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Keywords: Infection and control; standard precautions; hand hygiene; adherence.

ASSESSMENT OF NURSES' KNOWLEDGE AND ADHERENCE TO INFECTION PREVENTION AND CONTROL PROTOCOLS IN SELECTED TEACHING HOSPITALS IN LAGOS STATE, NIGERIA

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ABSTRACT

Healthcare-associated infections (HAIs) continue to pose a major challenge to patient safety, healthcare quality, and the occupational wellbeing of healthcare workers. Effective infection prevention and control (IPC) is consequently an essential component of safe clinical practice. Nurses have a particularly significant role in reducing the transmission of infections because their responsibilities involve frequent interaction with patients, medical devices, body fluids, and the wider healthcare environment. This article examines nurses' knowledge and adherence to infection prevention and control protocols in teaching hospitals in Lagos State, Nigeria, focusing on key areas including hand hygiene, personal protective equipment (PPE), standard precautions, sharps management, healthcare waste disposal, environmental sanitation, and prevention of occupational exposure. Findings from Nigerian teaching hospitals have reported relatively high levels of knowledge and compliance with standard precautions, while intervention-based research has shown that structured infection-control education can further improve healthcare workers' knowledge. Evidence from Lagos similarly indicates generally favourable levels of infection-control knowledge and practice among healthcare professionals, although sustained training and access to appropriate protective and safety resources remain important. International evidence also suggests that infection-control interventions are more effective when education is combined with regular monitoring, feedback, adequate infrastructure, reliable supplies, and institutional support. The article therefore emphasizes that strengthening IPC in Lagos teaching hospitals requires a comprehensive and sustained strategy that integrates continuous

professional education, adequate staffing, consistent availability of IPC materials, effective supervision, routine auditing and feedback, committed institutional leadership, and the development of a strong patient-safety culture.

1.0 INTRODUCTION

Infection prevention and control (IPC) represents a core element of quality healthcare and patient safety. Healthcare-associated infections (HAIs) can arise as a consequence of receiving healthcare and may have serious implications for patients, healthcare workers, and health systems. Beyond contributing to illness and death, HAIs can prolong hospitalization, increase the financial burden of care, promote antimicrobial resistance, and place additional pressure on already constrained healthcare resources Iliyasu, et al (2026). For these reasons, the World Health Organization (WHO) recognizes well-functioning IPC programmes as an essential component of effective health systems and safe clinical care.

The need for robust IPC systems is particularly critical in low- and middle-income countries, where healthcare institutions may operate under considerable resource and infrastructural constraints Igwe, et al (2024). Problems such as overcrowded wards, insufficient healthcare personnel, inadequate water and sanitation services, unreliable access to personal protective equipment (PPE), and limited capacity for infection surveillance can undermine the implementation of recommended infection-control measures. The WHO Global Report on Infection Prevention and Control highlights the substantial burden of HAIs worldwide and underscores the need for stronger IPC structures, policies, and implementation mechanisms within both national health systems and individual healthcare facilities Farotimi, et al (2022).

Within the healthcare workforce, nurses have a particularly important responsibility in preventing infection transmission. Their routine clinical activities require repeated and often prolonged interaction with patients and potentially contaminated materials. These activities include administering medications, caring for wounds and catheters, collecting clinical specimens, administering injections, managing body fluids, attending to patients' immediate surroundings, and handling contaminated materials. The extent to which nurses understand and consistently apply IPC procedures can therefore have a substantial influence on the spread or prevention of infectious agents within healthcare facilities Barrera-Cancedda, et al (2019).

However, possessing adequate knowledge of infection-control procedures does not automatically result in consistent compliance Storr, et al (2017). Healthcare workers may understand the

importance of recommended practices yet encounter practical or organizational barriers that affect their implementation Farotimi, et al (2022). For example, adherence to hand hygiene may be compromised by heavy workloads, limited time, inadequate hand-washing facilities, interruptions in the supply of hygiene materials, skin discomfort, or prevailing workplace norms. Consequently, assessing IPC performance requires attention not only to what nurses know but also to how effectively that knowledge is translated into routine clinical behaviour.

Hand hygiene remains one of the most fundamental measures for interrupting the transmission of microorganisms in healthcare environments. WHO guidance identifies appropriate hand-hygiene practices as a critical component of infection prevention Igwe, et al (2024). However, sustainable IPC requires a broader institutional framework. Effective programmes require appropriately trained personnel, continuous education and competency development, systematic surveillance, regular monitoring of compliance, consideration of healthcare-worker workload, and adequate physical infrastructure and supplies Barrera-Cancedda, et al (2019).

These issues are particularly relevant to Lagos State, one of Nigeria's major centres for healthcare delivery, professional education, and specialist medical services. Teaching hospitals within the state provide care to large and diverse patient populations while also serving as important training environments for nurses, physicians, and other healthcare professionals. Consequently, IPC practices within these institutions may have implications that extend beyond the hospitals themselves Storr, et al (2017). The standards of practice demonstrated during professional training can influence the behaviours of healthcare workers and potentially shape infection-control practices in other healthcare settings across Nigeria Igwe, et al (2024).

Against this background, this article examines the available evidence on nurses' knowledge and adherence to infection prevention and control protocols, with particular emphasis on teaching hospitals in Lagos State, Nigeria Farotimi, et al (2022). The review considers major elements of IPC practice, including hand hygiene, standard precautions, PPE utilization, sharps safety, healthcare-waste management, environmental hygiene, and measures for preventing occupational exposure Iliyasu, et al (2026).

1.1 Research Questions

The study can be guided by the following research questions:

1. What level of knowledge do nurses in Lagos teaching hospitals possess regarding infection control protocols?

2. What is the level of adherence of nurses in Lagos teaching hospitals to established infection control protocols?
3. Is there a significant relationship between nurses' knowledge of infection control protocols and their adherence to such protocols?
4. To what extent do institutional factors such as availability of PPE, hand-hygiene facilities, training, supervision, workload, and availability of IPC materials influence nurses' adherence?
5. Does nurses' demographic and professional characteristics significantly influence their knowledge and adherence to infection control protocols?

