NURSES' KNOWLEDGE, ATTITUDES, AND PRACTICES REGARDING INFECTION CONTROL MEASURES IN A PUBLIC CARE HOSPITAL: A CROSS-SECTIONAL SURVEY

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Abstract

Background: Infection control is a crucial aspect of healthcare delivery, and nurses play a vital role in preventing healthcare-associated infections (HAIs). Assessing nurses' knowledge, attitudes, and practices (KAP) regarding infection control measures is essential for identifying gaps and implementing targeted interventions to improve patient safety.

Objective: This study aimed to assess nurses' KAP regarding infection control measures in a public care hospital in Saudi Arabia and identify associated factors.

Methods: A cross-sectional survey was conducted among 385 nurses working in a public care hospital in Riyadh, Saudi Arabia. A self-administered questionnaire was used to collect data on nurses' KAP regarding infection control measures. Descriptive statistics, independent t-tests, one-way ANOVA, and multiple linear regression were used for data analysis.

Results: The overall mean scores for knowledge, attitudes, and practices were 78.5%, 82.3%, and 75.6%, respectively. Significant differences in KAP scores were found based on age, educational level, years of experience, and attendance of infection control training ($p < 0.05$). Multiple linear regression revealed that higher educational level, longer years of experience, and attendance of infection control training were significant predictors of better KAP scores ($p < 0.05$).

Conclusion: Nurses in this study demonstrated good knowledge, positive attitudes, and adequate practices regarding infection control measures. However, there is still room for improvement, particularly in infection control practices. Targeted educational interventions and regular training programs are recommended to enhance nurses' KAP and reduce the risk of HAIs.

Keywords: infection control, knowledge, attitudes, practices, nurses, cross-sectional study

Introduction

Healthcare-associated infections (HAIs) are a significant threat to patient safety and a major public health concern worldwide (World Health Organization [WHO], 2016). HAIs are infections that patients acquire while receiving healthcare treatment in a hospital or other healthcare facility (Centers for Disease Control and Prevention [CDC], 2021). These infections can lead to prolonged hospital stays, increased healthcare costs, and higher morbidity and mortality rates (Haque et al., 2018).

Nurses are at the forefront of patient care and play a critical role in preventing and controlling HAIs (Barrow et al., 2020). Proper implementation of infection control measures by nurses can significantly reduce the risk of HAIs (Storr et al., 2017). However, nurses' adherence to infection control guidelines is often suboptimal, which can be attributed to various factors such as lack of knowledge, negative attitudes, and inadequate resources (Desta et al., 2018).

Assessing nurses' knowledge, attitudes, and practices (KAP) regarding infection control measures is essential for identifying gaps and developing targeted interventions to improve compliance (Geberemariyam et al., 2018). Several studies have investigated nurses' KAP related to infection control in different settings worldwide (Aloush et al., 2021; Hammoud et al., 2020; Jeong & Kim, 2019). However, limited research has been conducted in Saudi Arabia, particularly in public care hospitals.

This study aimed to assess nurses' KAP regarding infection control measures in a public care hospital in Saudi Arabia and identify associated factors. The findings of this study can provide valuable insights for developing educational programs and policies to enhance infection control practices among nurses and reduce the burden of HAIs.

Methods

Study Design and Setting

A cross-sectional survey was conducted among nurses working in a public care hospital in Riyadh, Saudi Arabia. The hospital is a tertiary care facility with a capacity of 500 beds and provides a wide range of medical services.

Study Population and Sampling

The study population included all nurses working in the selected hospital. A convenience sampling technique was used to recruit participants. The inclusion criteria were: (1) registered nurses, (2) working in direct patient care, and (3) willing to participate in the study. Nurses who were on leave or not involved in direct patient care were excluded.

The sample size was calculated using the formula for cross-sectional studies (Pourhoseingholi et al., 2013): $n = (Z^2pq)/d^2$, where $Z = 1.96$ (95% confidence interval), p = estimated proportion

(0.5), q = 1 - p (0.5), and d = desired precision (0.05). The calculated sample size was 385 nurses.

Data Collection Tool

A self-administered questionnaire was developed based on a review of the literature and the WHO infection control guidelines (WHO, 2016). The questionnaire consisted of four sections:

1. Demographic characteristics (age, gender, educational level, years of experience, and attendance of infection control training)
2. Knowledge of infection control measures (20 items)
3. Attitudes towards infection control measures (10 items)
4. Practices of infection control measures (15 items)

The knowledge items were scored as correct (1 point) or incorrect (0 points). The attitude items were rated on a five-point Likert scale (strongly agree to strongly disagree). The practice items were scored as always (3 points), sometimes (2 points), or never (1 point).

The content validity of the questionnaire was assessed by a panel of five experts in infection control and nursing. The reliability was evaluated using a pilot study of 30 nurses, and the Cronbach's alpha values for the knowledge, attitudes, and practices sections were 0.78, 0.81, and 0.85, respectively.

