$ = $\frac{257}{1−0.10}$ = 286

Resulting in a sample size of 286 nurses.

**Sampling techniques**

The wards were selected via a simple random sampling method and nurses were chosen through convenience sampling.

**Instrument for data collection**

A self-constructed questionnaire was the primary data collection instrument, developed specifically for this study and was divided into four sections: demographic data, knowledge of universal standard precautions, compliance with these precautions and factors influencing compliance.

**Reliability of the Instrument**

The reliability of the questionnaire was confirmed through a pilot study with 26 nurses from Central Hospital, Benin city, using the Cronbach’s alpha reliability technique18, which yielded a coefficient of 0.81. The validity of the instrument was ensured through expert judgement.

**Data analysis**

Data collection involved administering questionnaires to nurses at UBTH. The collected data were collated and entered into a Microsoft Excel spreadsheet and then analyzed via the Statistical Package for Social Sciences (SPSS) version 23.016. Both descriptive and inferential statistical analyses were employed, with chi-square tests used to assess data significance (P values < 0.05 were considered significant). McDonald’s standard of learning outcome measurement criteria was used to categorize nurses’ knowledge19. The criterion was divided into five categories: very low (˂60%), low (60%–69.99%), moderate (70%–79.99%), high (80%–89.99%), and very high (90%–100%).

**Ethical consideration**

Ethical approval for the study was obtained from the ethical committee of UBTH with Protocol number:ADM/E22/A/VOL.VII/14831137. Permission was also secured from the ethical review board of the University of Benin Teaching Hospital (UBTH) management. Informed consent was obtained from all participants after the study's objectives were explained. Confidentiality and anonymity were maintained throughout the study, ensuring that participants' personal information remained protected.

**Results**

A total of 286 questionnaires distributed to the respondents and only 257 were duly filled out and returned, which was a 90% response rate.

Table 1 shows that 58 (22.5%) of the respondents were between 31 and 35 years old. In terms of academic qualifications, 27 (10.5%) of the respondents had RNs, 50 (19.5%) had RNs and RMs, 100 (38.9%) had BNscs, 70 (27.2%) had M. NSc, while 10 (3.9%) had PhDs. The distribution of the respondents in terms of years of practice revealed that 50 (19.5%) had practised for 1--5 years, 100 (38.9%) had practised for 6-10 years, 70 (27.2%) had practised for 11--15 years, 27 (10.5%) had practised for 16--20 years, and 10 (3.9%) had practised for 20 years or more.

**Table 1: Demographic information of the respondents**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Variables** | **Attributes** | **Frequency** | **Percent (%)** |
|  1. | **Age** | 21-25 years | 27 | 10.5 |
|   |   | 26-30 years | 50 | 19.5 |
|   |   | 31-35 years | 58 | 22.5 |
|   |   | 36 – 40years | 52 | 20.2 |
|   |   | 41 – 45 years | 30 | 11.7 |
|   |   | 46 – 50 years | 20 | 07.8 |
|   |   | 51 years and above | 20 | 07.8 |
|  2 | **Academic****Qualification** | RN | 27 | 10.5 |
|   |   | RN & RM | 50 | 19.5 |
|   |   | BNsc | 100 | 38.9 |
|   |   | M.Nsc | 70 | 27.2 |
|   |   | PhD | 10 | 3.9 |
|  3 |  **Marital Status** | Single | 77 | 30 |
|   |   | Married | 150 | 58.4 |
|   |   | Divorced | 20 | 7.8 |
|   |   | Widowed | 10 | 3.9 |
|  4 |  **Years of practice** | 1 – 5 years | 50 | 19.5 |
|   |   | 6 – 10 years | 100 | 38.9 |
|   |   | 11-15 years | 70 | 27.2 |
|   |   | 16-20 years | 27 | 10.5 |
|   |   | 20 years and above | 10 | 3.9 |

As shown in Table 2 above, the majority (206, 80.2%) of the respondents claimed to be familiar with the definition of nosocomial infection, whereas 51 (19.8%) of the respondents were not familiar with the definition of nosocomial infection in item 1. In response to item 2, 156 (60.7%) of the respondents indicated that nosocomial infections are not transmitted through direct contact, whereas 101 (39.3%) indicated otherwise. The majority of the respondents, representing 200 (77.8%), reported that body fluids are handled via gloved hands, whereas 57 (22.2%) reported otherwise. Similarly, the majority of the respondents reported correct responses to items 4, 5 and 6 in Table 2, whereas only a few had incorrect responses. The mean percentage of correctly answered items by the respondents computed in Table 2 was 191 (74.3%), and that of incorrectly answered questions was 66 (25.7%).

