Journal of Medicine and Allied Health

JOMAH.ORG
JOURNAL OF MEDICINE AND ALLIED HEALTH

Volume I, Issue I
Open Access, Double Blind Peer Reviewed.
Web: https://jomah.com, **ISSN**: xxx-xxx
https://doi.org/ 10.5281/zenodo.18228603

Article

Knowledge, Attitude, and Practices of Nurses Regarding Infection Control Measures in Tertiary Care Hospitals: A Cross-Sectional Study

Hira Shahzadi[1]

1 Maternity Hospital Kuwait

Correspondence
Hirahameed7078@gmail.com

Cite this Article

Received 2024-02-28
Revised 2024-04-14
Accepted 2024-05-17
Published 2024-06-29

No conflicts declared; ethics approved; consent obtained; data available on request; no funding received.

Authors' Contributions
Concept and design: HS; data collection: HS; analysis: HS; manuscript drafting and revision: HS

ABSTRACT

Background: Background: Infection control has been identified as an area with immense potential for causing harm to patient safety on account of high-volume healthcare delivery systems, for which nursing practice remains crucial for preventing the transmission of infection. The aims and objectives of this study are to evaluate the level of knowledge, attitude, and practice related to infection control practices among nursing personnel in Johar Poly Clinics. Methods: A cross-sectional observational study was carried out on 105 registered nursing professionals who actively worked in healthcare delivery systems at Johar Poly Clinics. The structured self-administered questionnaire categorized the information collected from nursing professionals regarding demographic variables, level of knowledge related to infection control practices, attitude toward infection prevention practices, and infection control practices. Descriptive as well as inferential statistical analysis was carried out to evaluate variables influencing effective infection control practices among nursing professionals. Clinical Knowledge: The findings from this study demonstrated high-level knowledge among nursing professionals related to infection control practices, for which they showed positive attitudes toward infection prevention practices too. However, practices among just 40% nursing professionals were reported to be effective. Higher-level nursing knowledge, attendance to infection control practices workshop, and nursing professionals with higher experiences were reported to be crucial influencing variables for effective infection control practices among nursing professionals ($p < 0.05$). Hand hygienic practices were found to be high, but deficiencies were noted in biomedical disposable practices as well as personal protective equipment practices.

Keywords: Infection control; Nurses; Knowledge, attitude, and practices; Healthcare-associated infections; Cross-sectional study

INTRODUCTION

Healthcare-associated infections (HAIs) continue to pose a challenge to patient safety as well as the quality of care offered. HAIs results in higher levels of morbidity, mortality, longer lengths of stay, as well as economic strain within the healthcare system. Successful infection control practices can thus be considered integral elements of safe healthcare practices. Nurses can be described as key players in infection control programs given their continuous patient interaction, participation in invasive care practices, as well as maintaining a clean environment during patient care practices (1).

The implementation process of effective infection control measures mostly relies on the knowledge, attitude, and practice variables in the health care provider group. Knowledge helps the nurse understand the mechanisms related to the transmission and prevention of infections; a positive attitude helps promote coordination with infection control rules, while proper practice leads to the implementation of theoretical knowledge into effective health care practice. A lack in any of the above variables could impact compliance with standard precautions, thus raising the rates of health care-associated infections (2,3). It has been observed that even in places where guidelines are present, a lack of proper awareness and a negative attitude could impact efforts toward effective implementation.

However, despite efforts towards disseminating hospital and infection control practices, adherence among nursing staff has been inconsistent, and this has been particularly evident among countries with lower and middle incomes. Some of the major barriers hindering effective implementation of infection control practices have been found to be workload, poor training, a lack of

infrastructure, and a lack of a monitoring system within institutions (4). Variabilities among nurses with regard to levels of knowledge and adherence in hospital settings have been previously identified in studies (5, 6).

Most of the previous studies regarding infection control were carried out within large public hospitals, and information regarding private health facilities and poly clinics was limited. Nurses employed within poly clinic environments often cope with large patient numbers and relatively fewer resources and less-structured infection control programs, which may affect their compliance with infection control practices. It is crucial to assess knowledge, attitude, and practices regarding infection control among nurses within these settings to devise specific interventions (7).

