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RESEARCH ARTICLE

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Infection Prevention and Control Practices among Health Care Workers in ISTH, Irrua Edo State, Nigeria

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ABSTRACT

Background: Healthcare-associated infections (HAIs) pose a significant burden in developing countries due to inadequate infection prevention and control (IPC) measures. Understanding healthcare workers' (HCWs) knowledge, attitudes, and practices regarding IPC is crucial for reducing HAIs.

Methods: This study assessed IPC knowledge, compliance, and associated factors among 207 HCWs. Data were analyzed for associations between demographic variables and IPC adherence. Comparisons were made with similar studies from Ethiopia, Nigeria, Ghana, and Kenya.

Results: Overall, 91.3% of HCWs demonstrated good IPC knowledge, with 95.2% aware of standard precautions. However, only 46.9% consistently practiced hand hygiene, and 45.4% regularly used personal protective equipment (PPE), indicating a gap between knowledge and practice. The main contributors to HAIs identified were poor hand hygiene (96.6%), inadequate sterilization (89.9%), and overcrowding (90.8%). No significant associations ($p > 0.05$) were found between IPC knowledge and age, gender, job role, or years of experience, suggesting uniform awareness among HCWs.

Conclusion: Despite high IPC knowledge, adherence to best practices remains suboptimal, primarily due to resource limitations and workload challenges. Continuous training, improved hospital infrastructure, and policy reinforcement are essential to enhance compliance and reduce HAIs.

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Introduction

Healthcare-associated infections (HAIs) remain a significant public health challenge, contributing to increased morbidity, prolonged hospital stays, and higher healthcare costs [1]. The World Health Organization (WHO) estimates that millions of patients worldwide are affected by HAIs annually, with developing countries bearing a disproportionately higher burden due to limited resources, inadequate infrastructure, and inconsistent adherence to infection prevention and control (IPC) measures [2]. It also reported that at least 7–10% of hospitalized patients in high-income countries and 15–20% in low- and middle-income countries (LMICs) acquire HAIs [3]. In low-resource settings, such as many healthcare facilities in Nigeria, the effectiveness of IPC practices among healthcare workers (HCWs) is crucial in reducing the transmission of infections within hospitals. Despite the availability of national and international guidelines on IPC, studies have shown that compliance with standard precautions among HCWs remains suboptimal [4]. Factors such as inadequate knowledge, lack of training, poor availability of personal protective equipment (PPE), work overload, and low risk perception contribute to poor IPC practices. Hand hygiene, proper use of PPE, safe injection practices, and proper waste disposal are essential in preventing the spread of infections; however, these measures are often inconsistently followed. Furthermore, noncompliance with IPC guidelines exposes HCWs to occupational infections such as hepatitis B, hepatitis C, and HIV, further underscoring the need for strict adherence to preventive measures [5].

The need for infection control in healthcare facilities is born out of the need to prevent Healthcare associated infections (HCAIs). They are today by far the most common complications among hospitalized patients [6]. Therefore, they are preventable and are considered an indicator of the quality of patient care and patient safety. HAIs are of significant concern to the healthcare system and a burden to the public health discipline. It contributes to significant morbidity and mortality, longer duration of hospitalization, as well as increased cost of treatment in both developed and resource-poor countries [1]. Even with the paucity of data in sub-Saharan Africa, HCAI remains a major cause of preventable morbidity and mortality in developing countries where infection rates are relatively higher due to poor infection control practices and overcrowding of hospitals [7]. Abuse and misuse of antibiotics have further enabled multi-drug-resistant organisms to flourish which can be transmitted as HCAIs [8]. To curtail this menace, it has become necessary to implement infection control measures so as to reduce the morbidity and mortality that comes with the HCAIs. Standard guidelines with various components from evidence-based care have been outlined to ensure global standards among healthcare workers (HCWs) for effective infection control [9].

