Reprint from The Review of DIABETIC STUDIES

The Review Of
DIABETIC
STUDIES OPEN ACCESS

Assessment Of Infection Control Knowledge And Practice Compliance Among Nursing Staff In Emergency And Intensive Care Units

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Abstract
Healthcare-associated infections (HAIs) are a significant problem to healthcare systems across the world and especially in hospitals that are considered high-risk areas such as emergency departments (EDs) and intensive care units (ICUs). Nurses are at the core of applying infection prevention and control (IPC). The purpose of the study was to evaluate the level of knowledge regarding infection control, adherence to infection control measures, as well as the significance of the institutional support of the nursing staff working in EDs and ICUs. The study was a cross-sectional descriptive correlational study with 178 nurses. The questionnaire of the structured questionnaire with a five-point Likert scale was used to collect data. Pearson correlation analysis and descriptive statistics were done. The findings showed that there was a high rate of knowledge (M = 4.51), compliance (M = 4.50) and institutional support (M = 4.48). There was a high positive correlation between compliance and the knowledge on infection control (r =.62, p <.001). There was moderately strong correlation between institutional support and knowledge (r = .48, p <.001) and compliance (r =.55, p <.001). These results demonstrate how knowledge, adherence to practice, and organizational support depend on each other in high-risk clinical settings. Enhancing specific training interventions and the reinforcement of institutional involvement can be used as the next potential way to improve the results of infection control.

Keywords: Infection control, healthcare-associated infections, nursing compliance, intensive care units, emergency departments, institutional support.

Introduction

Healthcare-associated infections (HAIs) have been a significant issue in the global area of public health and have been a major threat to patient safety, healthcare worker well-being, and the sustainability of healthcare systems. HAIs are a significant issue in terms of morbidity, mortality, increased hospitalization, and rising costs of health care across the globe (World Health Organization [WHO], 2021). Though preventable to a large extent, the recurrence of HAIs is in many times a symptom of systematic failures in the application and adherence to infection prevention and control (IPC) practices. With the changes and complexity in the healthcare systems, IPC is no longer limited to the infection control committees only, but a shared responsibility among all the healthcare professionals and institutional structures.

Global health agencies like the WHO and the Centers of Disease Control and Prevention (CDC) have developed evidence based comprehensive IPC guidelines. Regardless of these uniform frameworks,

there is still a gap between the suggested infection control (IC) practices and the reality on the ground in the clinical environment. This disparity is different in different geographical areas, institutional abilities, professional groups and the availability of resources. This variability is depicted by the studies carried out in different contexts. As an illustration, a study on dental healthcare providers in Kenya indicated that the practice of sterilization and protection against eye diseases had massive gaps (Butt et al., 2019). Conversely, an assessment of the infrastructure of Saudi Arabian emergency departments' ICs found that the support of the institution was high, but the levels of self-reported and observed adherence among healthcare providers were inconsistent (AlAnazy and Ahmed, 2024). In a similar way, the nursing personnel at Egyptian dental clinics showed mostly sufficiently high practices of infection control, but there was also a lack of protective eye equipment use (Soliman, Abd El-Aziz, and Elsayed, 2022). The overall effect of these findings is that compliance depends on behavioral, educational and contextual determinants although structural support might be present.

The recent literature focuses on the necessity to consider infection control as a multidisciplinary activity. The optimal healthcare setting is explained as a place where dentistry, nursing, medicine, radiology, laboratories, pharmacy, and information management system operate in harmony to interrupt the chain of infection (Almutairi et al., 2025). In this continuum, individual professional groups have different risks of exposure and difficulties in their respective operations. Nurses, especially those who work in high-acuity settings like emergency departments (EDs) and intensive care units (ICUs) are the front runners in the application of infection control measures. They are at the frontline in infection prevention due to their regular contacts with patients and their professional responsibility in organizing care.

HAIs are particularly sensitive to ICUs because of the complexity of care, the frequent exposure of patients to invasive devices, immunocompromised patient groups, and the high intensity of clinical interventions (Mukhopadhyay, 2018). The nurses in such units are critical in the adoption of hand hygiene, isolation, environmental disinfection, as well as aseptic practices. In turn, the knowledge and adherence of nurses to infection control practices are the crucial factors to evaluate the workability of IPC programs (Sole et al., 2020).

