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Assessment of Knowledge and Practices of Nosocomial Infection among Nurses of Jinnah Hospital Lahore, Punjab- Pakistan

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ABSTRACT

Nosocomial infection is an infection originating in a patient within a hospital. The infection was not present at the time of admission to the healthcare facility but develops after 48 hours stay within the healthcare facility. **Objective:** To assess the knowledge of staff nurses regarding the prevention of nosocomial infections and to identify the factors influencing the knowledge deficit of staff nurses. **Methods:** The current study followed a quantitative research approach using a descriptive, cross-sectional research design. A purposive, non-probability sampling technique was utilized. The sample was selected from a population of medical, surgical, and Intensive Care Units (ICUs) with a sample size of 70. The data collection tool used for this study was a modified questionnaire. **Results:** The knowledge and practice regarding nosocomial infection among nurses aged 30-35 years was higher compared with nurses aged 26-30 years and 21-25 years. **Conclusions:** The results of this study indicate that nurses with more than 10 years of work experience have greater knowledge and practice regarding nosocomial infection and its control. The study further suggests that the knowledge and practice of nurses towards infection control measures may be improved by providing health education.

INTRODUCTION

Several studies have highlighted the importance of knowledge and practices among healthcare professionals, especially nurses, in preventing nosocomial infections. Nazeer et al. reported that nurses have varying levels of understanding regarding the spread of these infections, suggesting a need for improved training [1]. Similarly, Parveen et al. found significant gaps in nurses' knowledge and practices related to infection prevention in burn patients at tertiary care hospitals [2]. Salman et al. emphasized that despite positive attitudes towards hand hygiene, compliance among Pakistani health professionals remains suboptimal [3]. Uzair et al. observed moderate knowledge and practices of infection control among healthcare providers in tertiary care settings [4]. The findings of Buksh et al. further support the need for targeted education, as nurses demonstrated insufficient knowledge and practices in preventing infections in burn patients [5]. Lastly, Mustafa and Nasir concluded that

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health professionals generally lack adequate knowledge and practices regarding nosocomial infection control, underscoring the urgency for enhanced awareness programs [6]. Sax et al. in 2020 conducted a national survey in Switzerland that highlighted strategies for preventing healthcare-associated infections [7]. According to the study conducted in Europe, the prevalence rate was 2.9%. The primary causes of nosocomial infection included medical intervention, poor environmental conditions, inadequate personal hygiene among staff and patients and poor practice of routine duties. However, while it is not possible to completely eradicate nosocomial infections even in advanced healthcare facilities, standards and guidelines can be implemented to reduce their occurrence. To prevent or reduce the incidence of nosocomial infection, it is important to understand prevalence rates so that infection control programs can be implemented and effective plans developed [8]. Nosocomial infections have a significant impact in healthcare facilities due to compromised patient and healthcare worker safety and diminished quality of care. Preventive measures should be taken to control the transmission of nosocomial infections in healthcare settings, such as the use of disinfectants and antiseptics, strengthened institutional controls, and regular microbiological testing. Moreover, assigning single rooms to patients can reduce the risk of nosocomial infection through person-to-person surface contact. In addition, assessing patients' initial risk of infection through a detailed study of disease severity and making appropriate adjustments to care can further reduce infection rates. By implementing such strategies, healthcare facilities can combat and prevent the occurrence of nosocomial infections, benefiting both healthcare workers and patient safety [9]. In the 19th century, Dr. Semmelweis first integrated the practice of hand hygiene in healthcare settings to prevent and control nosocomial infection. Implementation of proper hand hygiene can have a profound impact on minimizing the incidence of hospital acquired infections. The World Health Organization (WHO) emphasizes hand hygiene as a core strategy for preventing nosocomial infections and the spread of multi drug-resistant microorganisms. Such preventive measures reduce the risk of nosocomial infections and associated costs. The WHO suggests that the risk of hospital-acquired infections can be minimized by proper hand washing with soap and water and the use of alcohol-based sanitizers (WHO, 2023). Nurses are highly susceptible to acquiring nosocomial infections while providing nursing care; therefore, they must possess adequate knowledge and skills to control the spread of infection. Implementation of standard protective measures is a vital part of nursing care to prevent transmission. This study aimed to evaluate the knowledge related to the prevention of nosocomial infections among staff nurses at Jinnah hospital Lahore and to identify the factors influencing knowledge deficits among them [10, 11].