Globally, hundreds of millions of people are affected every year by avoidable infections in health care [10]. In this respect, healthcare-associated infections (HCAIs) affect patients, healthcare workers (HCWs), support staff, medical students and patient attendants [11]. The prevalence in the developed world is reported to be 15% among hospitalized patients while it is as high as 37% for patients admitted into the Intensive Care Unit [12]. The prevalence in developing countries is somewhat higher with up to 19% prevalence of HCAI among hospitalized patients [13]. In the United States, the added expenditure as a result of HCAI is in excess of $4.5 billion while in the United Kingdom, a mortality rate of 13% and a prolongation of hospital stay by a factor of 2.5 was reported [14]. The associated burden of disease related to HCAIs is extremely high and the impact of HCAIs implies prolonged hospital stay, long-term disability, increased resistance of microorganisms to antimicrobials, massive additional financial burden for health systems, high costs for patients and their family, and unnecessary deaths [15]. HCAIs accounted for 16 million additional hospital stays in Europe with estimated total costs of €7 billion, and this also cost the United States healthcare system to loss an estimated $ 30–45 billion each year [16]. The worldwide indicated more than 1.4 million people are suffering from infections acquired in hospitals. Such risk is 2–20 times higher in developing countries [17]. Despite the simplicity and clarity of precautions; understanding how poor practice could fuel up the transmission, the practice among health care worker is still low. This problem is exacerbated in resource limited settings, like Africa [18]. Like other African countries, HCAI in Nigeria is a major public health problem with the magnitude not clearly known or not well studied [19]. Besides, adherence to the precautions of infection prevention practices among HCWs is questionable and not addressed well [20]. Conversely, the Federal Ministry of Health (FMoH) of Nigeria undertook a multitude of initiatives to protect patients and HCWs by setting standards and guidelines [21]. However, in many healthcare settings, resources are constrained and control of the risk of acquiring HCAIs is a bit challenging and HCWs lack adequate knowledge and motivation to implement the recommended infection prevention practice.

Furthermore, the magnitude of the problem of poor knowledge of IPC is particularly noticed in an environment where basic infection control measures are usually lacking or non-existent in health facilities [22]. Hospital-acquired infections are among the leading causes of death in the US and contribute to the shortage of human resources for health [23]. Severe Acute Respiratory Syndrome (SARS), recognized as the first deadly emerging and transmissible disease by the World Health Organization in the 21st century, was noted to have easily spread through close hospital contact with infected persons [24]. In fact, as SARS spread, it became obvious that many countries lacked the necessary infrastructure, facilities, equipment and trained personnel to provide appropriate infection control measures [17]. A hospital can provide a favourable transmission environment for the spread of infections; especially in facilities having staff with poor knowledge of IPC. Gaps have been identified in the knowledge and compliance of IPC among healthcare workers by some authors. With the rising rates of tuberculosis, hospital-acquired infections and other emerging and re-emerging diseases like SARS, Middle East Respiratory Syndrome (MERS) and COVID-19 internationally, it is necessary to take precautions to prevent infectious disease transmission in healthcare settings. The transmission of infections is possible in health facilities providing a wide range of health services (as found in the Primary Health Care (PHC) Centers). Hence, the need to ascertain the level of IPC knowledge among staff, because the determinants and availability of administrative control measures a significant step to break the chain of transmission of such infections.

Infection control in healthcare facilities places special emphasis on standard and additional (transmission-based) precautions [25]. Several scholars have worked on IPC within different levels of healthcare systems globally and more locally within Nigeria [19]. Very few investigated IPC knowledge at PHCs. Most authors agreed that healthcare workers in Nigeria were knowledgeable and compliant with standard precautions which is just an aspect of IPC. Others still held the view that the practice of IPC had remained very poor in healthcare settings [26]. However, the Ebola outbreak of 2014 could not be easily forgotten as it reawakened the inevitable need to observe IPC strategies, not just among healthcare workers but everybody in the West Africa sub-region (including Nigeria). This then underscored the fact that the responsibility of IPC should be that of everybody.

Infection prevention and control safe practices at a healthcare facility can be affected by a few factors, including knowledge on IPC, availability of a functional IPC program, availability of IPC guidelines and policies, training of staff and medical students on IPC, availability of personal protective equipment and infrastructure [27]. Healthcare workers being the first line of defense when it comes to HAI, must be knowledgeable on IPC practices. Important components of infection control programmes include basic measures for infection control, (i.e. standard and additional precautions); education and training of health care workers; protection of health care workers, (e.g. immunization against some diseases like hepatitis); identification of hazards and minimizing risks; routine practices essential to infection control such as aseptic techniques, use of single-use devices, appropriate reprocessing of instruments and equipment, antibiotic usage, management of blood/body fluid exposure, handling and use of blood and blood products and sound management of medical waste [2]. However, infection control comprises four major aspects which include administrative measures, environmental measures, personal protective measures and waste disposal measures in Nigeria, there is no data available on healthcare workers' level of IPC knowledge and adherence to IPC practices. In LDHMT healthcare facilities, to be precise, no study has been conducted on IPC knowledge and practices among healthcare workers. The fundamental approach to preventing and controlling the spread of HAI and addressing patient safety and delivering quality healthcare services involves having a knowledgeable workforce on IPC principles and a safe healthcare delivery practice. Therefore, this study aims to determine the level of IPC knowledge and practices among healthcare workers and their associated factors.

