Infection Prevention and Control in the Emergency Department Unit in King Khalid Hospital, Hail City, Saudi Arabia

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ABSTRACT

Context: The emergency department presents unique challenges to infection control and prevention. Infection control (IC) activities include the identification of infectious disease processes, surveillance, and epidemiologic investigation, preventing/controlling the transmission of infectious agents/healthcare-associated infections, employee/occupational health, management and communication, education and research, managing the environment of care, and cleaning, sterilization, disinfection, and asepsis.
Aim: Assess infection prevention and control practices in the emergency department in King Khalid Hospital, Hail City, Saudi Arabia.
Methods: A quantitative, descriptive correlational study design was used to conduct the study in the emergency department (ED) unit at King Khalid Hospital (KKH), Hail City, Saudi Arabia. All available nurses working in the emergency department KKH at the time of data collection. A self-administered structured questionnaire was utilized to collect data in the current study.
Results: 71.7% (n=76) of the participants were between 25 and 35 years old, 24.5% (n=26) were between 36-45 years old, and only 3.8% (n=4) were over 45 years old. 79.2% of the nurses reported that there is a curriculum or program for IC training for doctors and nurses, 71.7% mentioned that they have recommendations for IC training link doctors and nurses, 84.8% reported that IC issues are parts of the examination and evaluation in basic training for nurses, and there are policies and procedures elaborating infection control interventions. Besides, 82.1% of the nurses reported infection control policies and guidelines in their units, and 83% and 82.7% stated that there is a list of reportable infectious agents available in their unit and accessible to all staff, and there is an active infection control team, respectively.
***Conclusion*:** Overall, this study indicated that nurses reported a high level of infection prevention and control practices in the ED of King Khalid Hospital. There was no statistically significant association between nurses' knowledge of infection prevention and control practices and their demographic characteristics. Implementing regular training and educational programs for nurses, focusing on updating knowledge and skills in IPC practices, was recommended.

Keywords: Infection, prevention, control, emergency department, hospital

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1. Introduction

An emergency department (ED), also referred to as an accident and emergency department, emergency room (ER), emergency ward (EW), or casualty branch, is a medical treatment facility that specializes in emergency medicine, intensive care, and walk-in patients *(Kerr et al., 2021)*. The emergency department is generally located at a different location in a sanitarium or care center. Due to the unplanned nature of a patient's attendance, the department must provide initial treatment for a wide range of illnesses and injuries, some of which may be life-threatening and require immediate attention *(Turnbull et al., 2019).*

The Emergency Department (ED) presents special situations requiring contamination handling and prevention: Hand hygiene, transmission-based precautions, environmental cleaning, excessive disinfection and sterilization of reusable clinical devices, and prevention of healthcare-associated infections. Catheter-associated urinary tract infections, ventilator-associated pneumonia, and central line-associated bloodstream infections are major priorities in preventing ED contamination *(Liang et al., 2018).* Robust, sustained infection prevention techniques designed for ED are necessary and feasible *(Chen et al., 2019).*

The advantages of infection prevention and control services are obvious in many aspects. First, they reduce health care costs for individuals or the health care system by reducing the need for treatment, clinic stays, and readmissions due to contamination from health facilities. Second, by cutting and stopping health facility-acquired infections, they reduce overheads, consisting of the deaths of infected persons *(Munoz-Price et al., 2019).*

Core competencies required are identification of infectious disease processes, epidemiological surveillance and investigation, stopping/controlling transmission of infectious agents/infections associated with health care, professional fitness of workers, data management, training

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and research, the environment of care, and sterilization, disinfection, and sterility *(Teymourzadeh et al., 2019)*.

Infection management standards have become an indispensable part of the accreditation application for all hospital medical settings. Preferred precautions for contamination management consist of proven measures that include hand hygiene, sharps protection, worker suitability, use of personal protective equipment (PPE), system integrity, waste management, and environmental disinfection *(Atalla, 2016).*

As the front-line staff in this service, the nurse team must have several competencies to prevent infection and control *(Munoz-Price et al., 2019)*. They must have the capabilities and experience to collect and analyze infection facts, disseminate the implications of findings to healthcare workers and other relevant officials, help devise answers, and forcefully institute promotions *(Fawzi et al., 2019)*.

