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NURSES' KNOWLEDGE, PRACTICES, AND PERCEIVED CHALLENGES IN THE PREVENTION AND CONTROL OF HOSPITAL-ACQUIRED INFECTIONS IN LAHORE, PUNJAB

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Abstract

Background: *Due to their substantial contribution to patient morbidity, mortality, and extended hospital stays, hospital-acquired infections (HAIs) continue to pose a serious danger to world health. As the backbone of healthcare delivery, nurses play a critical role in putting infection prevention and control (IPC) plans into practice. However, systemic hurdles and differences between clinical practice and understanding frequently obstruct the best possible infection control results.*

Aim & Objective: *The purpose of this study is to evaluate nurses' infection prevention and control (IPC) of hospital-acquired infections (HAIs) knowledge, practices, and perceived challenges in order to pinpoint important implementation gaps.*

Methodology: *A descriptive cross-sectional study was carried out among registered nurses working in both public and private institutions in Punjab, Pakistan. The method of convenient sampling was used. A verified, structured questionnaire that followed CDC and WHO IPC requirements was used to gather data. Demographic information, practices, knowledge, and perceived institutional and individual challenges were all measured using the instrument.*

Results: *94.9% of participants comprehended the need of hand cleanliness, while the majority (96.2%) acknowledged the need for face masks in the treatment of respiratory infections. Additionally, 91.0% supported regular surface disinfection, and 96.2% recognized the importance of waste segregation in infection prevention. There is a noticeable knowledge gap, too, as just 52.6% of respondents correctly recognized that alcohol-based hand massages are not always a good alternative to hand washing. Participants also mentioned a number of issues that impede constant IPC compliance, such as a lack of administrative*

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support, high patient-to-nurse ratios, staff shortages, a lack of personal protective equipment (PPE), and a lack of continuous training.

Conclusion: *It is admirable that nurses have a basic understanding of IPC, but systemic issues and inconsistent practice demand urgent correction. Strengthening IPC practices and reducing the risk of HAIs requires specialised training programs, sufficient funding, and supporting institutional policies.*

Introduction

Nosocomial infections, commonly known as hospital-acquired infections (HAIs), are illnesses that were not present or incubating at the time of admission but were contracted while receiving hospital care. Usually, these infections show up 48 hours or longer after being admitted to the hospital. Depending on the type of exposure and the infection, healthcare-associated infections may also develop within 30 days following surgery or within 3 days following discharge (Organization 2016). Since incubation times vary and infection onset is complex, each suspected HAI case needs to be evaluated separately to ascertain whether hospitalisation is directly related to it. This is essential for comprehending the mechanisms of transmission and putting into practice efficient preventative measures (Saraswathy, Nalliah et al. 2021). Surgical site infections, urinary tract infections linked to catheter use, central line-associated bloodstream infections, and ventilator-associated pneumonia are examples of healthcare-associated infections (HAIs) (Rai, Yuet-Meng et al. 2016). These infections are a major cause of longer hospital stays, higher medical expenses, and higher rates of morbidity and death among patients (Shahida, Islam et al. 2016).

Healthcare practitioners must work together to prevent hospital-acquired infections (HAIC), which has become a critical aspect of patient safety. To promote coordinated care and standardize infection control procedures across disciplines, nurses and physicians must learn from, with, and about one another. Such interprofessional cooperation is essential for effective infection prevention (Organization 2011). Health care workers (HCWs) are at increasing risk of acquiring (HAIs) due to occupational exposure including; exposure to blood and body fluids, direct contact with patients or contaminated environmental surfaces with in the patient's surrounding (Haque, Sartelli et al. 2018). In this regard, nurses play a crucial role in infection prevention and control (IPC) as they are both frontline defenders and possible vectors of illness transmission.

The incidence of HAIs can be considerably impacted by nursing practices and procedures. On the one hand, by following evidence-based procedures, nurses can successfully avoid infections. Conversely, poor nursing practices may be a factor in the transmission of infections. Thus, nurses play a crucial and essential role in preventing HAIs in order to protect patients and uphold the standard of healthcare (Mustafa and Lahu 2019). An essential component of any hospital-based quality improvement program is the nurse. They are in a unique position to affect infection control results because of their ongoing presence at the patient's bedside and participation in a variety of care procedures. Thus, nurses' knowledge, attitudes, and behaviours have a big impact on how well IPC programs work (Kakkar, Bala et al. 2021).