In Nigeria, healthcare facilities, particularly in public hospitals, face significant challenges in implementing effective IPC measures due to infrastructural deficits, irregular supply of essential IPC materials, and insufficient surveillance systems [26]. Additionally, occupational exposure to infectious diseases such as tuberculosis, hepatitis B, hepatitis C, and HIV remains a major concern for HCWs, emphasizing the need for stringent IPC compliance to protect both patients and healthcare personnel. Despite the critical role of IPC in preventing HAIs and ensuring patient safety, there is a limited body of research assessing IPC practices among HCWs in Nigerian healthcare settings. Understanding the current level of adherence to IPC measures, identifying gaps, and exploring barriers to compliance are essential for strengthening infection control strategies.

Healthcare-associated infections (HAIs) contribute significantly to morbidity, mortality, and increased healthcare costs, particularly in resource-limited settings. Effective infection prevention and control (IPC) measures are critical in reducing the burden of HAIs, protecting both patients and healthcare workers (HCWs) from infectious diseases such as hepatitis B, tuberculosis, and multidrug-resistant infections. Despite existing guidelines and policies, compliance with IPC practices among HCWs remains inconsistent due to inadequate training, limited access to protective equipment, and poor institutional enforcement. Given these concerns, this study is necessary to assess the current level of IPC adherence among HCWs, identify existing gaps, and explore barriers that hinder effective implementation.

Furthermore, the findings from this study will contribute to evidence-based policymaking and guide hospital administrators, public health officials, and government agencies in strengthening IPC programs. By assessing knowledge, attitudes, and practices regarding infection control, the study will help identify areas where additional training and resources are needed. The results will also support the development of institutional policies aimed at improving adherence to IPC protocols, ultimately reducing the incidence of HAIs. Given the increasing global concern over antimicrobial resistance and emerging infectious diseases, strengthening IPC measures is more important than ever. This study will, therefore, serve as a crucial step in promoting a culture of infection prevention, ensuring a safer healthcare environment for both patients and healthcare providers.

Materials and Method

Study Area and Design

This study was conducted at Irrua Specialist Teaching Hospital (ISTH), a tertiary healthcare facility located in Irrua, Edo State, Nigeria. ISTH serves as a referral center for infectious diseases and other specialized medical services, catering to patients from Edo State and neighboring states such as Kogi, Ondo, and Delta. The hospital is well known for its expertise in managing infectious diseases, particularly Lassa fever, making it a strategic location for studying infection prevention and control (IPC) practices among healthcare workers (HCWs). ISTH provides a wide range of medical services, including general and specialized outpatient care, emergency services, surgery, pediatrics, obstetrics and gynecology, internal medicine, and laboratory diagnostics and the hospital employs a diverse workforce of medical doctors, nurses, laboratory scientists, pharmacists, and other allied health professionals, all of whom play a crucial role in infection prevention. Given the hospital's high patient load, exposure to infectious diseases, and the need for strict infection control protocols, assessing the knowledge, practices, and challenges related to IPC among HCWs is essential. This study will help identify gaps in IPC compliance and provide insights to improve infection control strategies in a tertiary healthcare setting in Nigeria.

A descriptive cross-sectional design was used for this study. The study lasted for a period of 6 months.

Study Population

The study population comprise of healthcare workers at ISTH

Inclusion Criteria

Healthcare workers who have worked at ISTH for at least six months, who are directly involved in patient care or infection control practices, who are willing to provide informed consent to participate in the study and who were available during the period of data collection.

Exclusion Criteria

Those who have worked at ISTH for less than six months, administrative staff or HCWs not directly involved in IPC practices, HCWs on extended leave (e.g., maternity leave, study leave, or sick leave) during the study period and those who decline to give informed consent to participate.

Sample Size Determination

Using Cochran statistical formula [28].

$$N = \frac{z^2pq}{d^2}$$

Where n=minimum sample size

Z=standard normal deviate (reliability coefficient at 95% confidence interval, standard value is1.96)

d= degree of accuracy or margin of error at 5%

p= prevalence (report of 14.3%-point prevalence in a study done in three states in northern on infection prevention and control implementation in selected healthcare facilities in Nigeria) [29].

P=14.3% =0.14

q=1-p =1-0.143 =0.857

d=degree of precision at confidence level of 95%=0.05

Substituting into the formula above;

n= (1.96)2x0.143x0.857/ (0.05)2

n=188

Non-Response Rate=10%of 188=19

Sample size is=minimum sample size + nonresponsive rate

188+ 19=164

Sample size=207

Sampling Technique

A stratified random sampling technique was used to ensure proportionate representation of different categories of HCWs.