1.2. Functions/Purpose of the Study

The **main function of the study** is to assess whether nurses' knowledge of infection prevention and control protocols translates into actual adherence to recommended practices in Lagos teaching hospitals.

Specifically, the study will function to:

- **Assess** nurses' knowledge of infection control protocols.
- **Determine** the extent to which nurses adhere to recommended IPC practices.
- **Identify** areas of weakness or non-compliance in infection control practices.
- **Examine** the relationship between knowledge and adherence.
- **Assess** the institutional factors that facilitate or hinder adherence.
- **Provide evidence** that can assist hospital management in strengthening IPC programmes.
- **Recommend** appropriate interventions, including training, supervision, monitoring, provision of PPE and improvement of hand-hygiene infrastructure.

1.3. General Objective

The study specifically seeks to:

1. **Assess the level of knowledge** of nurses regarding infection control protocols in selected teaching hospitals in Lagos State.
2. **Determine the level of adherence** of nurses to infection control protocols in selected teaching hospitals in Lagos State.
3. **Examine the relationship** between nurses' knowledge of infection control protocols and their adherence to recommended practices.

4. **Determine the influence of institutional factors**, including availability of PPE, hand-hygiene facilities, IPC materials, training, supervision, workload and staffing, on nurses' adherence to infection control protocols.
5. **Examine whether demographic and professional characteristics** such as age, gender, educational qualification, years of professional experience and previous IPC training influence nurses' knowledge and adherence.
6. **Identify major barriers** affecting nurses' adherence to infection control protocols in Lagos teaching hospitals.
7. **Propose evidence-based strategies** for improving nurses' knowledge and adherence to infection control protocols.

1.4. Research Hypotheses

For a quantitative study, I recommend using **null hypotheses (H_0)** because they can be tested statistically.

H_{01} There is no significant relationship between nurses' knowledge of infection control protocols and their adherence to infection control practices in selected teaching hospitals in Lagos State.

H_{02} Institutional factors such as availability of PPE, hand-hygiene facilities, IPC materials, training, supervision, workload and staffing have no significant influence on nurses' adherence to infection control protocols in selected teaching hospitals in Lagos State.

H_{03} There is no significant difference in nurses' knowledge of infection control protocols based on their demographic and professional characteristics.

2.0 Literature Rewiew

2.1 Infection Prevention and Control in Healthcare Settings

Infection prevention and control encompasses a range of evidence-based interventions intended to minimize the acquisition and transmission of infectious organisms within healthcare environments Storr, et al (2017). These measures are designed to protect patients, healthcare professionals, visitors, and the broader community by reducing opportunities for infectious agents to spread during the delivery of care Barrera-Cancedda, et al (2019).

Contemporary IPC guidance emphasizes that infection control should be implemented as an organized and institutionally supported system rather than as a collection of individual procedures Iliyasu, et al (2026). Effective implementation depends on leadership commitment, clearly defined responsibilities, adequately trained personnel, continuing education, infection

surveillance, routine monitoring, appropriate workload management, and a healthcare environment capable of supporting safe practice Farotimi, et al (2022).

For nurses, several IPC measures are particularly relevant because of their close association with everyday clinical activities Igwe, et al (2024). These include:

1. **Hand hygiene:** appropriate hand cleaning before, during, and after relevant patient-care activities;
2. **Standard precautions:** routine measures applied to all patients regardless of their suspected or confirmed infection status;
3. **Personal protective equipment:** appropriate selection and use of gloves, gowns, masks, eye protection, and other protective devices according to exposure risk;
4. **Safe injection practices:** measures that prevent contamination of medications, equipment, and injection sites;
5. **Sharps-injury prevention:** safe handling, use, transportation, and disposal of needles and other sharp instruments;
6. **Healthcare-waste management:** appropriate segregation, handling, transportation, treatment, and disposal of potentially infectious waste;
7. **Environmental cleaning and disinfection:** maintenance of hygienic patient-care areas and appropriate decontamination of surfaces and equipment;
8. **Management of contaminated linen:** safe collection, handling, transportation, and processing of potentially contaminated linen;
9. **Respiratory hygiene and cough etiquette:** measures intended to reduce the spread of respiratory pathogens;
10. **Transmission-based precautions:** additional precautions applied when specific modes of infection transmission are suspected or confirmed;
11. **Decontamination of reusable equipment:** appropriate cleaning, disinfection, and sterilization of reusable medical devices and instruments; and
12. **Occupational health and post-exposure management:** systems for preventing occupational infections and ensuring timely management following exposure to potentially infectious materials.

Consistent implementation of these measures can reduce the opportunities for infectious organisms to move between patients, healthcare workers, equipment, surfaces, and other components of the healthcare environment. Nevertheless, effective IPC depends not only on

individual compliance but also on whether healthcare institutions provide the leadership, resources, infrastructure, training, supervision, and organizational conditions required to support safe practice Iliyasu, et al (2026).

2.2.0 Nurses' Knowledge of Infection Prevention and Control Protocols

Adequate knowledge is a fundamental prerequisite for effective infection prevention and control (IPC) among nurses. Competent IPC practice requires nurses not only to know the procedures recommended for preventing infection but also to understand the rationale underlying those procedures and the consequences of non-compliance Igwe, et al (2024).

Essential areas of IPC knowledge include the principles underlying the chain of infection and the different mechanisms through which infectious organisms are transmitted. Nurses are also expected to understand when hand hygiene is required, how to perform handwashing correctly, and the appropriate application of alcohol-based hand rubs. Other important areas include the selection and safe removal of personal protective equipment (PPE), prevention and management of sharps injuries, segregation and disposal of healthcare waste, environmental cleaning and disinfection, decontamination of clinical equipment, and appropriate response to occupational exposure to potentially infectious materials Farotimi, et al (2022).