The inadequate application of evidence-based practices and the low involvement of healthcare providers in quality improvement programs are two of the most urgent issues facing infection control. Many healthcare facilities, especially in poor nations, suffer from a lack of resources, surveillance systems, and training programs in spite of established rules (Iliyasu, Dayyab et al. 2018). Efforts to successfully address the issue are further complicated by the fact that the prevalence of HAI is frequently underestimated or not recognised due to the diagnostic challenge and inadequate capacity for proper surveillance.

Furthermore, hospital patients are extremely susceptible to infections, even from low-virulence microbes, particularly those with weakened immune systems. Broad-spectrum antibiotics are commonly used to treat HAIs, which can promote antibiotic resistance and worsen the morbidity and mortality linked to these infections (Mythri and Kashinath 2014). IPC measures must therefore be proactive, ongoing, and backed by front-line employees as well as institutional leadership.

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It's also critical to remember that encouraging infection control compliance requires strong organisational support. Research has shown that the availability of supportive institutional environments, nurses' knowledge, and their adherence to infection prevention policies are significantly positively correlated (Kamunge, Cahill et al. 2015). However, even experienced nurses could not consistently use best practices if they don't receive regular training, performance reviews, and feedback channels.

The growing prevalence of HAIs in healthcare environments necessitates a quick review of the current framework and tactics. Continuous evaluation, organised instruction, and performance tracking are necessary for effective infection prevention. Developing lasting interventions requires recognising and addressing the facilitators and barriers affecting nurses' knowledge and practice. Accordingly, one of the best ways to prevent HAIs and enhance patient outcomes is to provide nursing staff with frequent professional development (Mustafa and Lahu 2019). Hospital-acquired infections result in higher rates of morbidity and mortality, longer hospital stays, and significant financial costs. The training, expertise, and practices of nursing professionals—who continue to be at the core of patient care delivery—must thus be a major emphasis of efforts to reduce HAIs (Mpinda-Joseph, Anand Paramadhas et al. 2019).

Literature review

Nosocomial infections, also referred to as healthcare-acquired infections (HAIs), continue to be a major global public health concern, especially in light of new health emergencies. When a patient is admitted to the hospital, these infections are characterised as states that are either absent or incubating (Jahngir, Qureshi et al. 2023). Because healthcare professionals—especially nurses, who are at the forefront of patient care—apply infection prevention and control (IPC) strategies inconsistently, the prevalence of HAIs remains high despite improvements in medical practices and technology breakthroughs.

An increasing amount of research reveals a concerning pattern: nurses frequently exhibit weak practice and awareness of general infection prevention techniques (Campo and Remon 2025). This deficiency is especially noticeable in the use of care packages, transmission-based precautions, and standard precautions—all of which are essential elements of successful IPC (Sodhi, Shrivastava et al. 2013).

Hand hygiene is often overlooked or not followed correctly, despite being the most straightforward and efficient way to avoid HAIs. Handwashing correctly and consistently can significantly lower the prevalence of HAIs in healthcare settings, according to numerous research (Iliyasu, Dayyab et al. 2016). Despite being the most straightforward and efficient way to avoid HAIs, hand hygiene is commonly disregarded or not properly practiced. Several studies have demonstrated that regular and appropriate handwashing can significantly lower the prevalence of healthcare-associated infections (HAIs) (Sarani, Balouchi et al. 2015). The implementation of IPC initiatives around the world is hampered by a number of issues. Effective IPC implementation has been shown to be severely hampered by issues including poor nurse-to-patient ratios, a lack of financing, and a lack of human resources, even in intensive care units (Swaminathan, Prasad et al. 2017).

Healthcare organisations' capacity to regularly monitor, assess, and implement infection control procedures is jeopardised by these systemic constraints.

A clear reminder of the pressing need for effective infection prevention measures was provided by the COVID-19 pandemic. It underlined how crucial it is to utilise personal protective equipment (PPE) correctly, which includes using masks, hand hygiene procedures, and appropriate donning and doffing techniques. Both physicians and nurses need to be knowledgeable about choosing the right PPE and following stringent guidelines for its use and disposal, even though applying it might be difficult. However, fundamental precautions like practicing good hand hygiene should always come first (Ambigapathy, Rajahram et al. 2020). Nurses and other healthcare workers (HCWs) are at risk of getting infections themselves in addition to being essential in preventing HAIs. Therefore, it is crucial that all hospital staff members, regardless of position, are fully aware of and strictly comply to IPC policies. Healthcare personnel and patients can be protected against nosocomial infections by adhering to institutional protocols and

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established standard precautions (Monegro, Muppidi et al.).