As a result, the key motivation for this study was to evaluate the existing level of knowledge, attitude, and practices concerning infection control practices among the nurses working with the Johar Poly Clinics with the view of determining any gaps that would serve as a basis for crafting interventions.

MATERIAL AND METHOD

This cross-sectional observational study is carried out in Johar Poly Clinics to address the knowledge, attitude, as well as practices of the nurses regarding the application of the infection control practices in the healthcare settings. The study design will help generate data regarding the distribution of the knowledge, attitudes, as well as the practices, in relation to the application of the Infection Control practices in the healthcare settings. The study will be carried out after obtaining administrative consent from the management of the healthcare facility.

To be included, registered nurses working directly with patients were considered for participation. Those working solely in administrative positions, student nurses, and nurses with less than six months of clinical experience were excluded to guarantee sufficient exposure to infection control procedures and avoid incorrect classification based on insufficient work experience. Participants were gathered via consecutive convenience sampling during working hours until the desired sample size was achieved. Sampling was done under controlled circumstances to avoid selection bias, with all eligible nurses present during the time of data gathering invited and informed of the nature and procedures of the research before being included with written, voluntary consent. Confidentiality of research participants was maintained by ensuring that personal information was not gathered, with research questionnaires stored safely with controlled access.

The survey used a structured self-administered questionnaire that was derived from domains of infection prevention recommendations as well as previous KAP studies such as hand hygiene practices, personal protective equipment use, sterilization and cleaning practices, biomedical waste management practices, as well as the methods of infection transmission (1,2,5,6). In the questionnaire, there are four domains that address the demographic and occupational details of the participants, knowledge items for which the respondents can select the objectively correct answers, statements that measure attitudes using a format that required the respondent to choose a score following the Likert format, and practice items which consisted of normal infection prevention practices. The questionnaire was validated for content by the occupational heads of the studied health facilities and underwent pilot studies with a selected group of the concerned occupational health professionals to check the clarity and interpretability of the items, with the slightest modifications made for better understanding. Knowledge items received scores of 1 for the appropriate and 0 for inappropriate or 'don't know' answers that have the same effect. An overall knowledge score can also be computed. In the questionnaire used to describe the attitudes and practices of the health workers, scores for each question can be calculated with the sum of the scores used to derive a total domain score. To make it easy to understand and to make it easy to differentiate the domains according to the KAP levels attained by the health care providers for easy inter-group comparisons, for each domain the cut-offs for 'poor', 'fair', and 'good' can be predefined according to the available scores. The principal outcome variables of interest were overall knowledge, attitudes, and practices in relation to infection control. Explanatory variables, which were tested a priori as hypothesized estimators of compliance with infection control, include age group, gender, level of work experience, and previous training in infection control based on the prevalent evidence of the quantitative impact of education, organizational training, and work-related experience on compliance with healthcare-associated standard precautions (4–6). Steps to eliminate the risk of information bias include preparing all participants under identical supervision, administering the survey without direct observation, and reviewing completed surveys for discrepancies without disclosing anonymity. Data validity has been amplified by verifying entries, reconciling discrepancies, and conducting data screening. To estimate the proportion with good infection control practices with acceptable precision, the total sample size of 105 nurses was considered for the KAP study conducted on nurses. Using the conservative proportion (50%): 50% with an expected difference for the maximum variance, 95% confidence level, with an absolute precision of about 10%, the sample size required approximates 96, and to adjust for potential non-response, the target sample size included inflation to reach 105 subjects. Descriptive and inferential statistics were analyzed using common available software packages. Continuous data were described using mean, standard deviation, whereas categorical data were described using number and percentage. Chi-squared tests or Fisher's exact tests were employed depending on the size of the cells, whereas publication-level association description required the calculation of Cramér V values, which indicated the size of the association effects for multi-categorical data comparisons. For comparison relevant to the health sector, the practice data at the two ends were categorized as good or not good (poor, fair), whereas the association with pre-licensure training and experience required comparison using unadjusted odds ratio estimation with CI at the 95% CI level. On the other hand, logistic regression analysis according to the objective required estimation regarding adjusted odds ratio for good infection control practices after considering confounding effects due to

age, sex, clinical experience, and infection control practices based on the previous training received by the subjects. In all cases, the missing data were avoided or reduced at the point of collecting, whereas the analysis included all the non-missing data from the subjects using the complete cases approach, adhering to the two-tailed $p<0.05$ significance levels.