Stage 1: The workforce was stratified into doctors, nurses, laboratory scientists, pharmacists, and other allied health workers.

Stage 2: A simple random sampling method was applied within each stratum to select participants.

Method of Data Collection

Data was collected using structured interviewer administered questionnaires focusing on demographic characteristics (section A), Knowledge of infection prevention and control among healthcare workers (section B), Factors responsible for hospital-acquired infection (Section C), Infection prevention and control practices (section D). Questions were designed after an intensive literature review by the research team and was distributed to the selected individuals within the inclusion criteria. Questionnaires were distributed and continued until the required number was completed.

Data Analysis

Data collected was entered into a spreadsheet and analyzed using the Statistical Package for Scientific Solutions (SPSS) database program version 23. Summary statistics for mean, percentage standard deviation and variance were used where appropriate. Chi square test and odd ratio was performed for significance analysis and measure of dispersion. Level of significance test was set at $p \leq 0.05$.

Results

Socio-Demographic Characteristics of Respondents

Table 1 shows the socio-demographic characteristics of the respondents. Two hundred and seven (207) respondents were recruited for this study comprising 45.9% males and 54.1% females. Majority of the respondents (25.1%) were in age group 25 – 34 years, 74.4% of the respondents were married, 29.5% of the respondents were from Esan, 38.2% of the respondents were nurses, 28.5% work in the nursing services, while 32.4% had 1 – 5 years working experience.

Table 1: Socio-Demographic Characteristics of the Respondents

Variables	Frequency (n = 207)	Percent (%)
Age group (years)		
20 – 24	28	13.5
25 – 34	52	25.1
35 – 44	49	23.7
45 – 54	47	22.7
55 years and above	31	15.0
Gender		
Male	95	45.9
Female	112	54.1
Marital Status		
Single	53	25.6
Married	154	74.4
Ethnic Group		
Esan	61	29.5
Beni	41	19.8
Igbo	40	19.3
Yoruba	45	21.7
Etsako/Afemai	20	9.7
Job Role		
Doctor	51	24.6
Nurse	79	38.2
Pharmacist	28	13.5
Medical Lab Scientist	30	14.5
Community health workers	19	9.2
Department		
Internal Medicine	33	15.9
Surgery	15	7.2
Pediatrics	22	10.6
Obstetrics & Gynecology	20	9.7
Laboratory Services	30	14.5
Pharmacy	28	13.5
Nursing Services	59	28.5
Years of Experience		
Less than 1 year	43	20.8
1 – 5 years	67	32.4
6 – 10 years	41	19.8
More than 10 years	56	27.0

Knowledge of Infection Prevention and Control

Table 2 shows the knowledge of Infection Prevention and Control among the respondents. The results obtained showed that 95.2% of the respondents were aware of the standard precautions for infection prevention and control, 90.9% knew the recommended duration of hand wash, 74.4% opined that Hand hygiene before and after patient contact is the most effective way to prevent hospital-acquired infection, while 72.5% agreed that the correct way to disinfect reuseable equipment is to sterilize or disinfect based on the level of contamination and equipment type.

Table 2: Knowledge of Infection Prevention and Control among the Respondents

Variables	Frequency (n = 207)	Percent (%)
Aware of the standard precautions for infection prevention and control		
Yes	197	95.2
No	10	4.8
The recommended duration for handwashing with soap and water		
Less than 10 seconds	4	1.9
10–15 seconds	6	2.9
At least 20 seconds	188	90.9
I don't know	9	4.3
The most effective way to prevent hospital-acquired infections		
Wearing gloves only	17	8.2
Hand hygiene before and after patient contact	154	74.4
Using antibiotics for all patients	10	4.8
Frequent use of disinfectants on floors	26	12.6
PPE necessary when handling blood or body fluids		
Gloves	138	66.7
Face mask	122	58.9
Goggles/face shield	76	38.1
Gown	131	63.3
How should used needles and sharps be disposed		
Recap and discard in a regular waste bin	150	72.5
Dispose of directly into a puncture-proof sharps container	13	6.3
Break the needle before disposal	24	11.5
Leave it on a tray for cleaning staff to handle	20	9.7
Which of the following statements about hand hygiene is correct		
Handwashing is only necessary when hands are visibly dirty	74	35.7
Alcohol-based hand rub is more effective than soap and water	66	31.9
Gloves eliminate the need for hand hygiene	48	23.2
Hand hygiene is not required when wearing PPE	19	9.2
When should standard precautions be applied		
Only for patients known to have infections	16	7.7
Only in high-risk hospital areas (e.g., ICU, surgical ward)	21	10.1
For all patients, regardless of infection status	155	74.9
Only when there is visible contamination with blood or body fluids	15	7.3
The correct way to disinfect reusable medical equipment		
Wipe with dry cloth and reuse	16	7.7
Clean with soap and water only	14	6.8
Sterilize or disinfect based on the level of contamination and equipment type	150	72.5
Use alcohol wipes for all types of equipment	27	13.0