Despite the growing burden of nosocomial infections and the central role of nurses in infection prevention, there is limited localized evidence assessing their knowledge and practical compliance within public tertiary care hospitals in Punjab, Pakistan. Existing studies highlight knowledge deficits and inconsistent adherence to infection control protocols; however, data specific to Jinnah Hospital Lahore remain scarce. Furthermore, few studies have explored the association between demographic and professional characteristics and knowledge gaps in this setting. Addressing this gap is essential for designing targeted educational interventions and strengthening institutional infection control practices.

METHODS

A descriptive cross-sectional study was conducted from July to December 2019 at Jinnah Hospital, Lahore among the nurses of this hospital using a convenience sampling technique. The sample size was calculated using online software, with a confidence interval of 5% and an additional 5% to account for potential dropouts or nonparticipation; hence, the final sample size was 70. The reference number for the ethical approval or data collection permission letter for the study is 32327/Admn/JHL. An open-access, structured, closed ended questionnaire was used, which had also been utilized in multiple prior studies and was considered reliable and validated. Data were collected from nurses working in the Medical, Surgical, and ICU units. Authorization for data collection was obtained from the Medical Superintendent of Jinnah Hospital, Lahore and consent forms were signed by eligible participants. Autonomy, confidentiality, and privacy were maintained and participants were informed about the study's purpose. The data were analyzed using SPSS Version 25.

RESULTS

Table 1 shows that a total of 70 individuals participated in the study. Among them, 25 (35.7%) were aged 21-25 years, 23 (32.9%) were aged 26-30 years, and 22 (31.4%) were aged 31-35 years. The number of participants with 0-5 years of experience was higher (52.9%) while the proportion of participants with 5-10 years, of experience was lower (21.4%).

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Table1: Demographic Profile of Respondents

S. No.	Demographic Profile of Respondents	Wards	Frequency (%)
1	Unit	Medical Unit	32 (45.7)
		Surgical Unit	23 (32.9)
		ICU	15 (21.4)
2	Age	21-25Years	25 (35.7)
		26-30Years	23 (32.9)
		31-35Years	22 (31.4)
3	Education	M.Sc. Nursing	8 (11.4)
		Nursing Degree	18 (25.71)
		Nursing Diploma	44 (62.86)
4	Gender	Male	1 (1.4)
		Female	69 (98.6)
5	Working Experience	0-5Years	37 (52.9)
		5-10Years	15 (21.4)
		>10Years	18 (25.7)
6	Marital Status	Married	44 (62.9)
		Unmarried	26 (37.1)

Table 2 shows nurses' knowledge and practices regarding nosocomial infection. The study indicates that all participants were aware of nosocomial infection. A majority of participants (85.7%) reported performing hand hygiene between patient care. In the study, a total of 59 participants (84.3%) followed the recommended protocols for alcohol-based solutions or other antiseptic use.

Table 2: Questionnaire Related to Knowledge and Practice

S. No.	Questions	Variables	Frequency (%)
1	Knowledge about nosocomial infection	Yes	70 (100)
		No	0 (0)
2	Attending any workshop to enhance knowledge regarding nosocomial infection?	Yes	27 (38.6)
		No	43 (61.4)
3	Healthcare providers follow correct hand washing in clinical setting	Yes	41 (58.6)
		No	29 (41.4)
4	Performing of hand hygiene in between patients care	Yes	60 (85.7)
		No	10 (14.3)
5	Environment is a major source of nosocomial infection	Yes	64 (91.4)
		No	6 (8.6)
6	Cleaning of walls and floors of hospitals with disinfectants	Yes	48 (68.6)
		No	22 (31.4)
7	Invasive procedure increases the risk of nosocomial infection	Yes	62 (88.6)
		No	8 (11.4)
8	Nosocomial infection is transmitted via medical equipment	Yes	57 (81.4)
		No	13 (18.6)
9	Isolation of patients with communicable diseases	Yes	62 (88.6)
		No	8 (11.4)
10	Observation of precaution standards in practice at your workplace	Yes	32 (45.7)
		No	38 (54.3)
11	Following recommended guidelines for use of alcohol -based solutions or other antiseptics during any surgical procedure	Yes	59 (84.3)
		No	11 (15.7)
12	Standard operative procedures (SOPs) for nosocomial infection control are present in your department	Yes	50 (71.4)
		No	20 (28.6)

Table 3 shows that 65 participants (92.9%) reported that nosocomial infection is caused by bacteria. The 42 participants (60%) indicated that airborne droplets are a common source of infection. Nurses demonstrated good knowledge regarding hand hygiene as 49 participants (70%) reported taking adequate time for proper handwashing. The 45 participants (64.3%) indicated that immunocompromised patients are at greater risk of infection, while indoor and outdoor patients (4.3%) were considered at lower risk of acquiring nosocomial infection.