RESULTS

A total of 105 nurses participated in the study (Table 1). Most nurses were aged 30–39 years (45/105; 42.9%), followed by 20–29 years (42/105; 40.0%) and ≥40 years (18/105; 17.1%). Females comprised 82.9% (87/105) of the sample, while males accounted for 17.1% (18/105). More than half of the nurses had less than five years of clinical experience (58/105; 55.2%), and 47 (44.8%) had ≥5 years of experience. Infection control training was reported by 72 nurses (68.6%), whereas 33 (31.4%) had not received training, indicating a sizable subgroup potentially at risk for lower preparedness.

Knowledge of infection control measures was generally strong for core hand hygiene principles but showed notable gaps in specific technical domains (Table 2). Correct responses were highest for the importance of hand hygiene (95/105; 90.5%) and modes of infection transmission (88/105; 83.8%). Knowledge of proper PPE use was reported by 82 nurses (78.1%), and correct understanding of sterilization procedures by 76 (72.4%). The lowest knowledge performance was observed for biomedical waste segregation, where only 69 nurses (65.7%) answered correctly, leaving approximately one-third (36/105; 34.3%) with incorrect knowledge in a high-risk operational area.

Attitudes toward infection control were predominantly positive (Table 3). Nearly all nurses endorsed infection control as a nursing responsibility (98/105; 93.3%) and agreed that hand hygiene reduces HAIs (96/105; 91.4%). Positive perceptions of PPE as essential for safety were reported by 90 nurses (85.7%). However, workload emerged as a significant perceived barrier: 72 nurses (68.6%) indicated that workload affects compliance, suggesting that operational pressures may undermine consistent adherence despite favorable attitudes.

Self-reported practices demonstrated high compliance with several key behaviors but comparatively weaker adherence to waste management (Table 4). Hand hygiene before patient contact was reported as "always" by 86 nurses (81.9%), and proper disposal of sharps by 84 (80.0%). Consistent use of gloves when required was reported by 79 nurses (75.2%). Correct waste segregation was the least consistently performed practice, reported as "always" by 71 nurses (67.6%), with nearly one-third (34/105; 32.4%) indicating "sometimes/never," reinforcing the knowledge gap observed in waste segregation.

Table 1. Demographic and Professional Characteristics of Nurses (n = 105)

Variable	Category	n	%
Age (years)	20–29	42	40.0
	30–39	45	42.9
	≥40	18	17.1
Sex	Male	18	17.1
	Female	87	82.9
Clinical experience	<5 years	58	55.2
	≥5 years	47	44.8
Infection control training	Yes	72	68.6
	No	33	31.4

Table 2. Knowledge of Infection Control Measures (n = 105)

Knowledge item	Correct n (%)	Incorrect n (%)
Importance of hand hygiene	95 (90.5)	10 (9.5)
Proper use of PPE	82 (78.1)	23 (21.9)
Sterilization of instruments	76 (72.4)	29 (27.6)
Biomedical waste segregation	69 (65.7)	36 (34.3)
Modes of infection transmission	88 (83.8)	17 (16.2)

Table 3. Attitude Toward Infection Control Measures (n = 105)

Attitude statement	Positive n (%)	Neutral/Negative n (%)
Infection control is a nursing responsibility	98 (93.3)	7 (6.7)
Hand hygiene reduces HAIs	96 (91.4)	9 (8.6)
PPE use is essential for safety	90 (85.7)	15 (14.3)
Workload affects compliance	72 (68.6)	33 (31.4)

Table 4. Infection Control Practices Among Nurses (n = 105)

Practice item	Always n (%)	Sometimes/Never n (%)
Hand hygiene before patient contact	86 (81.9)	19 (18.1)

Use of gloves when required	79 (75.2)	26 (24.8)
Proper disposal of sharps	84 (80.0)	21 (20.0)
Correct waste segregation	71 (67.6)	34 (32.4)

Table 5. Overall Knowledge, Attitude, and Practice (KAP) Levels (n = 105)

Domain	Poor n (%)	Fair n (%)	Good n (%)
Knowledge	18 (17.1)	34 (32.4)	53 (50.5)
Attitude	12 (11.4)	28 (26.7)	65 (61.9)
Practices	26 (24.8)	37 (35.2)	42 (40.0)