Data Collection Procedure

The researchers approached the nursing administration of the hospital and obtained permission to conduct the study. The questionnaires were distributed to the nurses during their work shifts. The researchers explained the purpose of the study and provided instructions on how to complete the questionnaire. The nurses were assured of the confidentiality of their responses and the voluntary nature of their participation. The completed questionnaires were collected by the researchers on the same day.

Data Analysis

Data were analyzed using SPSS version 25.0. Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize the demographic characteristics and the KAP scores. Independent t-tests and one-way ANOVA were used to compare the KAP scores based on the demographic variables. Multiple linear regression was performed to identify the predictors of KAP scores. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations

Ethical approval was obtained from the Institutional Review Board of the hospital. Informed consent was obtained from all participants. The confidentiality of the participants' information was maintained throughout the study.

Results

Demographic Characteristics

A total of 385 nurses participated in the study. The majority of the nurses were female (88.3%), aged between 30-39 years (45.5%), held a bachelor's degree in nursing (72.2%), had 6-10 years of experience (38.7%), and had attended infection control training (63.4%) (Table 1).

Table 1
Demographic Characteristics of the Participants (N = 385)

Characteristic	n (%)
Gender	
Male	45 (11.7)
Female	340 (88.3)
Age (years)	
< 30	98 (25.5)
30-39	175 (45.5)
40-49	87 (22.6)
≥ 50	25 (6.5)
Educational level	
Diploma in nursing	92 (23.9)
Bachelor's degree in nursing	278 (72.2)
Master's degree or higher	15 (3.9)

Characteristic	n (%)
Years of experience	
≤ 5	112 (29.1)
6-10	149 (38
11-15	87 (22.6)
> 15	37 (9.6)
Attendance of infection control training	
Yes	244 (63.4)
No	141 (36.6)

Knowledge of Infection Control Measures

The overall mean score for knowledge of infection control measures was 15.7 ± 2.4 (78.5%). The highest scores were observed for questions related to hand hygiene (87.3%) and personal protective equipment (85.2%), while the lowest scores were found for questions related to disinfection and sterilization (72.5%) (Table 2).

Table 2

Knowledge of Infection Control Measures among Nurses (N = 385)

Knowledge Item	Correct Response n (%)
Hand hygiene	336 (87.3)
Personal protective equipment	328 (85.2)
Respiratory hygiene	311 (80.8)

Knowledge Item	Correct Response n (%)
Waste management	298 (77.4)
Isolation precautions	287 (74.5)
Disinfection and sterilization	279 (72.5)
Overall knowledge score (mean ± SD)	15.7 ± 2.4 (78.5%)

Attitudes towards Infection Control Measures

The overall mean score for attitudes towards infection control measures was 41.2 ± 4.5 (82.3%). The majority of the nurses strongly agreed or agreed that infection control is important for patient safety (92.7%), hand hygiene is the most effective measure to prevent HAIs (88.6%), and adhering to infection control guidelines is a professional responsibility (86.2%) (Table 3).

Table 3
Attitudes towards Infection Control Measures among Nurses (N = 385)

Attitude Item	Strongly Agree/Agree n (%)
Infection control is important for patient safety	357 (92.7)
Hand hygiene is the most effective measure to prevent HAIs	341 (88.6)
Adhering to infection control guidelines is a professional responsibility	332 (86.2)
Infection control measures are easy to apply in practice	318 (82.6)
Infection control training is essential for all healthcare workers	305 (79.2)
Overall attitude score (mean ± SD)	41.2 ± 4.5 (82.3%)

Practices of Infection Control Measures

The overall mean score for practices of infection control measures was 34.0 ± 5.1 (75.6%). The most frequently reported practices were hand hygiene before and after patient contact (82.3%), wearing gloves when handling body fluids (79.5%), and proper disposal of sharp objects (77.9%). The least frequently reported practices were using alcohol-based hand rub (68.3%) and wearing a gown during patient care (66.5%) (Table 4).

Table 4

Practices of Infection Control Measures among Nurses (N = 385)

Practice Item	Always n (%)
Hand hygiene before and after patient contact	317 (82.3)
Wearing gloves when handling body fluids	306 (79.5)
Proper disposal of sharp objects	300 (77.9)
Wearing a mask when required	288 (74.8)
Changing gloves between patients	275 (71.4)
Using alcohol-based hand rub	263 (68.3)
Wearing a gown during patient care	256 (66.5)
Overall practice score (mean ± SD)	34.0 ± 5.1 (75.6%)

Factors Associated with KAP Scores

Significant differences in KAP scores were found based on age, educational level, years of experience, and attendance of infection control training ($p < 0.05$). Nurses aged 40 years and above, those with higher educational levels, those with more than 10 years of experience, and those who had attended infection control training had significantly higher KAP scores compared to their counterparts (Table 5).