Infections acquired from health centers are due to an insufficient understanding of acquired contamination prevention by medical institutions and passive adherence to standard infection prevention practices. Less than half of the nurses had good information, and about two-thirds had excellent practices to prevent contamination acquired by medical institutions *(Zghair & Atiyah, 2021).*

Adequate knowledge and safe practice of contamination prevention among healthcare providers is vital to preventing nosocomial infections. Contact with healthcare personnel and patients in a sanatorium causes pathogenic organisms to pass to each person differently. Nurses are regularly screened for various infections throughout their nursing activities. Nurses are the heart and soul of the health staff and are considered the first-line caregivers for patients, who, other than giving pills or providing routine care to the injured. Thus, nurses must have good experience and adhere strictly to pollution control practices *(Brooks et al., 2021).*

Infection prevention is crucial. One precaution is terminating the transmission. Officers implementing accurate techniques and tactics is the most important behavior in pollution prevention efforts *(Habboush et al., 2024).* Control of nosocomial infections can be achieved through multiple interventions, namely knowledge of well-known precautions, rational use of antibiotics, and application of standard precautions *(Nagliate et al., 2013).*

Adequate information and safe infection prevention practices among healthcare providers are critical to preventing nosocomial infections. Many healthcare providers have insufficient experience and risky infection prevention practices. Good pre-carrier admission and job education are required to improve healthcare workers' knowledge of infection prevention *(Assefa et al., 2020).*

2. Significance of the study

Despite the increasing recognition of the importance of infection prevention and control (IPC) in healthcare settings, a notable gap exists in the literature regarding IC practice specifically tailored to the emergency department (ED) environment. While infection control measures are crucial across all healthcare units, the unique challenges and dynamics of the ED necessitate a specialized focus. The current body of knowledge lacks comprehensive insights into the specific practices required for effective IPC in EDs, particularly in the context of King Khalid Hospital in Hail City, Saudi Arabia.

This study holds significant importance for several reasons. Firstly, understanding the specific practices needed for IPC in the ED setting is crucial for preventing healthcare-associated infections and ensuring patient safety. By addressing this gap; the study aims to contribute valuable insights that can inform training programs and educational interventions for emergency department staff in King Khalid Hospital. Secondly, the research outcomes can serve as a foundation for policy development, guiding the establishment of standardized protocols and practices tailored to the unique demands of the ED environment. Ultimately, the study's findings pave the way for enhancing the overall quality of care, reducing infection rates, and improving patient outcomes in emergency care settings.

3. Aim of the study

The study aims to assess infection prevention and control practices in the emergency department at King Khalid Hospital, Hail City, Saudi Arabia.

3.1. Research question

- What are the infection prevention and control practices at the emergency department in King Khalid Hospital from nurses' perspectives?

3.2 Operational definition

Infection prevention and control practices refer in this study to two domains. The first domain is knowledge and training issues. The second domain is experience information regarding the current infection prevention and control practice in ED.

4. Subjects & Methods

4.1. Research design

A quantitative, descriptive cross-sectional study design was adopted for this study. Descriptive research is a quantitative method that collects quantifiable information for statistical analysis of the population sample *(Siedlecki, 2020).*

4.2. Study setting

The current study was conducted in the emergency department (ED) unit at King Khalid Hospital (KKH), Hail City, Saudi Arabia. King Khalid Hospital is the first reference hospital in Hail, with a clinical capacity of 285 beds. The hospital's emergency department has recently witnessed a significant development in its facilities; the number of clinics has been increased, resulting in a reduction in waiting times, and the quality of regulatory and therapeutic procedures has been adjusted.

4.3. Subjects

Participants were drawn by non-probability convenience sampling from nurses working in the emergency department at KKH at the time of data collection. By using the clinical program, considering the total number of female and male nurses enrolled in these departments

(300), Margin of error (5%), Confidence level (95%), and the needed sample size was estimated to be 106.