Table3: Questionnaire Related to Knowledge Assessment

S. No.	MCQs	Variables	Frequency (%)
1	Hospital-acquired infections	Nosocomial	70 (100)
		Nosocongenial	0 (0)
		Notsocomial	0 (0)
2	First person to inform you about nosocomial infection	Books	39 (55.7)
		Media	6 (8.6)
		Workshops	8 (11.4)
		Hospital Coworkers	17 (24.3)
3	Infectious agents	Humans	1 (1.4)
		Animals	1 (1.4)
		Bacteria, Viruses	65 (92.9)
		Persons who are not immunized	3 (4.3)
4	Person at high risk for acquiring nosocomial infection	Indoor Patients	3 (4.3)
		Outdoor Patients	3 (4.3)
		VAP	19 (27.1)
		Immunocompromised Patients	45 (64.3)
5	First thing to know about infection control	Biohazards	2 (2.9)
		Hand Washing	57 (81.4)
		Disinfection	5 (7.1)
		Sterilization	6 (8.6)
6	Most common source of nosocomial infection	Contaminated equipment	12 (17.1)
		Bed Linen	5 (7.1)
		Indwelling catheter	11 (15.7)
		Air droplet	42 (60)
7	Most frequent mode of transmission of nosocomial infection	Direct contact	24 (34.3)
		Airborne	30 (42.9)
		Vehicle transmission	8 (11.4)
		Vector borne transmission	8 (11.4)
8	All are portals of bacterial entry except	Eye	29 (41.4)
		Nose	3 (4.3)
		Intact skin	37 (52.9)

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		Mouth	1 (1.4)
9	Proper hand washing	40–60 seconds	49 (70)
		20–30 seconds	12 (17.1)
		10 seconds	3 (4.3)
		2 minutes	6 (8.6)
10	Preferred solution for hand washing	Water	25 (35.7)
		Sanitizer	30 (42.9)
		Scrub	15 (21.4)
		Spirit	0 (0)
11	Predisposing factor for nosocomial infection	Disinfecting floors in hospital	3 (4.3)
		Filtering air	18 (25.7)
		Sterilizing surgical equipment	4 (5.7)
		Having open wound in hospital	45 (64.3)

Figure 1 illustrates key demographic and occupational characteristics of healthcare workers at heightened risk for nosocomial (hospital-acquired) infections. The data reveal that inexperienced staff (0–5 years of tenure, 52.9%) and workers in high-exposure units, particularly the Medical (45.7%) and Surgical (32.9%) departments face elevated risks. Younger age groups (21–30 years, 68.6% combined) and those with diploma-level education (62.86%) may also be vulnerable due to less advanced training or limited familiarity with infection-control protocols. Notably, the cohort is overwhelmingly female (98.6%) and married (62.9%), suggesting that these demographics warrant targeted preventive measures. These insights highlight critical intersections between work environment, experience level, and intrinsic factors in infection susceptibility.

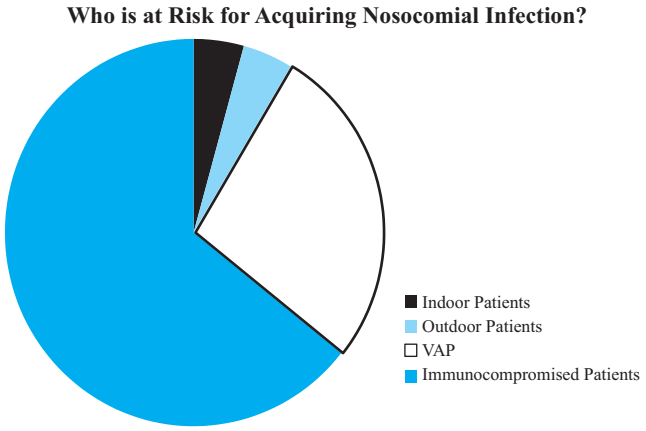

Figure 1: Demographic and Occupational Risk Factors for Nosocomial Infections among Healthcare Workers