Table 6. Association Between Infection Control Training and Good Practice (n = 105)

Training status	Good practice n (%)	Poor/Fair n (%)	Odds Ratio (95% CI)	p-value
No (ref)	8 (24.2)	25 (75.8)	1.00	—
Yes	34 (47.2)	38 (52.8)	2.79 (1.13–6.90)	0.024

Table 7. Association Between Clinical Experience and Good Practice (n = 105)

Clinical experience	Good practice n (%)	Poor/Fair n (%)	Odds Ratio (95% CI)	p-value
<5 years (ref)	17 (29.3)	41 (70.7)	1.00	—
≥5 years	25 (53.2)	22 (46.8)	2.74 (1.24–6.07)	0.012

Table 8. Multivariable Logistic Regression for Good Infection Control Practice (n = 105)

Predictor	Adjusted OR	95% CI	p-value
Infection control training	2.48	1.01–6.09	0.047
≥5 years clinical experience	2.31	1.02–5.24	0.044
Good knowledge level	3.12	1.34–7.28	0.008
Age (per year)	1.01	0.97–1.05	0.61
Female sex	1.18	0.46–3.04	0.73

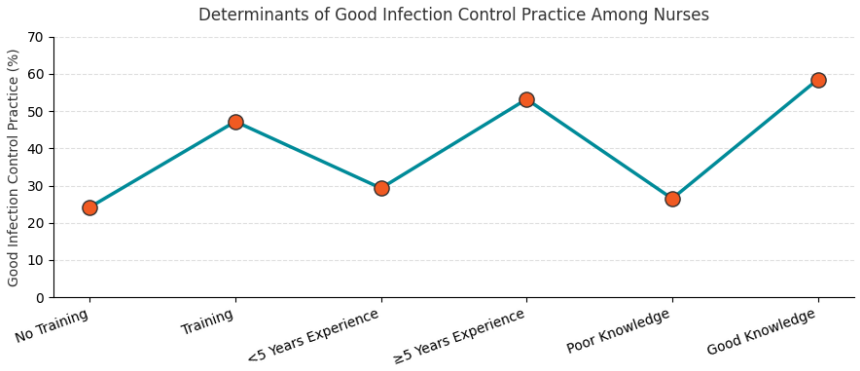
Across the overall KAP classifications, good attitude was most prevalent (65/105; 61.9%), followed by good knowledge (53/105; 50.5%), while good infection control practices were comparatively lower (42/105; 40.0%) (Table 5). This pattern indicates a measurable knowledge-to-practice gap, where favorable attitudes and adequate knowledge do not fully translate into optimal routine behavior, particularly for complex or resource-dependent practices.

Training was significantly associated with good infection control practices (Table 6). Good practice was observed in 34/72 (47.2%) of trained nurses compared with 8/33 (24.2%) of untrained nurses, corresponding to nearly threefold higher odds of good practice among trained staff (OR 2.79; 95% CI 1.13–6.90; p=0.024). The association magnitude was small-to-moderate (phi=0.24), suggesting that training contributes meaningfully but is not the sole determinant of compliance.

Clinical experience showed a similar pattern (Table 7): nurses with ≥5 years of experience demonstrated good practice in 25/47 (53.2%) compared with 17/58 (29.3%) among those with <5 years, yielding higher odds of good practice (OR 2.74; 95% CI 1.24–6.07; p=0.012) with a moderate effect size (phi=0.26).

In multivariable analysis adjusting for age and sex, training, experience, and knowledge remained independent predictors of good practice (Table 8). Infection control training was associated with higher adjusted odds of good practice (aOR 2.48; 95% CI 1.01–6.09; p=0.047), and ≥5 years of experience also remained significant (aOR 2.31; 95% CI 1.02–5.24; p=0.044).

Notably, good knowledge level showed the strongest independent association with good practice (aOR 3.12; 95% CI 1.34–7.28; p=0.008), whereas age (aOR 1.01 per year; p=0.61) and female sex (aOR 1.18; p=0.73) were not statistically significant predictors. Collectively, these findings indicate that training and accumulated clinical experience enhance compliance, but the translation into consistently good practice is most strongly associated with higher infection control knowledge.