**Table 2: Respondents’ knowledge levels**

|  |  |  |  |
| --- | --- | --- | --- |
| **S/N** | **ITEMS** | **CORRECT RESPONSE** | **INCORRECT RESPONSE** |
|   |   | **n (%)** | **n (%)** |
| 1 | Nosocomial infection is infection that occurs during admission | 206 (80.2%) | 51 (19.8%) |
| 2 | Nosocomial infection are not transmitted through direct contact | 156 (60.7%) | 101 (39.3%) |
| 3 | Body fluids are handled using gloved hands | 200 (77.8%) | 57 (22.2%) |
| 4 | Needles should be recapped after use. | 210 (81.7%) | 47 (18.3%) |
| 5 | Personal protective equipment should be worn when handling bed linen. | 198 (77.0%) | 59 (23.0%) |
| 6 | When there is risk of splashes or spray of blood and body fluids, the nurse must wear mask, goggle and gown. | 180 (70.0%) | 77 (30.0%) |
|   | **Mean** | **191 (74.3%)** | **66 (25.7%)** |

 The mean percentages are compared with McDonald’s standard of learning outcome measurement criteria (Table 3). Therefore, 74.3% of the respondents who exhibited correct knowledge of universal standard precautions in comparison with the McDonald scale indicated a moderate level of knowledge regarding universal standard precautions. Therefore, the respondents can be said to have a moderate level of knowledge of universal standard precautions.

**Table 3 showing McDonald’s standard of learning outcome measurement criteria[**

Levels of knowledge​​​​ composite of scores (%)

Very low​​​​​ < 60%

Low​​​​​​​ 60–69.99%

Moderate​​​​​​ 70–79.99%

High​​​​​​​ 80–89.99%

Very high​​​​​​ 90–100%

Table 4 shows respondents’ responses regarding their compliance with universal standard precautions. From item 1 in Table 4 above, 196 (76.3%) of the respondents strongly agreed that they washed my hands or rub with alcohol-based solutions or other antiseptics before and after providing a nursing procedure, 31 (12.1%) agreed, 15 (5.8%) disagreed, and the remaining 15 (5.8%) strongly disagreed. The mean response of the respondents to item 1 is 3.59, which is more than the average of 2.50 for a 4-point Likert scale, hence indicating that the respondents generally agree with item 1, which states “I wash my hands or rub with alcohol-based solutions or other antiseptics before and after providing a nursing procedure”. Similarly, the mean responses from the respondents with respect to all the items except item 5 in Table 4 were found to be greater than 2.50, thus suggesting that the respondents generally agreed with the items in the table. The grand mean of the respondents’ responses was computed as 3.26, which is above the decision point of 2.50, thus indicating good compliance with universal standard precaution by the sampled nurses.

**Table 4: Compliance with universal standard precautions among nurses**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **S/N** | **ITEMS** | **SA** | **A** | **D** | **SD** | **Mean** | **Decision** |
| 1 | I wash my hands or rub with alcohol based solutions or other antiseptics before and after providing a nursing procedure. | 196**76.3%** | 31**12.1%** | 15**5.8%** | 15**5.8%** | 3.59 | compliance |
|  2 | I wash my hands before and after having direct contact with patient’s intact skin. | 200**77.8%** | 40 **15.6%** | 10 **3.9%** | 7 **2.7%** |  3.67 | compliance |
|  3 | I am less compliant with recommended guidelines for reducing transmission of nosocomial infection when workload increases or  in emergencies | 20**7.8%** | 30**11.7%** | 187**72.8%** | 20**7.8%** |  2.81 | compliance |
|  4 | I wash my hands after touching inanimate surfaces and objects in patient’s surroundings. | 196**76.3%** | 31**12.1%** | 15**5.8%** | 15**5.8%** |  3.59 | compliance |
| 5 | I shake linens out to release dust from the linen. | 20**7.8%** | 30**11.7%** | 187**72.8%** | 20**7.8%** |  2.19 | Non compliance |
|  6 | I always put on a mask and gown when performing invasive and body fluid procedures | 200**77.8%** | 40**15.6%** | 10**3.9%** | 7**2.7%** |  3.68  | compliance |
|  | **GRAND MEAN** | **3.26** |  |