DISCUSSION

Participants were evenly distributed across age group (21-25 years, 35.7%; 26-30 years 32.9%; and 31-35 years 31.4%). However, no significant correlation was found between knowledge and demographic factors such as age or qualification. The results of this study align with the findings of a study conducted at Narayana Medical College, Nellore, by Sebastian. The current study indicates that, out of 70 participants, more than three-fourths reported performing hand hygiene, while the remaining participants did not perform hand hygiene between patients care. These findings are supported by a study conducted in Lahore, Pakistan by Maria Jahangir ...which reported similar results because both studies were conducted in regions sharing similar cultures and values Jahangir *et al.* in 2017 [11]. Findings also reveal that out of 70 participants, ninety percent participants believed that environment is a major source of Nosocomial infection, while the remaining participants did not. These results are supported by a study conducted in Muscat, Oman by Labrague *et al.* in 2012 [13]. Both studies highlight that standard Precautions are an essential component of the nursing curriculum in both countries. The findings of the current study show that more than two-thirds of the participants were aware that invasive procedures elevate the risk of nosocomial infection, while one-third lacked this knowledge. This was also demonstrated by the findings of a study conducted by J. Labrague *et al,* 2012 [13]. Both studies emphasize this content as a significant part of nursing curricula as well as clinical practice in healthcare settings. There are no contradictory findings regarding knowledge, as infection-prevention content is a core component of all medical curricula; there is a noted lack of practice in various healthcare settings. The findings of the current study also show that over 80% of participants recognized that nosocomial infection can be transmitted via medical equipment, while the remaining participants lacked this knowledge. This finding is supported by a study conducted in Lahore, Pakistan by Jahangir *et al,* in 2017 [11]. However these findings contrast with those of Angelillo *et al,* who studied nurses in 16 randomly selected hospitals in Calabria, Italy [14]. The results differ because of a lack of broad procedural knowledge. The current study also revealed that nearly 90% of participants agreed that patients with communicable disease should be kept in isolation rooms, while the remaining participants disagreed [14]. The study contrasts with the findings of a study conducted in eight hospitals of Jordan by Mohammad Suliman, where differing results were attributed to inadequate education regarding isolation strategies Suliman *et al.* in 2018 [15]. Additionally, 84.3% of participants in the present study reported following recommended guidelines for the use of alcohol-based solutions, while 15.7% did not. These results differ from findings reported by Marie Pierre Tavolacci *et al.* In 2008 at Rouen University, France, where traditional soap was commonly used due to limited knowledge about alcohol-based hand rubs [16]. The current study also shows that more than two-third of participants agreed that Standard

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Operative Procedures (SOPs) were present in the departments, while the remaining participants disagreed. This finding contrasts with study conducted in Shebin El Kom district, Egypt by Salam *et al.* [17]. Where written SOPs and infection control guidelines were present in every section of each department Salam *et al,* in 2021 [17]. Kollef *et al.* (2021) emphasize that modern intensive care units (ICUs) face increasing nosocomial infection complexity due to aging populations, rising immunosuppression, and antimicrobial resistance. They note a shift in etiological pathogens and stress that virulence and resistance patterns demand more robust prevention strategies [18]. Khan *et al.* in 2015 complement these observations by underscoring systematic interventions such as antibiotic stewardship and environmental hygiene in reducing transmission [19]. Inweregbu *et al.* in 2005 provide foundational context, revealing that ICUs exhibit the highest prevalence of nosocomial infections (20.6%) among hospital units, largely due to invasive procedures and immunocompromised patients, with Staphylococcus aureus identified as the predominant pathogen [20].

This study is limited by its small sample size and single-center design, which restrict the generalizability of the findings to other healthcare institutions. The use of self-reported questionnaires may also introduce response bias and overestimation of actual practices. Future research should include multicenter studies with larger sample sizes and observational assessments to evaluate real-time compliance with infection control measures. Additionally, intervention-based studies are recommended to assess the effectiveness of structured training programs and continuous professional development initiatives in improving nurses' knowledge and practice.

CONCLUSIONS

As morbidity and mortality rates continue to rise globally among patients with nosocomial infections, this study was conducted to examine the impact of such infections on these rates. The results may inform the planning and implementing of standard protocols for preventing and controlling morbidity and mortality among patients with nosocomial infections. The findings of the current study revealed that most nurse's demonstrated satisfactory knowledge and practices regarding the prevention of hospital-acquired infections. However, the study was limited by its small sample size and being conducted at a single hospital, which restricts the generalizability of the findings to the broader population.

Authors' Contribution

Conceptualization: RL
Methodology: AS, SB, NP
Formal analysis: AS, NP
Writing and Drafting: RL, MS
Review and Editing: RL, MS, AS, NP, SB

All authors approved the final manuscript and take responsibility for the integrity of the work.

Conflicts of Interest

All the authors declare no conflict of interest.

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