Inclusion criteria

Nurses with BSc certificates, male and female employed nurses who are working in ED and approved to participate in this study.

Exclusion criteria

Nurses who are not working in ED and do not approve to participate in this study.

4.4. Tools of data collection

4.4.1. Self-Administrated-Structured Questionnaire

The data was collected from the participants using a self-administered structured questionnaire. It was developed by the researcher, guided by *the Nursing and Midwifery Council (2004*), to assess infection prevention and control practices in the emergency department at King Khalid Hospital. This questionnaire consisted of two parts:

Part A concerns assessing sociodemographic characteristics such as age, gender, nationality, education, and years of experience.

Part B consists of two domains and concerns assessing the ED's infection prevention and control practice.

- Domain 1: Knowledge of infection control practices in the ED and training regarding infection control practice in ED (9 items), such as
- Domain 2: Experience information regarding the current infection prevention and control practice in ED (8 items).

Scoring system

Each question in the first domain had either a yes or no response. The second domain contains four (yes and no) questions. In contrast, the second section (3 questions) was assessed against a five-point Likert scale of strongly agree, agree, neutral, disagree, and strongly disagree. The data was displayed as descriptive data in frequency and percentage.

4.5. Procedures

Ethical approval for the current study was obtained from the University of Hail, and the Research Center Ethics Board approved this study. Written consent was obtained from all participants prior to each interview. Electronic data and information, consent forms, and quantitative data from surveys were password-protected and only accessible to research team members. Through the survey, participation among nurses is voluntary, and they can withdraw from the study at any time. Responses will be completely anonymous, and the name will not appear anywhere in the final writing of the survey results.

Participants were asked to participate in the study, which is voluntary and anonymous. The questionnaire is available for volunteer participants to fill out anonymously on the site; respondents could ask questions directly to the researcher. The response period was limited to one month. The data collection process includes obtaining formal approval to proceed with this study from a selected hospital, revision of the study instrument and doing necessary modifications, conducting a pilot study for the issue of reliability of the instrument, and deciding if there are modifications to be done. Data was collected from the study sample by distributing the questionnaires to the participants and ensuring ethical considerations. The questionnaire provides researchers' contact information so respondents could later inquire about the study results.

The study questionnaire was subjected to face and content validation by a panel of experts from the College of Nursing, Hail University (three academicians), and two clinical experts from the ED in King Khalid Hospital**.** The Cronbach's Alpha test was done for the study tool. The calculated reliability was (r=0.823) for the self-administered structured questionnaire and within the accepted limit.

4.6. Data analysis

Data were imported from Excel Sheet to IBM SPSS Statistics version 21.0 for Windows® (IBM Corp., Armonk, NY, USA). Categorical data, including department, age, gender, nationality, education level, and work experience, was presented as frequency and percentages. The continuous variables' normality was checked using the Kolmogorov–Smirnov test (number >50). The data were not normally distributed, as shown by the results of the Kolmogorov–Smirnov (P <0.05). Therefore, we used the Mann-Whitney U and Kruskal-Wallis tests where appropriate to assess the association between knowledge and training domain and participants' characteristics. A p-value ≤0.05 was considered statistically significant.

5. Results

The sociodemographic data of the participants in this study, categorized by different variables, is represented in Table 1. The first variable is the age variable shows that 71.7% (n=76) of the participants are between 25-35 years old, 24.5% (n=26) are between 36-45 years old, and only 3.8% (n=4) are over 45 years old. The gender variable indicates that 64.2% (n=68) of the participants were females, while 35.8% (n=38) were males.

Regarding nationality, most participants (84.0%, n=89) are Saudi, and 16.0% (n=17) are non-Saudi. The educational level variable shows that the highest percentage of the participants (48.1%, n=51) have a bachelor's degree in nursing, 32.1% (n=34) have a high diploma, and 19.8% have postgraduate degrees, including masters or PhDs. Finally, the work experience variable shows that 35.8% (n=38) had between 6-10 years of experience, 33.0%(n=35) had 1-5 years of experience, and 14.2% (n=15) had 11-15 years of experience. Two groups, each accounting for 8.5%(n=9), have less than one year and more than 15 years of experience, respectively.

