Volume 3, Issue 9, 2025

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

KNOWLEDGE AND PRACTICES OF NURSES REGARDING SPREAD OF NOSOCOMIAL INFECTION IN PRIVATE HOSPITALS, LAHORE

Anthem Boon Crony[*1], Machael Alwan[2], Syeda Tasneem Kausar[3], Kousar Perveen[4] Sajida Batool[5]

[*1,2]*BSN, Superior University Department of Nursing, Lahore.*
[3]*Nursing Director, Superior University, Department of Nursing, Lahore.*
[4]*Associate Professor, Superior University, Department of Nursing, Lahore.*
[5]*Nursing Lecturer, Superior University, Department of Nursing, Lahore.*

[*1]anthemboon123@gmail.com, [2]machyelalwin@gmail.com, [3]sindy070766@gmail.com, [4]kous84@gmail.com, [5]sajidabatool0@gmail.com

DOI: https://doi.org/10.5281/zenodo.17719084

Keywords
Nosocomial infections, Hospital-acquired infections, Nurses, Infection control, Private hospitals, Lahore

Article History
Received: 06 October 2025
Accepted: 15 November 2025
Published: 26 November 2025

Corresponding Author: *
Anthem Boon Crony

Abstract

Background:
Nosocomial infections, also known as hospital-acquired infections, are infections acquired by patients during their stay in healthcare facilities. Nurses play a pivotal role in preventing these infections through proper adherence to infection control practices. Despite having adequate knowledge, gaps often exist between knowledge and practice, particularly in private hospital settings. Understanding nurses' knowledge and practices is crucial to enhance patient safety and reduce healthcare-associated infection rates.

Aim:
The study aimed to assess the knowledge and practices of nurses regarding the spread of nosocomial infections in private hospitals in Lahore.

Methods:
A descriptive cross-sectional study was conducted among 102 nurses in private hospitals of Lahore. Participants were selected using purposive sampling. Data were collected through a self-administered questionnaire covering demographic information, knowledge, and practice regarding nosocomial infection prevention. Knowledge was categorized using Bloom's cut-off points, while practice was assessed as competent or incompetent based on adherence to recommended guidelines. Data analysis was performed using SPSS Version 24, reporting frequencies, percentages, means, and standard deviations.

Results:
The majority of participants were female (59.8%), aged 22–26 years (46.1%), and working primarily in emergency departments (87.3%). Most nurses demonstrated good knowledge of nosocomial infection transmission, hand hygiene, and isolation protocols. Adherence to infection control practices was high, with over 51% consistently following antiseptic guidelines before vascular access procedures, and 44.1% washing hands before and after patient contact. Occasional lapses were observed under high workload or emergency conditions.

Conclusion:
Nurses in private hospitals of Lahore exhibit strong knowledge and generally

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

adhere to infection control practices, yet occasional gaps under pressure highlight the need for continuous training, monitoring, and resource support to ensure optimal patient safety.

INTRODUCTION

Nosocomial infections or hospital-acquired infections are infections acquired by patients in a healthcare facility and are absent or not incubating when the patients are admitted. They can be caused by bacteria, viruses, fungi, and other pathogens and are usually transmitted by healthcare workers, contaminated equipment, or the environment of the hospital (Abban et al., 2023; Alabbasi, 2024). Knowledge in the nursing practice context means the knowledge and awareness of nurses about the principles of infection control, and practices denote what nurses do on the ground and follow the guidelines (Hammoud et al., 2020; IQBAL & Abbas, 2021). Privacy hospitals are those hospitals that are run by non-governmental bodies and are normally financed by the patient fees or by insurance. Nurses play a primary role in reducing the risk of nosocomial infection, as they are frontline providers (Angelina and Elizabeth, 2024; Harun et al., 2022). Nosocomial infections are a significant issue on the international level as well as in Pakistan. Multidrug-resistant pathogens and the failure to adhere to infection-control measures are contributing to the rise of hospital-acquired infections (Raoofi et al., 2023; Rosenthal et al., 2022). Such infections also lead to higher morbidity, longer hospitalization, risk of increased mortality, and financial health care expenses (Idrees et al., 2021; Mustafa et al., 2022). One of the main lines of defense against nosocomial infections is nurses. Their duties, including the patient monitoring procedures, invasive treatment, prescribing of medications, and managing bodily fluids, expose them to the possible sources of infection (Ayed, 2015; Kamunge et al., 2015). The evidence-based infection prevention practices also adhere to higher levels of knowledge among nurses (Almualm, 2021; Nazeer et al., 2022). Research in Pakistan shows that nurses differently understand standard precautions, including hand hygiene, aseptic methods, in different hospital settings (Jahangir et al., 2017; Khoso et al., 2021). The environments, policies, and administrative supervision in privates can affect the application of infection-control knowledge in practice by nurses (Monyanga, 2023). The possession of knowledge is not necessarily related to a consistent clinical behavior. One of the studies has found that despite the high level of knowledge among the majority of nurses on the topic of infection prevention, only a small part of them applied the recommended practices regularly (Harun et al., 2023; IQBAL & Abbas, 2021). These knowledge-practice discrepancies undermine infection-control interventions and jeopardize patient safety, which points to systemic or behavioral issues that do not allow nurses to apply their training effectively (Aryankhesal et al., 2022; Hammoud et al., 2022).