The claim that nurses' practice and expertise have a major impact on HAI prevalence rates is supported by empirical research. The prevalence of HAIs among hospitalised patients and healthcare workers is significantly decreased when nurses follow best practices and are well-informed (Amoran and Onwube 2013, Ocran and Tagoe 2014). However, research also shows that nurses' levels of practice and understanding vary greatly throughout healthcare systems and geographical areas. Many medical professionals continue to lack thorough comprehension and struggle to apply their expertise in a consistent clinical setting (Cardo, Dennehy et al. 2010, Bhandari and Rairikar 2016). For instance, a study carried out in Pakistan discovered that a sizable percentage of nursing staff members exhibited subpar HAI prevention methods (Zaidi, Javed et al. 2016). According to a related study conducted in Iran, 42% of nurses used traditional and frequently antiquated ways to prevent HAIs, while 43% of nurses lacked sufficient understanding (Sarani, Balouchi et al. 2015). A study carried out in two tertiary institutions in Nigeria revealed that healthcare providers' median practice score was just 50.8%, indicating a significant gap in effective IPC practice (Ogoina, Pondei et al. 2015). These conclusions are supported by additional Ethiopian evidence. According to a Bahir Dar research, HCWs' overall HAI prevention practice was just 54.2%, suggesting significant space for improvement. Even lower numbers were found in another study conducted in the regional state referral hospitals in Amhara, where nurses achieved an average knowledge score of 40.7% and a practice score of 48.7% (Gulilat and Tiruneh 2014, Teshager, Engeda et al. 2015). These figures highlight the disparities in readiness around the world and the urgent need for healthcare staff to get standardized, efficient IPC training and enforcement.

In conclusion, the body of research demonstrates unequivocally the critical role nurses play in reducing hospital-acquired illnesses. Nonetheless, a crucial area for improvement is highlighted by the continued existence of knowledge gaps, inadequate training, and inconsistent practices. Important tactics for lowering the burden of HAIs and enhancing patient safety outcomes include bolstering nursing education, boosting institutional support, and encouraging evidence-based IPC procedures.

In order to evaluate nurses' knowledge, practices and challenges in preventing and controlling hospital-acquired infections (HAIs) in a few public and private hospitals in Punjab, Pakistan, this study used a descriptive cross-sectional quantitative methodology. Registered nurses with at least six months of clinical experience who worked in emergency services, intensive care units, surgical units, and inpatient wards were among the target audience. In order to guarantee representative inclusion from various hospital units, a convenient sampling procedure was employed. WHO and CDC IPC recommendations served as the basis for the development of a structured, self-administered questionnaire. Demographic information, knowledge evaluation using objective items, and practice evaluation using a Likert scale comprised the three elements of the tool.

Methodology

After receiving ethical permission from the appropriate institutional review board and hospital authorities' authorisation, data collection took place over a period of four weeks. Participants gave their informed consent, and all information was kept private. In order to minimise interference with clinical activities, questionnaires were distributed and collected during shift breaks. Descriptive statistics (frequencies, means, and standard deviations) were used to summarize the results of the data analysis, which was conducted using SPSS version 23.0. Throughout the whole research procedure, ethical norms such as the ability to withdraw, anonymity, and voluntary participation were rigorously adhered to.

Results

Demographic Characteristics of Participants

The study involved 78 nurses in all. According to the demographic statistics, women made up aconsiderable majority of the sample (78.2%), while men made up 21.8%. The majority of participants (66.7%) were in the 21–30 age range, followed by the 31–40 age group (26.7%) and the 41–50 age group (6.4%). 48.7% of respondents had one to five years of work experience, 19.2% had six to ten years and beyond ten years, and 12.8% had less than a year. In the past year, just 42.9% of respondents said they

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had attended IPC training.