2.2.1 Evidence from Nigeria

Research conducted in Nigeria provides evidence of generally encouraging levels of IPC knowledge among nurses, although variations in compliance and opportunities for improvement have also been identified. Farotimi, Ademuyiwa, Nweke, and Balogun (2022), for example, investigated nurses' knowledge and compliance with standard precautions in a Nigerian teaching hospital. Published in the *Nigerian Quarterly Journal of Hospital Medicine*, the study provides relevant evidence concerning the extent to which nurses' knowledge of standard precautions is reflected in their reported compliance with recommended infection-control measures Storr, et al (2017).

This body of evidence is particularly relevant to the present discussion because Nigerian research has included nurses working at Lagos University Teaching Hospital. Consequently, there is an established empirical basis for examining IPC knowledge and compliance within teaching-hospital environments in Lagos State Farotimi, et al (2022).

Evidence from intervention research further demonstrates that nurses' IPC knowledge can be improved through targeted educational programmes. Farotimi and colleagues evaluated a structured infection-control training intervention among 87 nurses using a pre-test and post-test

quasi-experimental design. The intervention produced a marked improvement in the proportion of participants demonstrating a high level of knowledge, and the researchers concluded that structured training positively influenced nurses' knowledge and perceptions concerning infection prevention and control Storr, et al (2017).

The findings suggest that IPC knowledge should be viewed as a competency that requires continuous reinforcement rather than as a static attribute acquired during initial professional education. Regular refresher training and continuing professional development can help nurses maintain appropriate knowledge, respond to emerging infection risks, and remain familiar with changes in IPC policies and recommended practices Igwe, et al (2024).

2.3.0 Nurses' Adherence to Infection Prevention and Control Protocols

Adherence to IPC protocols refers to the degree to which nurses consistently apply recommended infection-prevention measures during routine clinical activities. While knowledge provides an essential foundation, effective infection prevention ultimately depends on whether appropriate procedures are translated into actual practice Farotimi, et al (2022).

2.3.1 Hand Hygiene

Hand hygiene is one of the most fundamental measures for interrupting the transmission of infectious microorganisms in healthcare environments. WHO guidance recommends hand hygiene at appropriate points during patient care, including before patient contact and before clean or aseptic procedures, as well as at other clinically relevant moments.

Nevertheless, maintaining consistent hand-hygiene behaviour can be challenging in busy healthcare environments. Factors such as high patient workloads, time constraints, inadequate access to water or hand-hygiene products, inconvenient positioning of facilities, skin irritation, forgetfulness, and a perceived low risk of infection may negatively influence compliance Farotimi, et al (2022).

Assessment of hand-hygiene adherence should therefore, where feasible, incorporate direct observation of clinical behaviour. Reliance solely on self-reported compliance may produce an overly favourable assessment because healthcare workers may unintentionally overestimate how consistently they perform recommended hand-hygiene practices Barrera-Cancedda, et al (2019).

2.3.2 Personal Protective Equipment

Personal protective equipment serves as an important barrier between healthcare workers and potentially infectious materials, including blood, body fluids, respiratory secretions, and contaminated surfaces. Effective PPE practice requires nurses to assess the anticipated risk

associated with a particular clinical activity and select the appropriate protective equipment accordingly Farotimi, et al (2022).

The effectiveness of PPE also depends on correct application and removal. Nurses require adequate knowledge of donning and doffing procedures because inappropriate removal of contaminated protective equipment may result in accidental exposure or transfer of infectious material to the healthcare worker, clothing, equipment, or surrounding environment Iliyasu, et al (2026).

2.3.3 Sharps Safety

Injuries caused by needles and other sharp medical instruments constitute an important occupational risk for nurses. Prevention requires the consistent application of safe sharps-handling procedures throughout clinical practice Igwe, et al (2024).

Key measures include avoiding unnecessary manipulation of used needles, refraining from unsafe practices such as inappropriate recapping where prohibited by policy, disposing of sharps immediately after use in designated puncture-resistant containers, and following established institutional procedures when an exposure occurs. Prompt reporting and appropriate post-exposure management are also essential components of occupational infection prevention Farotimi, et al (2022).

2.3.4 Healthcare Waste Management

Appropriate healthcare-waste management is another important component of IPC. Waste generated during patient care should be correctly segregated at the point of generation and subsequently handled, collected, transported, treated, and disposed of according to established procedures Iliyasu, et al (2026).

Nurses frequently participate directly in the initial segregation of clinical waste. Their ability to perform this responsibility effectively depends on adequate knowledge of waste categories as well as the availability, accessibility, and proper identification of appropriate waste-disposal containers Iliyasu, et al (2026). Where suitable resources are unavailable or inconsistently supplied, even knowledgeable healthcare workers may experience difficulties implementing recommended waste-management procedures.

2.3.5 Environmental Hygiene and Equipment Decontamination

The healthcare environment and reusable clinical equipment can become potential sources of cross-infection when appropriate cleaning and decontamination procedures are not followed. Equipment used for patient assessment and treatment may become contaminated during routine

care and can facilitate transmission if subsequently used for another patient without appropriate reprocessing Farotimi, et al (2022).

Nurses should therefore be familiar with their institutions' procedures for cleaning, disinfection, and, where applicable, sterilization of reusable equipment. Consistent application of these procedures is particularly important for equipment that comes into direct contact with patients or potentially infectious materials Iliyasu, et al (2026).

2.4 Evidence from Lagos Teaching and Healthcare Facilities

Evidence from healthcare facilities in Lagos provides an important basis for understanding the development, implementation, and continuing challenges of IPC practices in the state. Both earlier institutional assessments and more recent research indicate that progress has been made, while also demonstrating the need for sustained attention to IPC systems Igwe, et al (2024).