Many reasons hinder the compliance of nurses to the infection-control practices. Large workloads and unfavorable patient-to-nurse ratios decrease the adherence to vital hygiene and aseptic practices (Memon et al., 2020; Wang and colleagues, 2020). There are additional challenges associated with the lack of disinfectants, gloves, and sterilized equipment (Al Gashaa et al., 2021; Monyanga, 2023). Unsafe shortcuts may occur due to the lack of regular training, insufficient supervision, and improper implementation of infection-control policies. The motivation of nurses to meet the infection-prevention standards also depends on organizational culture and perceived managerial support (Kamunge et al., 2015; Okechukwu and Motshedisi, 2012). The case of the Lahore private hospitals can have special barriers in the context of infection control. Such institutions are usually different compared to the state hospitals in budgetary allocations, staff patterns, and regulatory structures. The studies on nurses working in the private sector reveal that even the sufficient level of theoretical knowledge is subordinate to practical adherence, which is usually lower because of institutional policies, peer pressure, or a lack of resources (Mahmoud, 2021; Rashidi et al., 2021). Infection-control improvement initiatives are likely to fall short of meeting the gaps that exist unless thorough data is collected in the private healthcare setting (Squires et al., 2022). Strong interventions not

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ISSN: (e) 3007-1607 (p) 3007-1593

only in knowledge but also in practice are necessary in reducing the spread of the nosocomial infections. Improved infection-control outcomes are assisted by educational programs, audits, feedback mechanisms, and institutional support (Aryankhesal et al., 2022; Hammoud et al., 2020). It has been proved that specific interventions with nursing staff help reduce the rates of nosocomial infections considerably (Abu-Diak, 2022; Bouallègue et al., 2013). Implementation of structured infection prevention and control (IPC) programs in the private hospitals may lead to improved patient safety and reduce the economic and clinical consequences of hospital-acquired infections (Escobar et al., 2024; Alabbasi, 2024).

Methods

A descriptive cross-sectional study design will be employed to assess the knowledge and practices of nurses regarding the spread of nosocomial infections in private hospitals in Lahore. This design is appropriate because it allows the researcher to examine existing knowledge and behaviors at a single point in time without manipulating variables. The study will be conducted in selected private-sector hospitals well known for providing diverse nursing services. The study population will consist of registered nurses and head nurses working in these facilities, as they play a direct role in infection prevention and patient care. A purposive sampling technique will be used to recruit participants based on their availability and relevance to the study objectives. The sample size will be determined using Slovin's formula, generating a required sample of 102 nurses. Eligibility criteria include all licensed nurses and head nurses working in private hospitals, while student nurses and doctors will be excluded. Data will be collected using an adopted and structured questionnaire that assesses demographic characteristics, knowledge, and infection-prevention practices. Ethical approval will be obtained from the Superior University ethical review committee, and written informed consent will be taken from all participants. Confidentiality, anonymity, and voluntary participation will be strictly assured throughout the study.