Table 01: Demographic Characteristics of Participants (N = 79)

Variable	Category	Frequency (%)
Gender	Male	17 (21.8%)
	Female	61 (78.2%)
Age	21–30 years	52 (66.7%)
	31–40 years	21 (26.9%)
	41–50 years	5 (6.4%)
Experience	<1 year	10 (12.8%)
	1–5 years	38 (48.7%)
	6–10 years	15 (19.2%)
	>10 years	15 (19.2%)
IPC Training in Last Year	Yes	33 (42.9%)
	No	44 (57.1%)

Knowledge of Infection Prevention and Control (IPC)
Participants showed a thorough understanding of the fundamental IPC principles. 96.2% of respondents acknowledged the need for face masks in the treatment of respiratory infections, and nearly all (94.9%) grasped the need of hand cleanliness. Furthermore, 96.2% of respondents recognised the need of waste segregation in lowering infection risks, and 91.0% agreed that surfaces should be disinfected following each patient interaction. Only 52.6% of respondents correctly indicated that alcohol-based hand massages do not always substitute handwashing, indicating a knowledge gap about their proper usage.

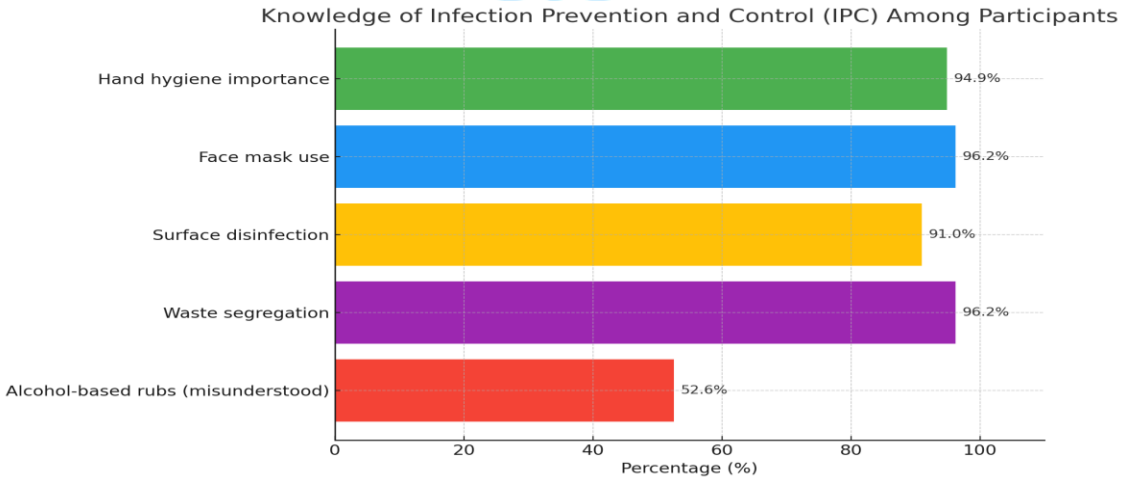

Figure 1: Knowledge of Infection Prevention and Control (IPC)

Self-Reported Practices of IPC Measures
In terms of daily practice, 87.2% of participants said they always wore face masks during procedures that were prone to infection, and 88.5% said they always wore gloves when necessary. 82.1% of respondents always cleaned and disinfected equipment after each use, and the majority (85.9%) always disposed of medical waste in the appropriate containers. While wearing PPE, a somewhat smaller fraction (79.5%) refrained from touching their faces. Remarkably, only 65.4% of respondents regularly cleaned their hands before and after interacting with patients.

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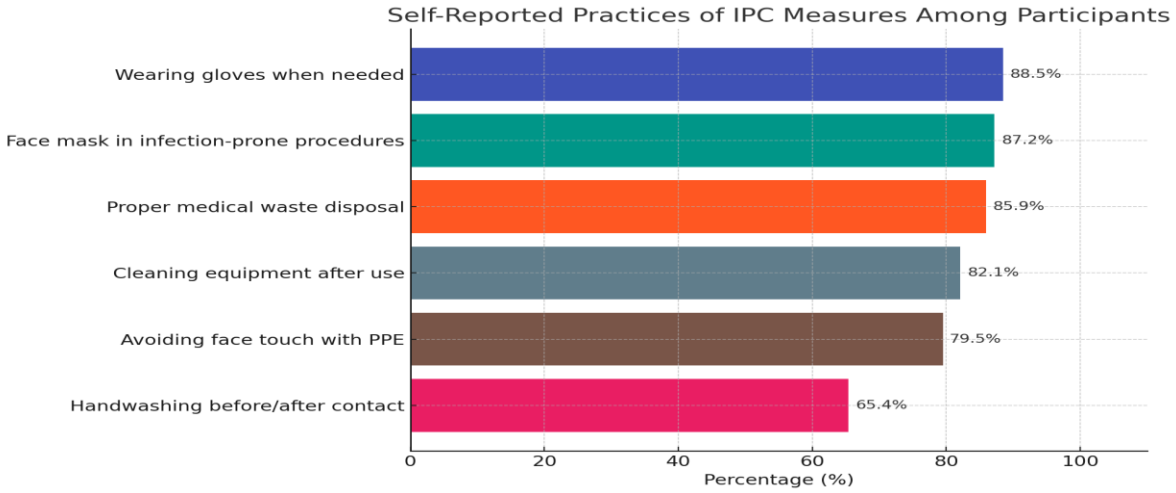