SA- strongly agree, A-agree, D- disagree, SD-strongly disagree

The 6 items in Table 5 were constructed such that a high mean score of ≥ 2.50 indicates that the item in the table is a factor that influences compliance with universal standard precautions among nurses. The response to item 1 in Table 5 shows that 191 (74.3%) of the respondents strongly agreed that the unavailability of PPE is a factor that influences compliance with universal standard precautions, 36 (14.1%) agreed, 15 (5.8%) disagreed, and 15 (5.8%) strongly disagreed. The mean response of 3.57 indicates that the respondents generally believe that the unavailability of PPE is a factor that influences compliance with universal standard precautions. Similarly, the responses to items 2, 4, and 6 in Table 5 revealed that the mean responses to the items were all above 2.50, thus indicating that the respondents agreed with the items. Item 3 and 5 are not factors that influence compliance with universal standard precautions.

**Table 5: Perceived influencing factors influencing compliance with universal standard precautions**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S/N** | **ITEMS** | **SA** | **A** | **D** | **SD** | **Mean** |
| 1 | Unavailability of personal protective equipment influences practicing infection prevention and control | 191**74.3%** | 36**14.1%** | 15**5.8%** | 15**5.8%** | 3.57 |
| 2 | Hospital policies do not encourage practicing infection prevention strategies | 210 **81.7%** | 30 **11.7%** | 12 **4.7%** | 5 **1.9%** |  3.84 |
| 3 | Emergency situation often influences my use of personal protective equipment | 22**8.6%** | 30**11.7%** | 187**72.8%** | 18**7.0%** |  2.22 |
| 4 | Years of practice influences my practice of the use of Infection prevention and control strategies | 186**72.4%** | 41**16.0%** | 12**4.7%** | 18**7.0%** |  3.54 |
| 5 | Prompt supervision by infection control committee would encourage the use infection control measures. | 30**11.7%** | 40**15.6%** | 160**62.3%** | 27**10.5%** |  2.28 |
| 6 | Attitude of nurses towards infection prevention and control | 190**73.9%** | 50**19.5%** | 10**3.9%** | 7**2.7%** |  3.65 |

SA- strongly agree, A-agree, D- disagree, SD-strongly disagree

**Discussion**

The demographic data of this study revealed a diverse age distribution among the respondents, with 10.5% aged between 21 and 25 years, 19.5% between 26 and 30 years, 22.5% between 31 and 35 years, and 7.8% aged 51 years and above. This wide age range suggests that the findings reflect perspectives from both early-career and more experienced nurses. In terms of academic qualifications, 10.5% held Registered Nurse (RN) qualifications, 19.5% were both RNs and Registered Midwives (RMs), 38.9% had a Bachelor of Nursing Science (BNSc), 27.2% held a Master of Nursing Science (MNSc), and 3.9% had a Doctor of Philosophy (PhD). The high proportion of respondents with a BNSc or higher degree suggests a relatively well-educated sample, which may have positively influenced both knowledge and compliance levels. Marital status data showed that 30% of respondents were single, 58.4% married, 7.8% divorced, and 3.9% widowed. Regarding years of professional practice, 19.5% had 1–5 years, 38.9% had 6–10 years, 27.2% had 11–15 years, 10.5% had 16–20 years, and 3.9% had more than 20 years of experience.

The study revealed that 74.3% of respondents exhibited correct knowledge of universal standard precautions, reflecting a moderate level of awareness. This finding aligns with previous studies by Abdulraheem et al. and Ogbonda et al. which reported fair and adequate knowledge among healthcare workers, respectively13,14 The similarity may stem from comparable professional training, continuing education, or similar healthcare settings where infection control training is emphasized. However, the findings contradict those of a study conducted in Dar es Salaam, which reported poor knowledge among nurses15. This discrepancy may be due to differences in institutional training programs, frequency and quality of in-service training, or resource availability across the studied settings. Additionally, the lower knowledge levels observed in the Dar es Salaam study may reflect systemic issues such as insufficient policy enforcement or limited access to updated guidelines.