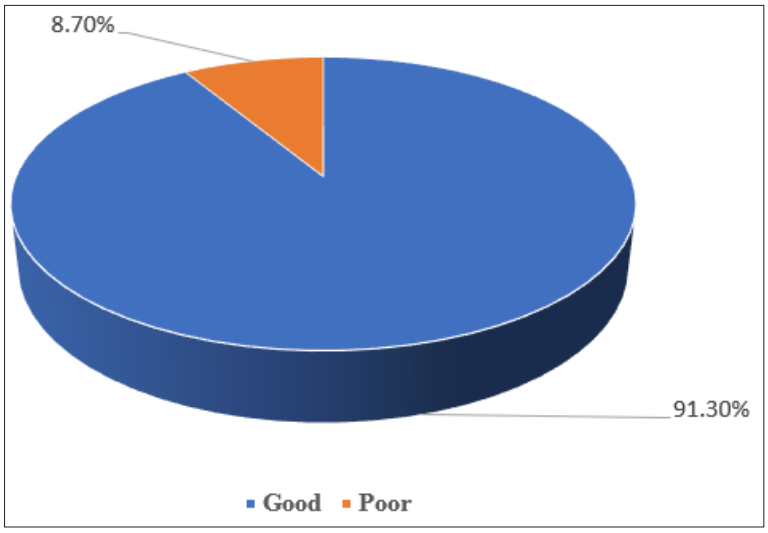

Figure 1: General Knowledge of Infection Prevention and Control

Figure 1 shows the general knowledge of the respondents on Infection Prevention and Control. The results obtained showed that 91.3% of the respondents had good knowledge of infection prevention and control, but 8.7% demonstrated poor knowledge.

Table 3 showed the association between socio-demographic variables and knowledge of IPC. The results obtained showed that there was no statistically significant difference ($p>0.05$) between level of gender, age, job role, years of experience and other socio-demographic variables with knowledge of IPC among the respondents.

Table 3: Association between Socio-Demographic Variables and Knowledge of IPC

Variables	Good	Poor	Total	Test Statistics	p-value
Age group (years)					
20 – 24	23 (11.1%)	5 (2.4%)	28 (13.5%)		
25 – 34	45 (21.7%)	7 (3.4%)	52 (25.1%)		
35 – 44	46 (22.2%)	3 (1.4%)	49 (23.7%)	$X^2 = 1.057$	0.478
45 – 54	45 (21.7%)	2 (1.0%)	47 (22.7%)		
55 years and above	30 (14.5%)	1 (0.5%)	31 (15.0%)		
Gender					
Male	87 (42.0%)	8 (3.9%)	95 (45.9%)		
Female	102 (49.3%)	10 (4.8%)	112 (54.1%)	$X^2 = 1.254$	0.366
Marital Status					
Single	46 (22.2%)	7 (3.4%)	53 (25.6%)		
Married	143 (69.1%)	11 (5.3%)	154 (74.4%)	$X^2 = 1.541$	0.442
Ethnic group					
Esan	58 (28.0%)	3 (1.4%)	61 (29.5%)		
Beni	35 (16.9%)	6 (3.0%)	41 (19.8%)		
Igbo	35 (16.9%)	5 (2.4%)	40 (19.3%)	$X^2 = 1.200$	0.455
Yoruba	43 (20.8%)	2 (1.0%)	45 (21.7%)		
Etsako/Afemai	18 (8.7%)	2 (1.0%)	20 (9.7%)		
Job Role					
Doctor	46 (22.2%)	5 (2.4%)	51 (24.6%)		
Nurse	76 (36.7%)	3 (1.4%)	79 (38.2%)		
Pharmacist	23 (11.1%)	5 (2.4%)	28 (13.5%)	$X^2 = 1.256$	0.596
Medical Lab Scientist	27 (13.0%)	3 (1.4%)	30 (14.5%)		
Community health workers	17 (8.2%)	2 (1.0%)	19 (9.2%)		
Years of Experience					
Less than 1 year	40 (19.3%)	6 (3.0%)	43 (20.8%)		
1 – 5 years	60 (29.0%)	7 (3.4%)	67 (32.4%)	$X^2 = 1.133$	0.712
6 – 10 years	39 (18.8%)	2 (1.0%)	41 (19.8%)		
More than 10 years	53 (25.6%)	3 (1.4%)	56 (27.0%)		

*Values are significant when $p<0.05$.