Table 2 shows the participants' responses to various questions related to the knowledge and training domain of infection control practice. 79.2% (n=84) of participants reported that there is a curriculum or program for infection control training for doctors and nurses. Regarding recommendations for training IC for doctors and nurses, 71.7% (n=76) of participants reported having recommendations in their hospital. Additionally, 84.8% (n=89) of participants reported that IC issues are part of the examination or evaluation in basic nurse training. Regarding the most usual backgrounds for IC, 77.4% (n=82) of participants reported that ED is the most common background. Regarding basic training in IC in medical and

nurse schools, 73.6% (n=78) of participants reported basic training in medical and nursing schools in their region.

In response to the question about the availability of a management plan for an infection control program, work plan, and project, the majority (80.2%, n=85) reported having these plans in their ED. The coordinating audits of professional practices related to IC in clinical areas were reported by 75.5% (n=80) of participants. Furthermore, 84.8% (n=89) of participants reported that there are policies and procedures for infection control activities, including elaborating infection control interventions like decontamination and sterilization of medical devices, in their hospital. In comparison, 15.2% did not have such policies and procedures. Finally, 84.9% (n=90) of participants reported that there are controlling practices for environmental sources of infections.

The results of participants' responses to questions related to the experience information domain in the context of infection control are represented in Table 3. In response to the question, "Do you have infection control policies and guidelines in your unit?" the majority of the participants (82.1%, n=87) answered "Yes." Regarding the presence of an active infection control team at the institution, 82.7% of the participants (n=86) responded "Yes." Regarding training or orientation about infection prevention and control, 76.4% of the participants (n=81) answered "Yes." When asked if they have a list of reportable infectious agents available in their unit and accessible to all staff, 83% of the participants (n=88) answered "Yes."

Regarding the turnaround time of laboratory results of the reportable infectious agents, 41.5% (n=44) of the participants strongly agreed or agreed. Responding to the preparedness for any infection outbreak, a substantial proportion (47.6%, n=50) of the participants strongly agreed or agreed that their hospital is prepared for any infection outbreak. Additionally, a notable number of respondents (46.2%, n=49) strongly agreed or agreed with the effectiveness of the surveillance tool used in their institution to prevent or control infection. Furthermore, a significant majority (46.2%, n=49) strongly agreed or agreed that all staff in their unit promptly follow infection control policies, rules, and guidelines.

The association between nurses' knowledge of infection prevention and control practices and their sociodemographic data is shown in Table 4. The study categorized nurses into 25-35 years, 36-45 years, and above 45 years. The results indicated that knowledge of infection prevention and control practices levels were consistent across these age groups, with mean ranks ranging from 53.03 to 54.85. This finding suggests that age does not significantly impact nurses' knowledge of ICP practices. Similarly, gender and nationality did not significantly influence nurses' knowledge of the IPC practices.

Regarding educational level, the study identified three categories: high diploma, bachelor's degree in nursing, and postgraduate qualification. The findings reveal that nurses with postgraduate qualifications had the highest mean rank (57.57), indicating a slightly higher knowledge of IPC practices. However, nurses with high diplomas (50.56) and bachelor's degrees (53.78) also demonstrated good knowledge levels. Finally, analyzing nurses' work experience, the results show that nurses' knowledge of IPC practice levels is not significantly associated with years of experience. Nurses with 6-10 years of experience (mean rank of 58.05) exhibited the highest knowledge. However, the knowledge decreased after ten years of experience (mean rank of 49.44).

Overall, this study indicates that nurses, regardless of their sociodemographic characteristics, possess a generally high level of knowledge of IPC but with a non-statistically significant difference between all the demographic characteristics and nurses' knowledge of IPC practices.

Table (1): Frequency and percentage distribution of participants' sociodemographic data (n=106).