Regarding compliance, the respondents in this study demonstrated good adherence to universal standard precautions. This is encouraging, considering that high compliance rates are critical in preventing healthcare-associated infections. However, this finding is at odds with the Dar es Salaam study, which reported poor compliance15. Possible reasons for this divergence could include differences in healthcare infrastructure, organizational support, availability of PPE, and monitoring mechanisms. It is also possible that cultural or motivational differences, or variations in patient load and staffing ratios, affected compliance differently across the two contexts.

Several factors influencing compliance with universal standard precautions were identified in this study. These included the unavailability of personal protective equipment (PPE), hospital policiesand nurses' attitudes. This is consistent with Zeb's findings, which revealed that inadequate resources, excessive workload, and the absence of clear infection control policies were major barriers to compliance20. Similarly, Esu et al. noted that the type of healthcare facility and years of professional experience significantly influenced nurses' adherence to standard precautions21. These parallels suggest that while knowledge is important, structural and institutional factors play a critical role in shaping compliance behavior. For instance, even well-informed nurses may be unable to comply with standard precautions if PPE is not consistently available or if management does not prioritize infection prevention practices. Moreover, attitudes shaped by experience and professional culture can significantly influence whether nurses internalize and practice these precautions consistently. Preventive behaviours toward infectious diseases are often influenced by level of knowledge, not only in healthcare settings but also within communities. The observed moderate knowledge and good compliance with universal standard precautions among the nurses in this study suggest that knowledge alone may not ensure appropriate infection prevention behaviours, whether in clinical or community settings, and additional factors such as resource availability, institutional policies and personal attitudes play critical role in shaping compliance as similarly reported in a study conducted to assess preventive practices of mothers towards Lassa fever.22

**Implications for Nursing**

Compliance with universal standard precautions is crucial for ensuring healthcare quality, affecting clinical outcomes and patient safety, and reducing the risk of healthcare-associated infections. Nurses, as frontline healthcare providers, play a pivotal role in adhering to these precautions to protect both themselves and their patients. The findings underscore the need for continuous education and training to increase nurses' knowledge and adherence to universal standard precautions. Strengthening hospital policies, ensuring the availability of PPE, and improving supervision by infection control units are vital steps in promoting better compliance among nurses. These efforts not only contribute to improved patient outcomes but also enhance the overall quality of healthcare delivery.

**Conclusion and recommendations**

This study highlights compliance with universal standard precautions among nurses at the University of Benin Teaching Hospital, Benin city. Nursing care plays a crucial role in the patient healing process, making adherence to universal standard precautions essential for ensuring high-quality care and preventing infections. The study revealed that nurses at UBTH have a moderate level of knowledge about these precautions and generally demonstrate good compliance with them. Thus, the conclusion is that there is a fair level of knowledge and good compliance with universal standard precautions among the nurses in this hospital.

On the basis of these findings, several recommendations are proposed to further improve compliance and knowledge. Hospitals should regularly conduct surveys to understand the needs and expectations of patients, allowing them to design nursing care that meets these requirements. Providing nurses with continuous training, including in-service, in-house, and on-the-job sessions focused on universal standard precautions and the factors influencing compliance, is vital. Additionally, nursing training institutions should enhance the practical skills of students regarding these precautions to ensure that they are well prepared for professional practice.

Moreover, expanding this research to include a larger sample size and nurses from other hospitals, especially those in rural areas with limited healthcare facilities, would provide a broader understanding of compliance with universal standard precautions. This would help identify any regional disparities and target areas for improvement across various healthcare settings.

**Availability of data and materials**

The data presented in this study are available on request from the corresponding author.

**Declarations**

**Ethical approval and consent to participate**

This study was performed in accordance with the Helsinki’s declaration and the protocol was approved by the Ethical Review Board at University of Benin Teaching Hospital, Benin-City, Edo state, Nigeria. Informed consent was obtained from the participants.

**Consent for publication**

Not applicable

**Key-points**

• Nurses at the University of Benin Teaching Hospital demonstrated a moderate level of knowledge regarding universal standard precautions.

• Compliance with universal standard precautions among nurses was generally good, despite variability in practice.

• Unavailability of personal protective equipment (PPE), hospital policies, years of professional practice, and nurses' attitudes significantly influenced compliance.

• A statistically significant relationship was found between knowledge and compliance with universal standard precautions.

• Targeted training, improved hospital policies, and consistent provision of PPE are essential to sustain and enhance compliance levels.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

Disclaimer (Artificial intelligence)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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