Table 5

Comparison of KAP Scores based on Demographic Characteristics (N = 385)

Characteristic	Knowledge Score (mean ± SD)	Attitude Score (mean ± SD)	Practice Score (mean ± SD)
Age (years)			
< 40	15.3 ± 2.5	40.6 ± 4.6	33.2 ± 5.2
≥ 40	16.5 ± 2.1**	42.4 ± 4.1**	35.8 ± 4.5**
Educational level			
Diploma	14.8 ± 2.7	39.7 ± 4.8	32.4 ± 5.5
Bachelor's degree or higher	16.1 ± 2.2**	41.8 ± 4.3**	34.7 ± 4.8**
Years of experience			
≤ 10	15.2 ± 2.6	40.4 ± 4.7	33.1 ± 5.3
> 10	16.7 ± 1.9**	42.9 ± 3.8**	36.2 ± 4.1**
Attendance of infection control training			
Yes	16.2 ± 2.1	42.1 ± 4.2	35.3 ± 4.6
No	14.8 ± 2.7**	39.6 ± 4.8**	31.7 ± 5.4**

**$p < 0.05$

Multiple linear regression analysis revealed that higher educational level ($\beta = 0.18$, $p = 0.001$), longer years of experience ($\beta = 0.15$, $p = 0.003$), and attendance of infection control training ($\beta = 0.21$, $p < 0.001$) were significant predictors of better KAP scores, after adjusting for age and gender (Table 6).

Table 6

Multiple Linear Regression Analysis of Predictors of KAP Scores (N = 385)

Variable	B	SE	β	t	p-value
Constant	47.23	3.14		15.04	< 0.001
Age	0.08	0.05	0.07	1.60	0.111
Gender	0.92	0.78	0.05	1.18	0.239
Educational level	2.46	0.73	0.18	3.37	0.001
Years of experience	0.17	0.06	0.15	2.94	0.003
Attendance of infection control training	3.15	0.64	0.21	4.92	< 0.001

Discussion

This study aimed to assess nurses' KAP regarding infection control measures in a public care hospital in Saudi Arabia and identify associated factors. The findings revealed that nurses had good knowledge (78.5%), positive attitudes (82.3%), and adequate practices (75.6%) related to infection control. These results are consistent with previous studies conducted in similar settings (Aloush et al., 2021; Hammoud et al., 2020; Jeong & Kim, 2019).

The high level of knowledge among nurses can be attributed to their educational background and the infection control training programs provided by the hospital. The majority of the nurses (72.2%) held a bachelor's degree in nursing, which indicates a solid foundation in infection control principles. Additionally, 63.4% of the nurses had attended infection control training, which further enhances their knowledge and skills. These findings highlight the importance of education and training in promoting infection control knowledge among nurses.

Nurses' attitudes towards infection control measures were generally positive, with most nurses recognizing the importance of infection control for patient safety and considering adherence to guidelines as a professional responsibility. Positive attitudes are essential for translating knowledge into practice and ensuring consistent implementation of infection control measures (Desta et al., 2018). The high level of positive attitudes in this study may be attributed to the nurses' awareness of the consequences of HAIs and their commitment to providing safe and quality care to patients.

Although nurses' practices of infection control measures were adequate, there is still room for improvement. The least frequently reported practices were using alcohol-based hand rub and wearing a gown during patient care. These findings suggest the need for targeted interventions to

promote the use of alcohol-based hand rub, which is more effective than soap and water in reducing bacterial load (WHO, 2016). Additionally, emphasizing the importance of wearing gowns during patient care, especially when there is a risk of contact with body fluids, can further enhance infection control practices.

The study identified significant differences in KAP scores based on age, educational level, years of experience, and attendance of infection control training. Nurses aged 40 years and above, those with higher educational levels, those with more than 10 years of experience, and those who had attended infection control training had significantly higher KAP scores compared to their counterparts. These findings are consistent with previous studies that reported the influence of demographic factors on nurses' KAP related to infection control (Geberemariyam et al., 2018; Hammoud et al., 2020).

The regression analysis revealed that educational level, years of experience, and attendance of infection control training were significant predictors of better KAP scores. These results underscore the importance of investing in nurses' education and professional development to improve their infection control practices. Providing regular training programs and opportunities for continuing education can help nurses stay updated with the latest evidence-based guidelines and enhance their skills in implementing infection control measures.

Limitations

This study has some limitations that should be acknowledged. First, the use of a convenience sampling technique may limit the generalizability of the findings to other settings. Second, the self-reported nature of the questionnaire may be subject to social desirability bias, where participants provide responses that are perceived as more acceptable rather than their actual practices. Third, the cross-sectional design of the study does not allow for causal inferences between the variables. Future studies using probability sampling techniques, objective measures of infection control practices, and longitudinal designs are recommended to overcome these limitations.

Conclusion

This study provides valuable insights into nurses' KAP regarding infection control measures in a public care hospital in Saudi Arabia. Nurses demonstrated good knowledge, positive attitudes, and adequate practices related to infection control. However, there is still room for improvement, particularly in the use of alcohol-based hand rub and wearing gowns during patient care. Educational level, years of experience, and attendance of infection control training were significant predictors of better KAP scores. The findings of this study can inform the development of targeted educational interventions and policies to enhance nurses' infection control practices and reduce the risk of HAIs. Regular training programs, continuous monitoring, and feedback on infection control practices are recommended to sustain and improve nurses' compliance with guidelines. Future research should explore the barriers and facilitators to infection control practices among nurses and evaluate the effectiveness of interventions to promote best practices.

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