Variables	No.	%
Age		
25-35 years	76	71.7
36-45 years	26	24.5
> 45 years	4	3.8
Gender		
Male	38	35.8
Female	68	64.2
Nationality		
Saudi	89	84.0
Non-Saudi	17	16.0
Educational level		
High diploma	34	32.1
BSN	51	48.1
Postgraduate (Masters/PhD)	21	19.8
Work experience		
less than one Year	9	8.5
1-5 Years	35	33.0
6-10Years	38	35.8
11-15 Years	15	14.2
> 15 years	9	8.5

Table (2): Frequency and percentage distribution of participants' knowledge of infection prevention, control practices, and training domain (n=106).

Domain one: Knowledge and training variables	No.	%
Is there any curriculum or programmer for IC training for doctors and nurses?		
Yes	84	79.2
No	22	20.8
Do you have recommendations for training IC link doctors and nurses in your hospital?		
Yes	76	71.7
No	30	28.3
Is IC issues part of the examination or evaluation in basic training for nurses?		
Yes	89	84.8
No	16	15.2
Does ED is the most usual background for IC?		
Yes	82	77.4
No	24	22.6
Is there basic training in IC in medical and nurse schools in your region?		
Yes	78	73.6
No	28	26.4
Is there management of an infection control program, work plan, and project in your ED?		
Yes	85	80.2
No	21	19.8
Are there coordinating audits of professional practices related to IC in your clinical areas?		
Yes	80	75.5
No	26	24.5
Is there preparing IC policies and procedures of infection control activities elaborating infection control interventions, e.g., decontamination and sterilization of medical devices in your hospital?		
Yes	89	84.8
No	16	15.2
Is there a controlling practice for environmental sources of infections?		
Yes	90	84.9
No	16	15.1

Table (3): Frequency and percentage distribution of participants' responses to experience information domain

Domain two: Experience information	No.	%
Do you have infection control policies and guidelines in your unit?		
Yes	87	82.1
No	19	17.9
At your institution, do you have an active infection control team?		
Yes	86	82.7
No	18	17.3
Have you received some training or orientation about infection prevention and control?		
Yes	81	76.4
No	25	23.6
Do you have a list of reportable infectious agents available in your unit and accessible to all staff?		
Yes	88	83.0
No	18	17.0
Is there a known turnaround time in your institution for laboratory results of the reportable infectious agents?		
Strongly disagree/disagree	21	19.8
Neutral	41	38.7
Strongly agree/Agree	44	41.5
Do you think your hospital is prepared for any infection outbreak?		
Strongly disagree/disagree	21	19.8
Neutral	34	32.4
Strongly agree/Agree	50	47.6
Do you agree that the surveillance tool used in your institution effectively prevents or controls infection?		
Strongly disagree/disagree	23	21.7
Neutral	34	32.1
Strongly agree/Agree	49	46.2
Do you think all staff in your unit promptly follow infection control policies, rules, and guidelines?		
Strongly disagree/disagree	24	22.7
Neutral	33	31.1
Strongly agree/ Agree	49	46.2

Table (4): Association between nurses' knowledge of infection prevention and control practices and their sociodemographic characteristics (n=106).

Variables	No.	(%)	mean rank	Test value	P value
Age					
25-35 years	76	71.7	53.03		
36-45 years	26	24.5	54.85	0.1	0.966
>45 years	4	3.8	53.75		
Gender					
Male	38	35.8	55.28	1224.5	0.655
Female	68	64.2	52.51		
Nationality					
Saudi	89	84.0	53.31	740.0	0.886
Non-Saudi	17	16.0	54.47		
Educational level					
High diploma	34	32.1	50.56		
Bachelor's in nursing	51	48.1	53.78	0.7	0.708
Postgraduate	21	19.8	57.57		
Work experience					
Less than one Year	9	8.5	43.78		
1-5 Years	35	33.0	56.10		
6-10Years	38	35.8	58.05	3.558	0.469
11-15 Years	15	14.2	44.17		
> 15 years	9	8.5	49.44		

6. Discussion

Adequate information and safe infection prevention practices among healthcare vendors are critical to preventing nosocomial infections. Many healthcare providers have insufficient experience and risky infection prevention practices *(Assefa et al., 2020).* Therefore, the study aims to assess infection prevention and control practices in the emergency department of King Khalid Hospital, Hail City, Saudi Arabia.