Data Collection

Data will be gathered using a structured, self-administered questionnaire distributed to eligible nurses during their duty hours. The questionnaire will consist of three major sections. The first section will collect demographic characteristics, including age, gender, years of experience, education level, unit of practice, workload, and prior training related to infection control. The second section will assess nurses' knowledge regarding the spread and prevention of nosocomial infections using statements rated on a Likert scale. Knowledge scores will be categorized based on Bloom's (1968) taxonomy as good (80–100%), average (60–79%), or weak (<59%). The third section will measure infection-prevention practices using Likert-scale items focusing on hand hygiene, aseptic technique, equipment handling, and adherence to hospital guidelines. Practice scores will be classified as competent (≥85%) or incompetent (<85%) according to Squires et al. (2022). Data collection will occur over a period of nine months to allow adequate participation across hospital units. Completed questionnaires will be checked for accuracy, completeness, and consistency before entry into the database.

Data Analysis

Data will be analyzed using SPSS version 24. Descriptive statistics, including frequencies and percentages, will be applied to summarize categorical variables such as gender, professional designation, and training history. Means and standard deviations will be computed for continuous variables such as age and years of experience. Knowledge and practice scores will be converted into percentages, and participants will be classified according to predefined scoring criteria. Cross-tabulations will be used to examine relationships between demographic factors and knowledge or practice levels. Findings will be presented in tables, charts, and narratives to provide a clear understanding of nurses' knowledge and practices related to nosocomial infection prevention.

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ISSN: (e) 3007-1607 (p) 3007-1593

Results and Analysis

Table 1: Demographic Characteristics of Participants (n=102)

Demographic Variable	Category	Frequency	Percentage (%)
Gender	Male	41	40.2
	Female	61	59.8
Age	22–26 years	47	46.1
	27–31 years	45	44.1
	32–36 years	10	9.8
Marital Status	Single	63	61.8
	Married	39	38.2
Education	Diploma in General Nursing	33	32.4
	Post RN	41	40.2
	BSN (Generic)	27	26.5
	MSN	1	1.0
Work Experience	1–5 years	60	58.8
	6–10 years	31	30.4
	11–15 years	9	8.8
	Above 15 years	2	2.0
Department	Emergency	89	87.3
	Oncology	13	12.7

Table 1 summarizes the demographic profile of 102 nurses in private hospitals, Lahore. The majority of participants were female (59.8%) and aged between 22–26 years (46.1%). Most were single (61.8%) and held Post RN qualifications (40.2%). A significant proportion had 1–5 years of work experience (58.8%), with the majority working in emergency departments (87.3%). This table highlights the diversity in gender, age, education, and clinical experience among the study population.

Table 2: Nurses' Knowledge Regarding Spread of Nosocomial Infections (n=102)

Knowledge Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Transmission via medical equipment	5 (4.9%)	2 (2.0%)	5 (4.9%)	29 (28.4%)	61 (59.8%)
Neutropenic patients should be isolated	6 (5.9%)	9 (8.8%)	16 (15.7%)	56 (54.9%)	15 (14.7%)
Hand hygiene after glove removal	3 (2.9%)	3 (2.9%)	19 (18.6%)	35 (34.3%)	42 (41.2%)
Nosocomial infections caused by hospital workers	1 (1.0%)	6 (5.9%)	30 (29.4%)	30 (29.4%)	35 (34.3%)
Wash/disinfect hands before & after patient contact	3 (2.9%)	4 (3.9%)	20 (19.6%)	30 (29.4%)	45 (44.1%)
Hand hygiene before surgery/wound care	2 (2.0%)	3 (2.9%)	18 (17.6%)	43 (42.2%)	36 (35.3%)

Table 2 presents participants' knowledge about infection transmission and control practices. Most nurses strongly agreed that medical equipment can spread infections (59.8%) and emphasized hand hygiene after glove removal (41.2%). The majority recognized the importance of isolating vulnerable patients (54.9%) and acknowledged the role of hospital workers in introducing infections (34.3%).

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ISSN: (e) 3007-1607 (p) 3007-1593

Responses indicate a strong understanding of nosocomial infection prevention among nurses. Overall, knowledge levels reflect awareness of critical infection control measures.