Factors Responsible for Hospital Acquired Infections

Table 4 shows the factors responsible for hospital-acquired infections among the respondents. From the results obtained, 96.6% of the respondents agree that poor hand hygiene among healthcare workers contributes to hospital-acquired infections, 89.9% agreed that inadequate sterilization of medical equipment causes hospital-acquired infections, 77.3% identified prolonged hospital stay, use of invasive devices and weakened immune system as patient-related factors that increased the risk of hospital-acquired infections, while 74.9% identified poor ventilation in hospital wards, contaminated surfaces and equipment and lack of clean water supply as environmental factors that contributes to hospital-acquired infections.

Table 4: Factors Responsible for Hospital Acquired Infections among the Respondents

Variables	Frequency (n = 207)	Percent (%)
Poor hand hygiene among healthcare workers contributes to hospital-acquired infections		
Yes	200	96.6
No	7	3.4
The following is a major factor contributing to hospital-acquired infections		
Poor hand hygiene	198	95.7
Inadequate sterilization of medical equipment	186	89.9
Overcrowding in hospitals	188	90.8
Lack of personal protective equipment (PPE)	179	86.5
How often do you observe healthcare workers failing to change gloves between patient contacts		
Always	67	32.4
Often	84	40.6
Sometimes	20	9.7
Never	36	17.4
Do you think understaffing in hospitals contributes to hospital-acquired infections		
Yes	38	18.4
No	169	81.6
Which patient-related factor increases the risk of hospital-acquired infections		
Prolonged hospital stay	10	4.8
Use of invasive devices (e.g., catheters, ventilators)	23	11.1
Weakened immune system	14	16.8
All of the above	160	77.3
Which environmental factor contributes most to hospital-acquired infections		
Poor ventilation in hospital wards	11	5.3
Contaminated surfaces and equipment	22	10.6
Lack of clean water supply	19	9.2
All of the above	155	74.9

Infection Prevention and Control Practices

Table 5 shows the practice of Infection Prevention and Control among the respondents. The results obtained that 46.9% said they always perform hand hygiene before and after patient contact, 45.4% always wear personal protective equipment when required, 59.9% opined that they disinfect medical equipment after patient use at the end of each shift, 42.5% said they always follow the hospital's guidelines on isolation precautions for infectious patients, while 74.9% said they immediately was the affected area and report it when exposed to a patient's blood or body fluids.

Table 5: Practice of Infection Prevention and Control among the Respondents

Variables	Frequency (n = 207)	Percent (%)
Do you always perform hand hygiene before and after patient contact		
Yes, always	97	46.9
Sometimes	70	33.8
Rarely	19	9.2
Never	21	10.1
How often do you wear personal protective equipment (PPE) (e.g., gloves, masks, gowns) when required		
Always	94	45.4
Often	76	36.7
Sometimes	23	11.1
Never	14	6.8

How frequently do you disinfect medical equipment after patient use		
After every patient	17	8.2
At the end of each shift	124	59.9
Occasionally	40	19.3
Rarely/Never	26	12.6
Do you follow the hospital's guidelines on isolation precautions for infectious patients		
Yes, always	88	42.5
Sometimes	72	34.8
Rarely	16	7.7
I am not aware of such guidelines	31	15.0
What is your response when exposed to a patient's blood or body fluids (e.g., needlestick injury, splash)	155	74.9
Immediately wash the affected area and report it	18	8.7
Ignore it if there's no visible wound	24	11.6
Clean it later when I have time	10	4.8
I don't know the correct procedure		
How often do you use alcohol-based hand rub when soap and water are unavailable		
Always	84	40.6
Often	86	41.5
Sometimes	28	13.5
Never	9	4.3