Figure 2: Self-Reported Practices of IPC Measures

Challenges in Following IPC Protocols

Participants outlined a number of difficulties in following IPC procedures. According to 39.7% of nurses, the most frequent obstacle was a lack of personal protective equipment (PPE). 32.1% respondents mentioned a lack of training, followed by a heavy workload (14.1%), limited staffing (1.3%), and poor supervision (12.8%). These difficulties highlight the necessity of institutional measures to improve adherence to IPC guidelines.

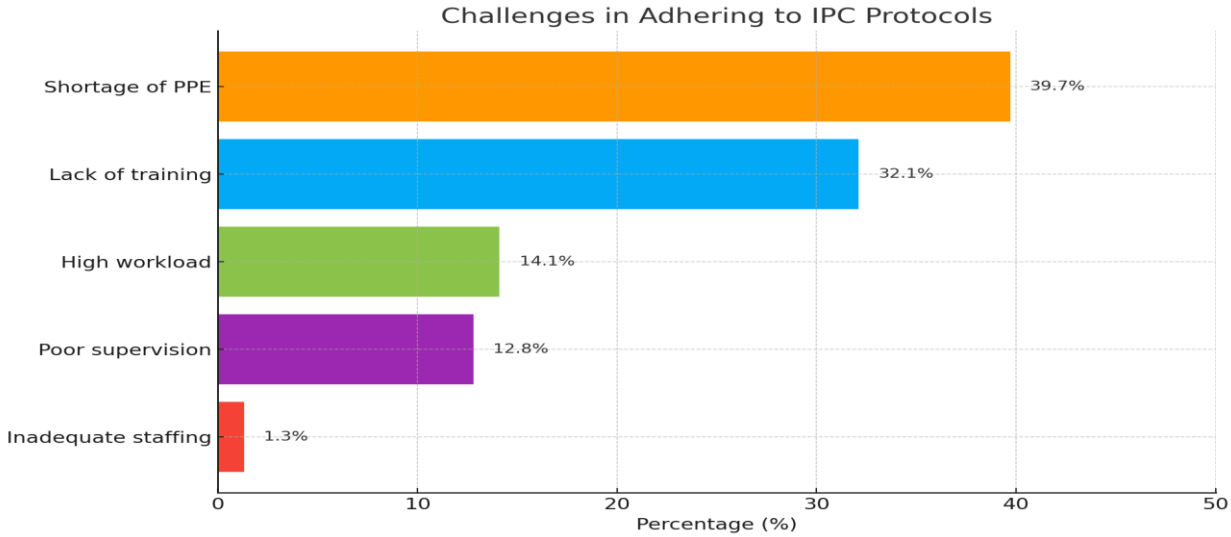

Figure 3: Challenges in Following IPC Protocols

Summary of Findings

Overall, the results show that nurses generally report following IPC procedures and possess solid fundamental knowledge. However, specific beliefs, training shortages, and resource availability point to areas that need improvement. To increase IPC adherence, focused instructional initiatives, resource distribution, and supervisory assistance are advised.