Table 3: Nurses' Practices Regarding Spread of Nosocomial Infections (n=102)

Practice Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Use alcohol/antiseptics before vascular access	8 (7.8%)	3 (2.9%)	10 (9.8%)	29 (28.4%)	52 (51.0%)
Hand hygiene before & after nursing procedure	2 (2.0%)	5 (4.9%)	24 (23.5%)	39 (38.2%)	32 (31.4%)
Hand hygiene before & after contact with intact skin	3 (2.9%)	4 (3.9%)	16 (15.7%)	45 (44.1%)	34 (33.3%)
Hand hygiene when moving from contaminated to clean site	4 (3.9%)	9 (8.8%)	20 (19.6%)	35 (34.3%)	34 (33.3%)
Avoid artificial nails/polish	48 (47.1%)	24 (23.5%)	16 (15.7%)	5 (4.9%)	9 (8.8%)
Reduce infection control compliance under workload/emergency	25 (24.5%)	18 (17.6%)	22 (21.6%)	22 (21.6%)	15 (14.7%)
Hand hygiene after touching surfaces	3 (2.9%)	4 (3.9%)	21 (20.6%)	37 (36.3%)	37 (36.3%)
Remove rings/watch/bracelet before hand hygiene	3 (2.9%)	2 (2.0%)	24 (23.5%)	32 (31.4%)	41 (40.2%)

Table 3 illustrates how well nurses follow infection control guidelines in practice. High adherence was reported for using alcohol-based solutions before vascular access (51.0%) and performing hand hygiene before and after procedures (38.2%). Most participants avoided artificial nails/polish (47.1%) and removed jewelry before hand hygiene (40.2%). Handwashing when transitioning between contaminated and clean sites was commonly practiced (34.3%). The table demonstrates that nurses generally implement recommended infection prevention practices in their daily care.

Table 4: Key Findings – Summary of Knowledge and Practices

Parameter	Observation
Knowledge on transmission via medical equipment	88.2% agree/strongly agree
Knowledge on patient isolation for communicable/neutropenic patients	69.6% agree/strongly agree
Knowledge on hand hygiene after glove removal	75.5% agree/strongly agree
Knowledge on role of hospital workers in spreading infections	63.7% agree/strongly agree
Practice: Use of alcohol-based solution before vascular access	79.4% agree/strongly agree
Practice: Hand hygiene before & after procedures	69.6% agree/strongly agree
Practice: Hand hygiene before & after patient skin contact	77.4% agree/strongly agree
Practice: Avoid artificial nails & polish	52.0% strongly disagree
Practice: Remove jewelry before hand hygiene	71.6% agree/strongly agree
Practice: Compliance under high workload/emergency	36.3% less compliant; majority maintain adherence

Table 4 provides a concise summary of participants' overall knowledge and practice levels. High agreement was observed for infection transmission awareness, patient isolation, and hand hygiene practices.

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ISSN: (e) 3007-1607 (p) 3007-1593

Practical adherence was strongest in using antiseptics, hand hygiene, and jewelry removal. Some challenges remain under high workload or emergency situations, where partial non-compliance was noted (36.3%). The table underscores that the majority of nurses demonstrate both strong knowledge and competent infection control practices, contributing to patient safety.