Discussion

Knowledge of infection prevention and control (IPC) was high among healthcare workers (HCWs) in this study, with 91.3% demonstrating good knowledge, 95.2% aware of standard precautions, and 90.9% correctly identifying the recommended handwashing duration. This aligns with findings at Benue State University Teaching Hospital, Makurdi, Nigeria, where 89% of HCWs had strong IPC awareness [30]. However, at Black Lion Hospital, Addis Ababa, Ethiopia, while 87% of HCWs were knowledgeable, compliance with standard precautions remained low, indicating a gap between knowledge and practice [31]. Knowledge of hand hygiene as the most effective way to prevent hospital-acquired infections (HAIs) was recognized by 74.4% of respondents, similar to findings at Korle-Bu Teaching Hospital, Accra, Ghana, where 78% of HCWs identified hand hygiene as a key IPC measure [20]. However, misconceptions persist; 23.2% of respondents in this study believed gloves eliminate the need for hand hygiene, a misconception also reported at Kenyatta National Hospital, Nairobi, Kenya, where 26% of HCWs held the same belief [32]. Additionally, only 72.5% correctly identified proper disposal of needles and sharps, mirroring findings at Goba Referral Hospital, Bale Zone, Ethiopia, where 69% adhered to sharps disposal guidelines [33]. Knowledge alone does not guarantee compliance, emphasizing the need for regular training and reinforcement of best practices.

This study identified poor hand hygiene (96.6%), inadequate sterilization of medical equipment (89.9%), and overcrowding (90.8%) as major contributors to HAIs. These findings align with a study at Obafemi Awolowo University Teaching Hospital, Nigeria, where similar factors were reported as key drivers of HAIs [34]. Additionally, prolonged hospital stay, use of invasive devices, and weakened immunity (77.3%) were recognized as patient-related risks, consistent with research at Felege-Hiwot Teaching Hospital, Ethiopia [35]. Addressing these challenges requires enhanced IPC protocols, staff training, and improved healthcare infrastructure to minimize infection risks.

This study included 207 healthcare workers (HCWs), with 54.1% female and 45.9% male, reflecting global trends where women dominate frontline healthcare roles [36]. Similar studies in Ethiopia report higher IPC compliance among female HCWs, particularly in hand hygiene and PPE use [37]. The majority of respondents were aged 25–34 years (25.1%), consistent with studies in Nigeria, where younger HCWs form the bulk of the workforce. However, research suggests older HCWs (above 45 years) adhere better to IPC protocols due to greater experience. Nurses made up 38.2% of respondents, followed by doctors (24.6%) and laboratory scientists (14.5%), aligning with studies where nurses demonstrate higher IPC compliance due to frequent patient interaction [38]. However, no significant association was found between professional roles and IPC knowledge in this study. Regarding experience, 32.4% had 1–5 years of practice, while 27% had over 10 years. The study found no significant association ($p > 0.05$) between age, gender, job role, or years of experience and IPC knowledge, indicating uniform awareness among HCWs. Similarly, a study at Benue State University Teaching Hospital, Nigeria, found no demographic differences in IPC knowledge [39]. These findings emphasize the need for continuous IPC training and policy enforcement to ensure consistent adherence across all HCW groups.

Knowledge of infection prevention and control (IPC) was high among healthcare workers (HCWs) in this study, with 91.3% demonstrating good knowledge, 95.2% aware of standard precautions, and 90.9% correctly identifying the recommended handwashing duration. This aligns with findings at Benue State University Teaching Hospital, Makurdi, Nigeria, where 89% of HCWs had strong IPC awareness [40]. However, at Black Lion Hospital,

Addis Ababa, Ethiopia, while 87% of HCWs were knowledgeable, compliance with standard precautions remained low, indicating a gap between knowledge and practice [41]. Knowledge of hand hygiene as the most effective way to prevent hospital-acquired infections (HAIs) was recognized by 74.4% of respondents, similar to findings at Korle-Bu Teaching Hospital, Accra, Ghana, where 78% of HCWs identified hand hygiene as a key IPC measure [42]. However, misconceptions persist; 23.2% of respondents in this study believed gloves eliminate the need for hand hygiene, a misconception also reported at Kenyatta National Hospital, Nairobi, Kenya, where 26% of HCWs held the same belief [43]. Additionally, only 72.5% correctly identified proper disposal of needles and sharps, mirroring findings at Goba Referral Hospital, Bale Zone, Ethiopia, where 69% adhered to sharps disposal guidelines [44]. Knowledge alone does not guarantee compliance, emphasizing the need for regular training and reinforcement of best practices. The study found no significant association ($p>0.05$) between age, gender, job role, or years of experience and IPC knowledge, indicating uniform awareness among HCWs. These findings emphasize the need for continuous IPC training and policy enforcement to ensure consistent adherence across all HCW groups.