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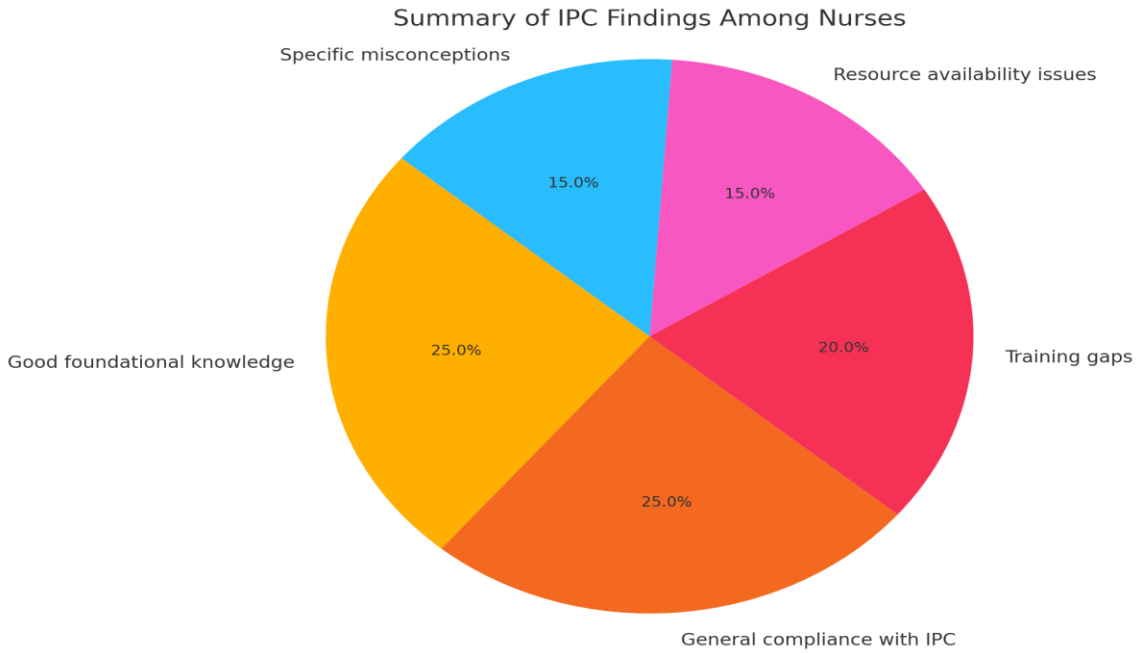

Figure 4: Summary of Findings

Discussion

According to the study's findings, nurses showed a good degree of knowledge of basic infection prevention and control (IPC) practices. In particular, 96.2% of respondents accurately identified the role that face masks play in treating respiratory infections, which is consistent with the increased focus on respiratory safety measures around the world in the wake of the COVID-19 pandemic. This result is in line with a research in Ethiopia found that more than 90% of medical professionals agreed that wearing a face mask is essential for preventing respiratory infections (Alhumaid, Al Mutair et al. 2021). Similarly, the results of a cross-sectional study conducted in Turkey, which found that hand hygiene was the most acknowledged IPC component among nurses, are also supported by the high level of knowledge on hand hygiene, with 94.9% of respondents acknowledging its significance. This implies that frontline healthcare providers' awareness of IPC has improved as a result of awareness campaigns and international training initiatives, especially those conducted during the COVID-19 epidemic (Abd Rahim and Ibrahim 2022). Additionally, 91.0% of the nurses in this survey agreed that sanitising surfaces after every patient interaction is essential, and 96.2% of them acknowledged the significance of medical waste segregation in lowering the spread of infections. These results are similar to those of Chitimwango (2021), who discovered analogous patterns among Zambian nurses who regularly used IPC techniques for waste management and surface disinfection (Chitimwango 2017).

Nevertheless, the study found a significant gap specific IPC knowledge—just 52.6% of respondents knew that alcohol-based hand massages do not often take the place of conventional hand washing—despite this generally high awareness. This disparity reveals a recurring misconception about the limitations of hand sanitizers, particularly in situations where hands are obviously dirty. The study in India highlighted the need for focused training to differentiate between hand washing and hand-rubbing techniques, identifying a similar knowledge gap (Kumar, Singh et al. 2023). IPC compliance may be impacted by this information gap, particularly in high-risk hospital settings. Inconsistent comprehension of IPC protocol specifics can compromise the overall efficacy of infection control measures, as noted by (Alhumaid, Al Mutair et al. 2021). Additionally, previous research have revealed that practice compliance is frequently

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variable, even though general awareness is still high (Habib, Dayyab et al. 2021) (Bawaqneh, Ayed et al. 2025). To close these last knowledge practice gaps, IPC training programs must not only cover general ideas but also concentrate on specific procedural differences. Frequent monitoring, hands on simulations, and refresher training may help assure a long-lasting effect on hospital infection control results.

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