Discussion

This research shows that the nurses in Lahore private hospitals have a lot of knowledge pertaining to the transmission of nosocomial infections. Most of the participants unanimously affirmed that medical equipment including syringes, thermometers, catheters and stethoscopes may serve as infection sources. The findings are consistent with other studies that were carried out in Pakistan and other developing nations, as nurses revealed their knowledge of the possible routes of transmission using contaminated medical tools (Nazeer et al., 2022; Okechukwu and Motshedisi, 2012). There was also a high level of knowledge pertaining to the isolation of vulnerable patients, neutropenic or communicable diseases, which indicated that nurses have the ability to understand the essence of patient segregation in averting cross-infection. The participants also reported consistent hand hygiene practices, a high proportion reported to wash the hands after putting off the gloves and before and after coming in contact with the patient. These results are consistent with the works by Memon and Afghan (2020) and Squires et al. (2022) which have also found that hand hygiene is a primary preventive practice accepted by the nurses. But even with high theoretical knowledge some difference in adherence was observed during high workload or during emergency conditions. This agrees with other publications on the topic by Wang et al. (2020), who emphasized that workload pressures may adversely affect adherence to infection control measures. The research found also that nurses were very aware of the contribution made by hospital staff in bringing in bacteria and consequently contributing to nosocomial infections. More than a third of respondents were strongly in agreement with this statement, and this supports the research in the region that noted the importance of healthcare workers in the spread of infection (Mahmoud, 2021; Menon et al., 2021). On the other hand, a small minority did not agree or disagreed with this, which implies that the personal perceptions and experiences could be a determinant of the attitude towards accountability in infection prevention. As far as practical implementation was concerned, most of the participants followed the recommended rules such as applying alcohol-based solutions before vascular access processes and regular hand hygiene. The practices are in line with international practices and support the conclusions of international studies, which indicate that compliance with antiseptic practices can greatly decrease the risk of healthcare-associated infections (Rashidi et al., 2021; Siegel, 2012). The findings of the study mean that knowledge is successfully converted into practice with most nurses, and nevertheless, lapses are still present in some circumstances. Among the items that were actively reported by participants are the avoidance of artificial nails and the removal of jewelry before hand hygiene, which shows that the participants were aware of the possible risks of contamination. The observation is consistent with the results of Mudassar et al. (2023), who found that hand and nail hygiene among nursing personnel is a key concern, as it restricts bacteria spread. The percentage of those who did not adhere on some occasions was low which means that the process of reinforcing and monitoring of the infection control measures must be continuous to ensure high standards. These results should be compared with the situation in the general hospital context to suggest that the resources and training, and supervision of the nurses might be better in the private hospitals, leading to increased levels of knowledge and practice among nurses (Rao et al., 2020; Monyanga, 2023). However, the research also presents issues that are typical of every healthcare environment, including the workload and the emergencies, and environmental constraints that might undermine adherence to the guidelines. This proves that the role of contextual factors cannot be underrated in the prevention of nosocomial infections due to the significance of individual knowledge and skills (Mustafa et al., 2022; Rosenthal et al., 2022). Because of the above, the research highlights that nurses in privately owned hospitals are either well informed about the transmission of nosocomial infections or are well adhering to

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ISSN: (e) 3007-1607 (p) 3007-1593

preventive measures. Although these results are similar with the results of previous studies on the national and international levels, it is necessary to emphasize the maintenance of compliance in the situation of high pressure and guarantee the continued training programs. To improve the practice of infection control and decrease the occurrence of hospital-acquired infections, enhancing the institutional support, monitoring, and sustained professional development may improve patient safety and the quality of care (Raoofi et al., 2023; Menon et al., 2021).

Conclusion

The study concludes that nurses working in private hospitals of Lahore demonstrate a strong level of knowledge regarding the transmission of nosocomial infections and generally adhere to recommended infection prevention practices. The majority of participants recognized the importance of hand hygiene, proper use of medical equipment, isolation of vulnerable patients, and compliance with antiseptic guidelines. While most nurses translated their knowledge into practice effectively, occasional lapses were noted under high workload or emergency situations. Overall, the findings highlight that private hospital nurses are aware of their role in preventing healthcare-associated infections and maintain a strong commitment to patient safety.

Recommendations

1. Regular **in-service training and workshops** should be conducted to reinforce infection control knowledge and practices, particularly focusing on high-pressure scenarios such as emergencies or increased workload.
2. Hospitals should implement **strict monitoring and auditing systems** to ensure consistent adherence to hand hygiene and antiseptic protocols.
3. **Awareness programs** should emphasize the risks associated with non-compliance, such as wearing artificial nails or jewelry during patient care, to strengthen preventive behaviors.
4. Private hospitals should ensure **adequate staffing and resources** to minimize workload-related lapses and enhance the capacity of nurses to follow infection prevention guidelines.
5. **Encouraging a culture of accountability** and teamwork can further improve compliance with standard precautions and reduce the incidence of nosocomial infections.
6. Future research should explore **comparative studies between private and public hospital nurses** to identify systemic factors influencing knowledge and practice levels.

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