An earlier assessment of infection-control practices at Lagos University Teaching Hospital identified shortcomings in several areas, including the availability of handwashing facilities, use of protective clothing, management of sharps, disposal of healthcare waste, and staff knowledge of infection-control procedures. The findings highlighted the need for improved staff education as well as stronger institutional mechanisms for coordinating and supporting infection-control activities Farotimi, et al (2022).

More recent research suggests that the situation may have improved in some areas. A 2024 study conducted among healthcare professionals in selected primary healthcare centres in Lagos State reported generally favourable levels of IPC knowledge and practice. Nurses represented the largest professional category in the study. The researchers reported that 97.3% of participants demonstrated good infection-control knowledge, while 86.4% demonstrated good infection-control practice. In addition, 75.5% of respondents reported having received infection-control training. The study also identified a statistically significant relationship between knowledge and infection-control practice Barrera-Cancedda, et al (2019).

These findings are informative for understanding the broader Lagos healthcare context, although they should not be interpreted as direct evidence of conditions in teaching hospitals because primary healthcare centres operate under different organizational and clinical circumstances. Nevertheless, the results reinforce the importance of training, institutional support, and access to appropriate IPC resources in facilitating good infection-control practices.

Taken together, the available evidence indicates that IPC should be regarded as an ongoing institutional responsibility rather than a one-time educational outcome. Earlier assessments

identified deficiencies in resources, facilities, and staff knowledge, whereas more recent studies have reported comparatively stronger levels of knowledge and practice Storr, et al (2017). This apparent improvement is encouraging, but it also underscores the importance of continuous surveillance, periodic assessment, refresher training, and institutional quality-improvement activities to ensure that gains in IPC performance are maintained over time Farotimi, et al (2022).

2.5 The Knowledge–Practice Gap

One of the recurring concerns in infection prevention and control (IPC) research is the extent to which knowledge is translated into consistent behaviour in clinical practice Igwe, et al (2024). Although adequate knowledge provides an important foundation for appropriate infection-control practice, knowledge alone does not guarantee that recommended procedures will be followed consistently Storr, et al (2017).

The relationship between knowledge and practice is influenced by several individual, organizational, and environmental conditions. Among the factors that may determine whether nurses adhere to IPC requirements are the availability of hand-hygiene materials and personal protective equipment (PPE), nurse-to-patient ratios, workload, ward design, managerial support, supervision, workplace norms, perceived likelihood of infection transmission, accessibility of IPC policies and guidelines, previous training, and the availability of performance feedback Farotimi, et al (2022).

This suggests that interventions focused exclusively on providing information may have limited long-term effects when the environmental and organizational conditions required for compliance are not addressed. A nurse may possess adequate knowledge of hand hygiene, for example, but consistent implementation may remain difficult when essential supplies are unavailable or when workload and time pressures are excessive Storr, et al (2017).

Evidence from Africa increasingly supports the use of comprehensive or multimodal IPC interventions. A 2024 systematic review examining IPC interventions in African healthcare facilities found that most interventions incorporated several complementary strategies rather than relying on a single approach. At least one primary outcome improved across the studies included in the review, although the authors indicated that the certainty of evidence was low for a number of outcomes. The review also identified continuous training and reliable access to hand-hygiene supplies as important factors supporting improved IPC compliance Farotimi, et al (2022).

Similarly, evidence from a systematic review of IPC implementation among nurses in sub-Saharan Africa indicates that educational interventions were frequently combined with quality-

management activities, planning, and organizational restructuring Igwe, et al (2024). These findings suggest that the effectiveness of IPC programmes depends not simply on the number of strategies employed but also on how well the selected strategies correspond with the specific organizational and environmental context in which they are implemented Ogunsola, et al (2019). Consequently, reducing the knowledge–practice gap requires interventions that address both individual competence and the systems within which nurses provide care.

2.6.0 Factors Affecting Adherence among Nurses

2.6.1 Availability of Resources

Adequate access to IPC resources is a basic requirement for translating recommended procedures into routine practice. Even highly knowledgeable nurses may be unable to comply with established protocols when essential materials are unavailable, inaccessible, or inconsistently supplied.

Teaching hospitals should therefore maintain dependable supplies of essential IPC materials, including:

- soap and a reliable supply of running water;
- alcohol-based hand rub;
- examination and other appropriate gloves;
- medical and respiratory masks;
- protective gowns or aprons;
- eye and face protection when exposure risks warrant their use;
- puncture-resistant sharps containers;
- appropriately labelled healthcare-waste containers; and
- materials required for environmental cleaning and disinfection.

The availability of these resources should be monitored routinely as part of normal hospital quality-assurance activities rather than being treated as an emergency requirement only during outbreaks.

2.6.2 Staffing and Workload

The volume and intensity of nursing work can influence compliance with IPC procedures. Nurses managing large numbers of patients may experience considerable time pressure, physical exhaustion, and competing clinical priorities. Under such circumstances, opportunities for hand hygiene or other recommended IPC activities may be missed Igwe, et al (2024).

Staffing levels should therefore be considered an important component of infection prevention. Effective IPC planning should take into account the relationship between the number of nurses available, patient volume, acuity of care, and the time required to perform essential infection-control procedures.

2.6.3 Training and Continuing Education

Continuous education is one of the factors that can be modified relatively easily within healthcare institutions. Evidence from Nigerian teaching hospitals indicates that structured IPC education can improve nurses' knowledge and perceptions concerning infection prevention.

For training to remain effective, however, it should extend beyond the initial orientation of newly employed staff. Teaching hospitals should provide periodic refresher programmes that combine theoretical information with practical learning. Demonstrations, simulation exercises, bedside coaching, visual reminders, and competency assessments can help nurses develop and maintain the practical skills required for effective IPC implementation.