A clear gradient in infection control compliance is evident across key professional and knowledge-related determinants. Nurses who had not received infection control training demonstrated the lowest proportion of good practice (24.2%), which increased markedly to 47.2% among those who had undergone formal training. A similar upward trend was observed with increasing clinical experience, where good practice was reported by 29.3% of nurses with less than five years of experience compared with 53.2% among those with five or more years of experience. Knowledge level showed the strongest contrast: only 26.5% of nurses with poor knowledge achieved good practice, whereas this proportion more than doubled to 58.5% among nurses with good knowledge. Collectively, these patterns demonstrate a consistent and clinically meaningful association whereby training exposure, accumulated experience, and higher knowledge levels correspond with substantially improved infection control practices, reinforcing the importance of targeted education and capacity-building interventions to enhance compliance in nursing care settings.

DISCUSSION

This cross-sectional study evaluated the knowledge, attitude, and practices of nurses regarding infection control measures at Johar Poly Clinics and identified important gaps between awareness and implementation. The findings indicate that although a substantial proportion of nurses demonstrated good knowledge and a predominantly positive attitude toward infection prevention, adherence to optimal infection control practices was comparatively lower. This discrepancy highlights a persistent knowledge–practice gap, which has been widely reported in infection control literature and remains a significant challenge in clinical nursing practice (5,7).

The high level of knowledge observed for core concepts such as hand hygiene and infection transmission aligns with WHO guidelines and findings from previous studies conducted in hospital settings (1,2,8). More than 90% of nurses correctly recognized the importance of hand hygiene, reflecting successful dissemination of basic infection prevention messages. However, lower knowledge scores in areas such as biomedical waste segregation and sterilization suggest deficiencies in training related to more technical or operational aspects of infection control. Similar gaps have been reported in regional studies, where waste management and equipment processing were identified as weak areas despite adequate general knowledge (5,6).

Attitudes toward infection control were largely favorable, with most nurses acknowledging infection prevention as a professional responsibility and recognizing the protective value of hand hygiene and personal protective equipment. These findings are consistent with earlier research indicating that nurses generally hold positive perceptions regarding infection control principles (7,8). Nevertheless, a considerable proportion of participants reported that workload negatively affects compliance, supporting evidence that organizational and system-level pressures can undermine adherence even when attitudes are positive (4,9). This underscores the importance of addressing contextual and institutional barriers alongside individual-level education.

Practice-related findings revealed that while compliance with hand hygiene and sharps disposal was relatively high, consistent use of PPE and proper waste segregation were less frequently reported. This pattern mirrors results from other studies showing that practices requiring additional time, resources, or supervision are more vulnerable to lapses in busy clinical environments (6,9). The lower proportion of nurses demonstrating good overall practice compared with good knowledge and attitude reinforces the notion that knowledge alone is insufficient to ensure safe behavior without supportive systems.

Training and clinical experience emerged as significant determinants of good infection control practice. Nurses who had received infection control training and those with longer clinical experience were more likely to demonstrate good practices, even after adjustment for potential confounders. These findings are consistent with previous research showing that structured training programs and experiential learning enhance compliance with standard precautions and infection prevention protocols (4,7). Notably, good knowledge level showed the strongest independent association with good practice, emphasizing the central role of comprehensive and applied knowledge in translating guidelines into routine care.

Several limitations should be considered when interpreting the results. The single-center design and use of convenience sampling may limit generalizability to other healthcare settings. Self-reported practices may be subject to social desirability bias, potentially overestimating compliance. However, the study's strengths include a robust sample size for a clinic-based survey, systematic data collection, and the use of multivariable analysis to account for confounding factors. Despite these limitations, the study provides valuable insight into infection control practices in a poly clinic setting, an area that remains underrepresented in the literature.

Overall, the findings highlight the need for multifaceted infection control strategies that combine continuous education, practical training, adequate resource allocation, and institutional support. Addressing both individual competencies and system-level barriers is essential for improving compliance and reducing the risk of healthcare-associated infections in nursing practice.