The participants' responses regarding knowledge and training in infection control (IC) practice indicate that the presence of practices for controlling environmental sources of infections, the presence of policies and procedures for IC activities in their hospital, IC issues being part of the examination or evaluation in basic training for nurses, IC issues being part of the examination or evaluation in basic training for nurses, and the availability of management plans for IC programs, work plans, and projects was reported by most of the respondents.

Additionally, the existence of a curriculum or program for IC training for doctors and nurses and the most common backgrounds for IC were identified as the Emergency Department (ED) were reported by more than three-quarters of the nurses. Around three-quarters reported that the recommendations for IC training are available in their hospital. Besides, they got basic IC training in medical and nurse schools in their region. These findings mean that most participants indicated the presence of various elements related to knowledge and training in infection control (IC) practice. These findings reflect the commitment of the ED in the King Khalid Hospital to the standards of infection prevention and control procedures.

A cross-sectional view was conducted among nurses to assess subjects' information on physical, mental, and exercise care near clinic-acquired infection prevention at Dessie's referral hospital in Ethiopia. Finding that 191 subjects examined took part in the research giving a response of 90.5% of the 211 overall pattern sizes. Examined subjects gave their answers consistent with the self-administered questionnaire. Results indicate that 86.4%, 76.4%, and 77% of respondents had adequate experience, a favorable mindset, and poor practice to prevent clinic-acquired infections, respectively *(Gezie et al., 2019).*

The current study's findings also matched those of *Abalkhail et al. (2021).* A cross-sectional online survey among heath care workers (HCWs) was conducted using a structured questionnaire. A total of 213 HCWs participated in the survey. The prevalence of good knowledge, attitude, and practice was 67.6%, 61.5%, and 73.2%, respectively.

At the same time, the current study findings disagreed with a cross-sectional study on 212 nurse practitioners in Abha facilities found that about two-thirds of the centers (60.8%) had a special and separate room for medical waste. Only 55.7% attended educational programs on manipulation of pollution, and 72.6% considered a coronavirus memorandum. Nearly a third of the individuals had poor infection control knowledge, and 88.2% had a good attitude toward pollution management coverage and methods. In comparison, 49.5% had a terrible exercise for the 2021 red level *(Al-Ahmari et al., 2021).*

The results from participants' responses to questions related to the experience information domain in the context of infection control reveal that most participants reported having infection control policies and guidelines in their unit and an active infection control team at their institution. Additionally, most participants indicated receiving training or orientation about infection prevention and control and having a list of reportable infectious agents available and accessible to all staff.

However, only a moderate proportion of participants agreed with the turnaround time of laboratory results for reportable infectious agents. At the same time, a substantial

number felt their hospital was prepared for any infection outbreak. Furthermore, a notable percentage agreed with the effectiveness of the surveillance tool used in their institution and the prompt adherence of all staff to infection control policies, rules, and guidelines. These findings highlight positive perceptions among the respondents regarding the institution's turnaround time for laboratory results, preparedness for infection outbreaks, effectiveness of surveillance tools, and staff compliance with infection control measures.

The current study findings were matched with *Assefa et al. (2020),* who reported that 70.8% and 55.0% of healthcare providers had adequate knowledge and safe practice of infection prevention respectively. Having infection prevention guidelines (AOR = 3.65, 95% CI; 1.26, 10.54), taking infection prevention training (AOR = 2.2, 95% CI; 1.01, 4.75), having five years or more work experience (AOR = 1.52:95%, CI; 1.13, 4.51*). Desta et al. (2018)* reported similar findings.

The current study results reveal a non-statistically significant difference between all demographic characteristics and the nurses' knowledge of infection prevention and control. The study classified the nurses into three groups: 25-35 years old, 36-45 years old, and over forty-five years old. The effects indicated that the stages of proficiency were fairly uniform across those age categories, with suggested ranks ranging from 53.03 to 54.85. This finding indicates that age no longer significantly affects nurses' knowledge of the IPC. In addition, it was observed that gender and nationality had no significant effect on knowledge of the IPC among nurses.