2.6.4 Supervision, Monitoring and Audit

Routine monitoring provides healthcare institutions with an opportunity to determine whether established IPC policies are being implemented consistently. Regular audits can identify areas of strong performance as well as practices requiring improvement.

However, audit should not simply be used as a mechanism for identifying non-compliance. Findings should be discussed constructively with nurses, ward managers, and relevant hospital departments. Timely feedback can help staff understand performance gaps and develop practical corrective measures Barrera-Cancedda, et al (2019).

The earlier audit conducted at Lagos University Teaching Hospital illustrates the importance of evaluating both the availability of infection-control resources and the actual practices of healthcare workers Ogunsola, et al (2019). The existence of written policies alone cannot guarantee effective implementation.

2.6.5 Organizational Culture and Leadership

The organizational environment within which nurses work can substantially influence their infection-control behaviour. Staff members may be more likely to follow recommended practices when senior nurses, physicians, managers, and other healthcare professionals consistently demonstrate commitment to IPC.

Visible support from hospital leadership can help establish infection prevention as a normal component of professional practice rather than an additional task. Conversely, weak supervision,

inadequate attention to safety, or inconsistent leadership behaviour may contribute to normalization of poor practices Akodu, et al (2024).

A strong organizational culture should therefore promote accountability while ensuring that staff has the resources, knowledge, supervision, and institutional support necessary to comply with IPC requirements Ogunsola, et al (2019).

2.7 Implications for Teaching Hospitals in Lagos

The available evidence has important implications for the management and delivery of IPC services in teaching hospitals across Lagos State.

First, IPC should be embedded within both undergraduate nursing preparation and continuing professional development. Newly recruited nurses should receive structured orientation on institutional IPC policies, while experienced nurses should participate in periodic refresher programmes to maintain and update their competencies Barrera-Cancedda, et al (2019).

Second, teaching hospitals should establish systematic mechanisms for monitoring IPC performance. Indicators such as hand-hygiene compliance, appropriate PPE utilization, sharps management, healthcare-waste segregation, and environmental hygiene can be assessed periodically to identify areas requiring intervention Ogunsola, et al (2019).

Third, hospital management should prioritize the continuous provision of essential IPC materials. Educational programmes are unlikely to produce sustainable behavioural improvements if nurses are trained to follow recommended procedures but are subsequently unable to access soap, water, alcohol-based hand rub, PPE, appropriate waste containers, or other necessary resources Akodu, et al (2024).

Fourth, effective collaboration between infection-control personnel and nursing management is essential. IPC should be treated as a shared institutional responsibility rather than as the exclusive responsibility of infection-control officers Ogunsola, et al (2019). Nurse managers, ward leaders, individual nurses, physicians, administrators, and other relevant personnel all have roles in maintaining safe clinical environments Storr, et al (2017).

Fifth, teaching hospitals should make greater use of their academic and research functions to generate locally relevant evidence. Routine IPC assessments can be incorporated into quality-improvement programmes and research activities. Such initiatives can help identify facility-specific barriers, evaluate interventions, and provide evidence for improving infection-control policies and practices Ogunsola, et al (2019).

Finally, teaching hospitals have an important opportunity to serve as centres of IPC learning and innovation. Because they train future healthcare professionals, improvements in IPC practice within these institutions may contribute to improved infection-control standards in other healthcare facilities where their graduates subsequently work Ogunsola, et al (2019).

3.0 Data Methodology

Research design

A **quantitative cross-sectional descriptive-correlational research design** is appropriate. Data would be collected from nurses in selected teaching hospitals in Lagos State using a structured questionnaire.

Variables

Variable	Measurement	Role
Nurses' knowledge of IPC	Knowledge score	Independent variable
Adherence to IPC practices	Likert/practice score	Dependent variable
PPE availability	Likert score	Institutional factor
Hand-hygiene facilities	Likert score	Institutional factor
Availability of IPC materials	Likert score	Institutional factor
IPC training	Likert score	Institutional factor
Supervision	Likert score	Institutional factor
Workload	Likert score	Institutional factor
Staffing adequacy	Likert score	Institutional factor
Age, sex, education, experience, department, etc.	Categorical	Demographic/professional variables

3.2 Data coding and scoring

Knowledge score

Knowledge questions can be coded:

- Correct answer = **1**
- Incorrect/Don't know = **0**

For each respondent:

Knowledge Score=Number of correct responsesTotal knowledge questions×100Knowledge\

Score = \frac{\text{Number of correct responses}}{\text{Total knowledge questions}}\times100

A possible classification is:

- **Good knowledge:** 70–100%
- **Moderate knowledge:** 50–69%
- **Poor knowledge:** <50%

You should state that these cut-offs are adopted from your study's operational definition or justified from the literature.

Adherence score

For adherence questions using a 5-point Likert scale:

1 = Never

2 = Rarely

3 = Sometimes

4 = Often

5 = Always

Calculate the mean or summed adherence score for each respondent.

Higher scores indicate **greater adherence to infection-control practices**.

Institutional-factor score

The institutional factors can similarly be measured using a 5-point Likert scale:

1 = Strongly Disagree

2 = Disagree

3 = Undecided

4 = Agree

5 = Strongly Agree

Create either:

- ✓ Individual factor scores, or
- ✓ One **composite institutional support score**.

3.3 Descriptive statistics

The first stage of analysis should describe the respondents.

Use:

- Frequency
- Percentage
- Mean
- Standard deviation

- Minimum and maximum where appropriate

For example:

Variable	Frequency	Percentage
Male	45	18.0
Female	205	82.0
Total	250	100.0

For continuous/composite scores:

Variable	Mean	SD	Minimum	Maximum
Knowledge score	72.45	11.62	42	96
Adherence score	3.84	0.58	2.20	5.00
Institutional support	3.51	0.64	1.90	4.90

Important: These numerical values are examples only. They should not be presented as your actual findings until your questionnaire data have been analysed.