Factors responsible for hospital-acquired infections (HAIs) identified in this study include poor hand hygiene (96.6%), inadequate sterilization of medical equipment (89.9%), and overcrowding (90.8%), consistent with findings at Obafemi Awolowo University Teaching Hospital, Nigeria, where these were major contributors to HAIs [44]. Additionally, 77.3% of respondents recognized prolonged hospital stays, use of invasive devices, and weakened immunity as patient-related risks, similar to findings at Felege-Hiwot Teaching Hospital, Ethiopia [45]. Environmental factors such as poor ventilation, contaminated surfaces, and lack of clean water supply (74.9%) were also identified as significant risks, aligning with studies at Korle-Bu Teaching Hospital, Ghana, where inadequate infrastructure was a major challenge [46]. Furthermore, 81.6% of respondents acknowledged understaffing as a contributor to HAIs, mirroring reports from Kenyatta National Hospital, Kenya, where excessive workload led to poor IPC adherence [47]. Addressing these challenges requires enhanced IPC protocols, improved hospital infrastructure, regular staff training, and adequate resource allocation to minimize infection risks and improve patient safety.

Practice of infection prevention and control (IPC) among respondents revealed that 46.9% consistently performed hand hygiene, 45.4% always used personal protective equipment (PPE), and 42.5% strictly followed isolation guidelines, indicating gaps in adherence. Similarly, a study at Bale Zone Hospitals, Ethiopia, found suboptimal IPC compliance despite high knowledge levels [48]. Additionally, only 59.9% disinfected medical equipment after patient use, which poses a risk for hospital-acquired infections (HAIs). However, 74.9% of respondents took immediate action after exposure to blood or body fluids, reflecting good occupational safety awareness. Limited adherence to IPC practices may be due to work overload, inadequate resources, and lack of regular training, as reported in similar studies at Kenyatta National Hospital, Kenya, where compliance improved with better institutional support [47]. Strengthening continuous IPC training, supervision, and ensuring PPE availability is essential to enhance compliance and minimize HAIs in healthcare settings.

Conclusion

This study emphasizes the need for continuous IPC training, adequate resource allocation, and strengthened hospital policies to improve compliance among healthcare workers. Institutional support, including better staffing, infrastructure, and strict monitoring, is crucial for reducing hospital-acquired infections. Additionally, fostering a culture of safety, enforcing adherence to IPC protocols, and ensuring the availability of PPE and hygiene facilities will enhance infection control. Future research should explore barriers to adherence, assess the impact of targeted interventions, and evaluate long-term IPC sustainability strategies in healthcare settings. Effective infection prevention and control (IPC) is essential for reducing hospital-acquired infections (HAIs) and ensuring the safety of both healthcare workers and patients. While knowledge of IPC among healthcare workers was high in this study. However, gaps in adherence highlight the need for targeted interventions.

To improve compliance and strengthen IPC practices, the following recommendations are proposed:

- Strengthen Continuous IPC Training: Implement regular workshops and refresher courses to enhance knowledge and adherence to IPC guidelines.
- Ensure Adequate Resource Availability: Provide sufficient personal protective equipment (PPE), hand hygiene facilities, and sterilization materials to support effective infection control.
- Improve Hospital Infrastructure: Address overcrowding, enhance ventilation systems, and ensure clean water supply to reduce environmental risks associated with HAIs.
- Enhance Monitoring and Compliance: Establish strict hospital policies with routine audits, supervision, and enforcement of IPC protocols.
- Address Staffing Shortages: Recruit and retain adequate healthcare personnel to reduce workload and improve adherence to IPC measures.

Limitation of Study

- Potential Reporting Bias – Self-reported data may be influenced by recall or social desirability bias, affecting accuracy.
- Non-Response Bias – Some HCWs may decline participation, potentially affecting representativeness.
- Limited Generalizability – Findings from ISTH may not fully apply to other healthcare settings, especially primary and secondary facilities.

Ethical Consideration

Institutional Consent

The research was approved by the Department of Community Medicine, Irrua Specialist Teaching Hospital; Irrua Ethical approval for the study was sought from the Heath Research Ethics Committee of Irrua Specialist Teaching Hospital. The study was carried out in line with local, national and international ethics code of and guideline. The participant confidentiality was maintained by ensuring there are no identifiers to identify the participants in any data collection tool. Questions were asked in such setting and manner that grant participant privacy at time chosen to be convenient for them.

Individual Consent

Written informed consent was obtained from respondents before questionnaire were administered. The purpose of the research was explained to the respondents as best as possible and they were made to understand that information gotten was strictly confidential and purely for academic purposes.

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Conflict of Interest

None to declare.

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Availability of Data and Materials

The authors declare consent for all available data present in this study.

Authors' Contributions

The entire study procedure was conducted with the involvement of all writers.

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