Concerning educational level, the research categorized participants into three groups: high diploma, bachelor's degree in nursing, and postgraduate qualification. Results indicate that nurses with postgraduate qualifications exhibited the highest mean rank, suggesting a slightly elevated level of knowledge in infection prevention and control (IPC) practices. Nonetheless, nurses with high diplomas and bachelor's degrees also demonstrated commendable levels of knowledge. This result might be because the nurses at this educational level mostly occupy an administrative position, so they are more oriented with the IC policies and training issues.

Nurses with 6-10 years of experience demonstrated the highest level of knowledge. However, knowledge tended to decrease after ten years of experience. The interpretation of this finding could suggest that nurses with moderate levels of experience, specifically in the 6-10 years range, may have the optimal balance of practical experience and ongoing learning opportunities, leading to a higher level of knowledge in infection prevention and control practices. However, as nurses gain more experience beyond ten years, there might be a tendency for complacency or a reduced emphasis on continuous learning, resulting in a slight decline in knowledge levels. This finding highlights the importance of ongoing education and training programs throughout nurses' careers to ensure that their knowledge remains current and effective in maintaining high standards of infection control practices.

This finding was not agreed upon by *Desta et al. (2018),* who reported that older age, lengthy work experience, and higher educational status were significantly associated with knowledge and practice of infection prevention. In-service training, availability of infection prevention supplies, and adherence to infection prevention guidelines were also associated with the practice of infection prevention.

Davis et al. (2018) reported a contradicting finding, as there was a significant positive relationship between the personal characteristics of staff nurses and their general mean competencies for prevention and sanatorium handling and the basic abilities of working nurses in preventing and controlling clinic contamination $p < 0.001$.

7. Conclusion

The study investigated various sociodemographic factors and their association with nurses' knowledge of infection prevention and control (IPC) practices. Participants' characteristics revealed a predominant representation of nurses aged 25-35 years, predominantly female, and primarily Saudi nationals with bachelor's degrees in nursing. Most participants reported having infection control policies and guidelines in their units, an active infection control team, and training or orientation in infection prevention and control. Most indicated the availability of management plans and policies for infection control activities. Responses regarding experience information showed a high level of preparedness for infection outbreaks and adherence to infection control policies.

Further examination revealed no significant influence of age, gender, nationality, or years of experience on nurses' knowledge of IPC practices. However, postgraduate qualifications were associated with slightly higher knowledge levels. These findings collectively suggest that while nurses demonstrate a generally high level of knowledge in IPC practices, sociodemographic factors do not significantly impact their knowledge levels.

8. Recommendations

Based on the findings of the study, several recommendations can be proposed to enhance infection prevention and control (IPC) practices among nurses:

- Implementing regular training and educational programs for nurses, focusing on updating knowledge and skills in IPC practices. This finding should include comprehensive coverage of infection control policies, guidelines, and the latest advancements in the field.
- Encouraging collaboration between nurses, infection control teams, and other healthcare professionals to share knowledge and best practices in IPC. Interdisciplinary training sessions and workshops can facilitate mutual learning and strengthen infection control efforts.
- Ensuring effective infection control policies and guidelines are implemented in healthcare facilities. Provide clear protocols and procedures for infection

prevention and regularly review and update them to align with current evidence-based practices.

- Offering support and incentives for nurses to pursue postgraduate qualifications in infection control and related fields. Investing in advanced education can enhance nurses' expertise and contribute to improved IPC practices.
- Fostering a culture of compliance with infection control policies and guidelines among all healthcare staff. It can be achieved through regular audits, feedback mechanisms, and recognition of adherence to IPC protocols.
- Recognizing the potential for knowledge decay among nurses with over ten years of experience and implementing targeted strategies to mitigate this trend. It may include refresher courses, mentorship programs, and opportunities for continued professional development.
- Encouraging research initiatives and quality improvement projects focused on IPC practices within healthcare settings. This finding can help identify areas for improvement and inform evidence-based interventions to enhance infection control measures.
- Additionally, further research could explore the specific factors contributing to the observed decline in knowledge after ten years of experience, such as changes in workplace dynamics or evolving best practices in infection prevention and control.

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