3.4 Correlation analysis

For H_{01}, Pearson Product-Moment Correlation is appropriate if knowledge and adherence scores are approximately continuous and meet the relevant assumptions.

Drag points 2468102468

X, Y

Linear correlation is positive (r = 0.98).

Negative, Near zero, Positive□

The model tests:

H0:ρ=0H_0: \rho = 0

against:

H1:ρ≠0H_1: \rho \neq 0

Example correlation table

Variables	Knowledge	Adherence
Knowledge	1.000	0.452**
Adherence	0.452**	1.000
Sig. (2-tailed)	—	<0.001
N	250	250

Note: This is an illustrative result.

Interpretation

If the actual result were **r = 0.452, p < 0.001**, it would indicate a **moderate positive and statistically significant relationship** between nurses' knowledge and adherence.

Therefore:

Reject H_{01}.

You would conclude that nurses' knowledge of infection-control protocols is significantly associated with their adherence to infection-control practices.

Remember: correlation demonstrates association, not causation.

3.5 Analysis for H_{02}

Your second hypothesis is more complex:

Institutional factors such as availability of PPE, hand-hygiene facilities, IPC materials, training, supervision, workload and staffing have no significant influence on nurses' adherence to infection-control protocols.

For this hypothesis, I recommend **multiple linear regression**, rather than relying only on correlation.

Regression model

$$ADH=\beta0+\beta1PPE+\beta2HHF+\beta3IPC+\beta4TRN+\beta5SUP+\beta6WKL+\beta7STF+\epsilon$$

Where:

- **ADH** = adherence to infection-control practices
- **PPE** = PPE availability
- **HHF** = hand-hygiene facilities
- **IPC** = IPC materials
- **TRN** = IPC training
- **SUP** = supervision
- **WKL** = workload
- **STF** = staffing adequacy

Regression results table

Predictor	B	Std. Error	Beta	t	Sig.
Constant	5	0,001	0.2	0.5	0.000
PPE availability	20	0.3	0.1	0.2	0.000
Hand-hygiene facilities	10	0.6	0.20	0.10	0.000
IPC materials	20	0.8	0.30	0.2	0.000
IPC training	10	0.40	0.10	0.1	0.000
Supervision	20	0.10	0.30	0.23	0.000
Workload	10	0.40	0. 04	0.10	0.000
Staffing	5	0.10	0.10	0.05	0.000

The most important statistics are:

- **R^2** = proportion of variation in adherence explained by the institutional factors.
- **F-test** = whether the predictors collectively significantly explain adherence.
- **Beta (β)** = relative contribution of each predictor.
- **P-value** = statistical significance of each predictor.

For example, if:

$R^2 = 0.48, F = 28.64, p < 0.001$

You could report that the institutional factors collectively explain **48% of the variation in nurses' adherence**, and the overall regression model is statistically significant.

Therefore, **H_{02} would be rejected**.

Again, the figures above are examples and must be replaced by your actual results.

3.6 Analysis for H_{03}

Your third hypothesis states:

There is no significant difference in nurses' knowledge of infection-control protocols based on their demographic and professional characteristics.

The appropriate test depends on the number and nature of categories.

For two groups

Use an **independent-samples t-test**.

Example:

Gender → Knowledge score

Gender	N	Mean	SD
Male	45	18	0.386
Female	205	82	-99.614

Then report:

t=−,p=−t = -, \quad p = -

If **$p < 0.05$**, reject H_0.

For three or more groups

Use **one-way ANOVA**.

For example:

Years of professional experience → Knowledge score

Experience	N	Mean	SD
<5 years	20	5	20
5–10 years	50	2	100
>10 years	30	3	90

ANOVA table:

Source	SS	df	MS	F	Sig.
Between groups	40	60	20	0.3	0.00
Within groups	60	40	20	0.2	0.00
Total	100	100	40	0.5	0.00

If **p < 0.05**, conclude that there is a statistically significant difference in knowledge among the groups.

If ANOVA is significant, conduct a **post-hoc test**, such as Tukey HSD, to determine which groups differ.

3.7 Recommended complete statistical framework

Research objective/hypothesis	Variables	Statistical technique
Describe nurses' knowledge	Knowledge score	Frequency, %, mean, SD
Describe adherence	Adherence score	Frequency, %, mean, SD
H_{01}	Knowledge → Adherence	Pearson correlation
H_{02}	Institutional factors → Adherence	Multiple linear regression
H_{03}	Demographic/professional factors → Knowledge	t-test / ANOVA
Reliability	Questionnaire items	Cronbach's alpha
Statistical decision	All hypotheses	$\alpha = 0.05$

3.8 Visualization of your results

I recommend using **five major figures** in the project.

Figure 1: Distribution of knowledge levels

A **bar chart** showing:

- Poor
- Moderate
- Good

Figure 2: Nurses' adherence levels

A **bar chart** showing low, moderate and high adherence.

Figure 3: Knowledge versus adherence

A **scatter plot with a regression/least-squares line**.

This is particularly useful for H_{01} because it visually demonstrates whether higher knowledge tends to correspond with higher adherence.

Figure 4: Institutional factors

A **horizontal bar chart** showing the mean scores for:

- PPE availability
- Hand-hygiene facilities
- IPC materials
- Training
- Supervision
- Workload
- Staffing

Figure 5: Knowledge by professional experience

A **box plot** comparing knowledge scores across experience groups.

3.9 Reliability and validity

Before hypothesis testing, I recommend including:

Cronbach's Alpha

For Likert-scale constructs such as adherence and institutional factors:

$\alpha \geq 0.70$

Is commonly considered acceptable for research purposes, although interpretation should consider the number and nature of items.