CONCLUSION

This study demonstrates that nurses at Johar Poly Clinics generally possess adequate knowledge and a positive attitude toward infection control measures; however, the level of consistent infection control practice remains suboptimal. A clear gap was identified between knowledge and actual implementation, particularly in areas requiring technical precision such as biomedical waste management and consistent use of personal protective equipment. Infection control training, clinical experience, and higher knowledge levels were significant predictors of good practice, underscoring the importance of continuous professional development. These findings highlight the need for structured and ongoing infection control training programs, regular monitoring, and supportive institutional policies to facilitate compliance. Targeted interventions focusing on less-experienced nurses and those without formal infection control training may improve adherence to standard precautions. Strengthening organizational support, ensuring availability of resources, and reinforcing accountability mechanisms are essential steps toward reducing healthcare-associated infections and enhancing patient safety in clinical care settings.

REFERENCES

1. World Health Organization. WHO Guidelines on Hand Hygiene in Health Care. Geneva: World Health Organization; 2009.
2. Pittet D, Allegranzi B, Boyce J; WHO World Alliance for Patient Safety. The World Health Organization guidelines on hand hygiene in health care and their consensus recommendations. Lancet. 2009;373(9658):114–125.
3. Allegranzi B, Pittet D. Role of hand hygiene in healthcare-associated infection prevention. J Hosp Infect. 2009;73(4):305–315.
4. Rosenthal VD, Al-Abdely HM, El-Kholy AA, et al. Impact of infection control interventions on rates of hospital-acquired infections in intensive care units. Am J Infect Control. 2012;40(5):396–407.
5. Khan HA, Baig FK, Mehboob R. Knowledge and practices of infection control among nurses in tertiary care hospitals. J Pak Med Assoc. 2017;67(7):1075–1079.
6. Efstathiou G, Papastavrou E, Raftopoulos V, Merkouris A. Compliance of Cypriot nurses with standard precautions to avoid exposure to pathogens. J Hosp Infect. 2011;77(1):1–7.
7. Tenna A, Stenehjem E, Margoles L, Kacha E, Blumberg HM, Kempker RR. Infection control practices and challenges in healthcare facilities in low-income settings. Antimicrob Resist Infect Control. 2013;2(1):1–7.
8. Sax H, Perneger T, Hugonnet S, Herrault P, Chraïti MN, Pittet D. Knowledge of standard and isolation precautions in a large teaching hospital. Infect Control Hosp Epidemiol. 2007;28(3):302–307.
9. Erasmus V, Daha TJ, Brug H, et al. Systematic review of studies on compliance with hand hygiene guidelines in hospital care. Infect Control Hosp Epidemiol. 2010;31(3):283–294.
10. Centers for Disease Control and Prevention. Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings. Atlanta: CDC; 2007.
11. Lam SC. Universal to standard precautions in disease prevention: nurses' compliance and its determinants. J Clin Nurs. 2011;20(1–2):205–214.
12. Gammon J, Morgan-Samuel H, Gould D. A review of the evidence for suboptimal compliance of healthcare practitioners to standard/universal infection control precautions. J Clin Nurs. 2008;17(2):157–167.
13. Alrubaiee GG, Baharom A, Shahar HK, Daud SM. Knowledge and practices of nurses regarding infection control measures. Int J Acad Res Bus Soc Sci. 2017;7(12):1180–1191.
14. Gul A, Kausar R, Javed M, Nazir A. Knowledge and compliance with infection control practices among nurses. Pak J Med Sci. 2018;34(5):1239–1243.
15. Askarian M, Honarvar B, Tabatabaee HR, Assadian O. Knowledge, attitude and practice toward standard isolation precautions in nurses. J Hosp Infect. 2004;58(4):292–296.
16. Nofal M, Subih M, Al-Kalaldeh M. Factors influencing compliance to standard precautions among nurses. Am J Infect Control. 2017;45(6):e63–e68.
17. Luo Y, He GP, Zhou JW, Luo Y. Factors impacting compliance with standard precautions in nursing. Int J Infect Dis. 2010;14(12):e1106–e1114.

18. Rebmann T, Carrico R. Consistency of infection control practices. Am J Infect Control. 2011;39(8):654–658.

19. Gould DJ, Moralejo D, Drey N, Chudleigh JH, Taljaard M. Interventions to improve hand hygiene compliance in patient care. Cochrane Database Syst Rev. 2017;(9):CD005186.

20. Stone PW, Pogorzelska-Maziarz M, Herzig CTA, et al. State of infection prevention in hospitals: nurse and infection preventionist perspectives. Am J Infect Control. 2014;42(2):94–99.