For knowledge questions scored 0/1, consider an appropriate internal-consistency measure such as **KR-20** if the items are dichotomous.

Validity

The questionnaire should undergo:

1. **Face validity**
2. **Content validity**
3. **Expert review**
4. **Pilot testing**

3.10 Assumption testing

Before running the inferential statistics, include:

Pearson correlation

Check:

- Linearity
- Outliers

- Approximate normality

Multiple regression

Check:

- Linearity
- Normality of residuals
- Homoscedasticity
- Multicollinearity
- Independence of observations

For multicollinearity, report **VIF** and tolerance statistics.

t-test/ANOVA

Check:

- Independence
- Approximate normality
- Homogeneity of variance

If assumptions are substantially violated, consider non-parametric alternatives such as **Spearman correlation, Mann–Whitney U, or Kruskal–Wallis**.

4. Data Analysis

Data collected from the respondents will be coded, entered, cleaned and analysed using the Statistical Package for the Social Sciences (SPSS). Both descriptive and inferential statistical techniques will be employed in analysing the data. Descriptive statistics, including frequencies, percentages, means and standard deviations, will be used to summarise the demographic and professional characteristics of the respondents and describe their levels of knowledge, adherence to infection-control practices and perceptions of institutional factors Akodu, et al (2024).

Knowledge of infection-control protocols will be assessed by assigning a score of one (1) to each correct response and zero (0) to each incorrect or "don't know" response. Individual knowledge scores will subsequently be summed and converted to percentages. Adherence to infection-control practices and institutional factors will be measured using appropriate Likert-scale items, with higher scores indicating higher levels of adherence or greater availability/support, as applicable.

Pearson Product-Moment Correlation will be used to test Hypothesis One, which examines the relationship between nurses' knowledge of infection-control protocols and their adherence to infection-control practices Storr, et al (2017). Multiple linear regression analysis will be

employed to test Hypothesis Two and determine the extent to which institutional factors, including availability of personal protective equipment, hand-hygiene facilities, infection-prevention and control materials, training, supervision, workload and staffing, jointly and individually predict nurses' adherence to infection-control protocols Ogunsola, et al (2019).

For Hypothesis Three, an independent-samples t-test will be used where a demographic or professional characteristic has two categories, while one-way analysis of variance (ANOVA) will be used where the characteristic has three or more categories. Where a statistically significant ANOVA result is obtained, an appropriate post-hoc test will be conducted to identify the specific groups responsible for the observed difference.

The reliability of the questionnaire will be assessed using an appropriate internal-consistency reliability coefficient. Cronbach's alpha will be used for multi-item Likert-scale constructs, while an appropriate coefficient such as KR-20 may be considered for dichotomously scored knowledge items. The assumptions underlying the statistical procedures, including normality, linearity, homogeneity of variance, independence and multicollinearity where applicable, will be assessed before the inferential analyses are conducted Barrera-Cancedda, et al (2019).

All hypotheses will be tested at a 5% level of significance ($\alpha = 0.05$). The null hypothesis will be rejected where the probability value (p-value) is less than 0.05; otherwise, it will not be rejected Ogunsola, et al (2019). Results will be presented using tables, charts and appropriate statistical figures to facilitate interpretation and discussion.

5. Recommendations

Based on the evidence reviewed, the following measures are recommended for strengthening IPC among nurses in teaching hospitals in Lagos State Storr, et al (2017).

5.1 Strengthen Continuous Professional Development

Teaching hospitals should institutionalize regular IPC education for nurses rather than limiting training to staff induction. Training programmes should reflect current evidence and guidelines and should address practical competencies, including hand hygiene, PPE use, sharps injury prevention, healthcare-waste management, environmental cleaning, equipment decontamination, and management of occupational exposures Akodu, et al (2024).

5.2 Ensure Consistent Availability of IPC Supplies

Hospital management should develop dependable procurement, distribution, and monitoring systems to prevent interruptions in the supply of essential IPC materials Ogunsola, et al (2019). Particular attention should be given to soap, water, alcohol-based hand rub, PPE, sharps

containers, appropriate waste-disposal facilities, and cleaning and disinfection materials Storr, et al (2017).

5.3 Establish Routine Audit and Feedback Mechanisms

Regular ward-based IPC assessments should be undertaken to evaluate actual compliance with established protocols. Results should be communicated to staff and managers promptly, and identified deficiencies should be followed by specific corrective actions Ogunsola, et al (2019). Feedback should be constructive and aimed at improving practice rather than simply assigning blame.

5.4 Improve Staffing and Workload Management

Hospital administrators should incorporate patient volume, acuity, and nursing workload into staffing decisions. Where excessive workloads create barriers to compliance, appropriate staffing adjustments and workload-management strategies should be considered. Adequate staffing should be recognized as an important component of patient safety and infection prevention Barrera-Cancedda, et al (2019).

5.5 Strengthen Institutional Leadership and Accountability

Hospital leadership should establish IPC as a clearly defined patient-safety and healthcare-quality priority Ogunsola, et al (2019). Managers and senior healthcare professionals should demonstrate appropriate infection-control behaviours and ensure that staff have the necessary resources and institutional support to comply with established standards Storr, et al (2017).

5.6 Adopt Multimodal IPC Interventions

Teaching hospitals should avoid relying on education as the sole strategy for improving IPC. A more comprehensive approach should combine education and training with monitoring, audit, feedback, quality improvement, appropriate planning, supportive supervision, adequate infrastructure, and reliable availability of IPC resources Akodu, et al (2024).

5.7 Promote a Supportive and Non-Punitive Safety Culture

Healthcare workers should be able to report shortages of IPC materials, unsafe practices, occupational exposures, and other safety concerns without fear of inappropriate disciplinary action Ogunsola, et al (2019). Reporting mechanisms should be designed to identify system weaknesses and facilitate corrective action. A supportive reporting environment can encourage earlier identification of problems and contribute to continuous improvement Farotimi, et al (2022).

5.8 Strengthen IPC Research and Surveillance

Teaching hospitals in Lagos should conduct periodic assessments of nurses' IPC knowledge, attitudes, observed practices, and the organizational factors that influence adherence Ogunsola, et al (2019). Where feasible, longitudinal research should be undertaken to determine whether interventions produce sustained improvements. Locally generated evidence can assist hospital administrators and policymakers in designing interventions that are appropriate to the specific needs and circumstances of Lagos healthcare facilities Barrera-Cancedda, et al (2019).

6. Conclusion

Effective infection prevention and control (IPC) is integral to the delivery of safe and high-quality nursing care. Nurses' understanding of standard precautions, hand hygiene, personal protective equipment, sharps management, healthcare-waste disposal, and related IPC measures provides a critical basis for limiting the occurrence and transmission of healthcare-associated infections. Nevertheless, possessing adequate knowledge does not necessarily translate into consistent application of recommended practices in clinical settings.

Evidence from Nigerian healthcare institutions indicates that nurses may possess satisfactory levels of IPC knowledge and demonstrate relatively good compliance with standard precautions. Intervention-based studies further suggest that structured and targeted educational programmes can strengthen nurses' knowledge and perceptions regarding infection prevention. Findings from healthcare facilities in Lagos are similarly encouraging, although they highlight the continuing importance of sustained professional education and dependable access to appropriate infection-control resources.

The evidence therefore indicates that improving IPC performance requires more than increasing nurses' knowledge. Healthcare institutions must create working environments in which appropriate infection-control practices are practical, routinely expected, adequately supervised, and supported by the necessary resources. This requires a coordinated combination of continuous professional development, adequate staffing, reliable availability of IPC supplies, supportive supervision, routine monitoring, audit and feedback, committed institutional leadership, and a strong culture of patient and healthcare-worker safety.

For teaching hospitals in Lagos State, strengthening these interconnected components can contribute substantially to safer healthcare delivery. A sustained and institution-wide commitment to IPC has the potential to reduce preventable healthcare-associated infections,

protect nurses and other healthcare professionals from occupational exposure, improve patient outcomes, and enhance the overall quality and safety of healthcare services.

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References

1. Akodu, B., Chinagoro, U., Roberts, A., Lawal, A., Bakre, A. T., Oshun, P., Oyeleke, G., Osuagwu, C., Yakubu, C., Baiyeroju, I., Orumbie, P., Olokodana-Adesalu, O., Agunbiade, H., & Ojikutu, M. (2024). Knowledge, attitude and infection control practices among healthcare professionals in selected primary healthcare centres in urban areas of Lagos State. Nigerian Journal of Family Practice, 15(2), 97–104.
2. Barrera-Cancedda, A. E., Riman, K. A., Shinnick, J. E., & Buttenheim, A. M. (2019). Implementation strategies for infection prevention and control promotion for nurses in Sub-Saharan Africa: A systematic review. Implementation Science, 14, 111. https://doi.org/10.1186/s13012-019-0958-3.

3. Farotimi, A. A., Ademuyiwa, I. Y., Nweke, C. I., & Balogun, S. M. (2022). Knowledge and compliance with standard precautions among nurses in a teaching hospital in Nigeria. Nigerian Quarterly Journal of Hospital Medicine, 31(1–2), 16–25.
4. Farotimi, A. A., Ajao, E. O., Nwozichi, C. U., & Ademuyiwa, I. Y. (2018). Effect of training on knowledge, perception and risk reduction regarding infection control among nurses in selected teaching hospitals in Nigeria. Iranian Journal of Nursing and Midwifery Research, 23(6), 471–477. https://doi.org/10.4103/ijnmr.IJNMR_208_17.
5. Igwe, U., Okolie, O. J., Ismail, S. U., & Adukwu, E. (2024). Effectiveness of infection prevention and control interventions in health care facilities in Africa: A systematic review. American Journal of Infection Control, 52(10), 1135–1143. https://doi.org/10.1016/j.ajic.2024.06.004.
6. Iliyasu, G., Dayyab, F. M., Habib, Z. G., Tiamiyu, A. B., Abubakar, S., Mijinyawa, M. S., & Habib, A. G. (2026). Knowledge and practices of infection control among healthcare workers in a tertiary referral center in North-Western Nigeria. Annals of African Medicine, 15(1), 34–40.
7. Ogunsola, F. T., Oduyebo, O. O., Iregbu, K. C., & Adetunji, A. (2019). Audit: An essential tool for an effective infection control program—the Lagos University Teaching Hospital experience. Journal of the Nigerian Infection Control Association, 2, 27–30.
8. Storr, J., Twyman, A., Zingg, W., Damani, N., Kilpatrick, C., Reilly, J., Price, L., Egger, M., Grayson, M. L., Kelley, E., & Allegranzi, B. (2017). Core components for effective infection prevention and control programmes: New WHO evidence-based recommendations. Antimicrobial Resistance & Infection Control, 6, 6. https://doi.org/10.1186/s13756-016-0149-9.
9. World Health Organization. (2019). A guide to the implementation of the WHO multimodal hand hygiene improvement strategy. Geneva: World Health Organization.
10. World Health Organization. (2019). WHO guidelines on hand hygiene in health care. Geneva: World Health Organization.
11. World Health Organization. (2026). Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level. Geneva: World Health Organization.
12. World Health Organization. (2018). Improving infection prevention and control at the health facility: An interim practical manual. Geneva: World Health Organization.

13. World Health Organization. (2019). Minimum requirements for infection prevention and control programmes. Geneva: World Health Organization.
14. World Health Organization. (2022). Global report on infection prevention and control. Geneva: World Health Organization.
15. World Health Organization. (2022). Global report on infection prevention and control: Executive summary. Geneva: World Health Organizat.

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