The data in different regions show that despite the generally good level of knowledge of nurses in general on the principles of infection control, there are still certain gaps. Research in Saudi Arabia reported that the level of knowledge among nurses was generally high but lacked in other aspects, including hand hygiene and isolation measures (AlJohani et al., 2021; Alhazmi et al., 2019). A study conducted in Bahrain also demonstrated good knowledge on the whole but deficiencies in areas concerning isolation protocols and antibiotic resistance (Alnasser et al., 2021). The study conducted in India revealed that nurses in ICUs did not possess proper knowledge about some of the infection control guidelines (Barker et al., 2017). Notably, a study in the Eastern Province of Saudi Arabia found the considerable positive association between the infection control knowledge and the adherence to infection control practices, which highlights the significance of educational interventions.(Aliss et al., 2025).

Infection control practices are not always reflective of the level of knowledge though. Although nurses usually accept the need of hand hygiene and protective clothing, the rates of their adherence are not statistic (Casaroto et al., 2022). Measured improvements in compliance, especially when it comes to the use of protective equipment, have been shown by training interventions (Şenol et al., 2022). Systematic reviews also indicate that education, positive attitudes, frequent feedbacks, and institutional support are also significant to adherence to patient safety and infection control standards (Vaismoradi et al., 2020). However, the challenge persists in such areas as environmental cleaning and compliance with isolation (Ghazanfari et al., 2022).

Although numerous sources are available to discuss the HAIs and IPC practices all over the world, there is still necessity to perform specific assessment of the level of knowledge and adherence to infection control practices among nursing professionals operating in the special units, i.e. emergency departments and ICUs. These settings also have special operational stresses, such as the unpredictability of patient flow, severity of critical illnesses, and high demand of timely decisions, which may affect adherence behaviors. Additionally, the relationship between knowledge and practice compliance and institutional support is vital to defining the gaps that can be modified and enhancing healthcare systems.

In this regard, the current research will evaluate the level of infection control knowledge and practice adherence among the nursing personnel in the emergency and intensive care units, as well as the importance of the institutional support and training. This study aims to provide evidence that can inform

specific interventions and improve the patient safety outcomes in high-risk clinical environments by defining the strengths and gaps in these spheres.

Methodology

Study Design

The research design used was a cross-sectional descriptive correlational research, which was aimed at assessing the level of infection control knowledge, adherence to infection control practices, and institutional support of the nursing staff working in emergency departments (EDs) and intensive care units (ICUs). The design allowed the evaluation of the connections between the knowledge, practice adherence, and organizational factors in one point in time.

Setting and Participants

The research was done in a third level hospital. A convenience sampling was used to recruit 178 registered nurses. Inclusion criteria included nurses who have more than six months of experience in ED or ICU location and who are directly engaged in work with patients. Nurses who were away during the data collection period were eliminated. The sample accurately reflected the frontline nursing staff since participants were of various age groups and years of professional experience.

Data Collection Instrument

The data were gathered using a self-administered, structured questionnaire that was designed around the WHO guidelines of infection prevention and previous studies (Aljohani et al., 2021; Alsahafi et al., 2021). This tool had four parts, which included (1) demographic characteristics (3 items), (2) infection control knowledge (5 items), (3) compliance with infection control practices (5 items) and (4) the institutional support and training (5 items). Measurement of responses was done in terms of five-point Likert scale (1 = strongly disagree to 5 = strongly agree).

Validity and Reliability

The expert review involved the review of infection control specialists and nursing researchers to decide on the content validity. Cronbach alpha was carried out to evaluate internal consistency reliability and showed high reliability among the domains (0.80). A small sample pilot test was done in order to ascertain clarity and the suitability of items.

Data Analysis

The analysis of data was done with the help of SPSS version 26. Participant characteristics and variables of the study were summarized using descriptive statistics that included mean, standard deviations, frequencies, and percentages. Pearson correlation was employed to determine the association between infection control knowledge, compliance and institutional support. The level of statistical significance was established as $p < .05$.

Results

1-Demographic information's

The age distribution of the participants (Table 1) is fairly balanced with the representation of early, mid, and late stages of careers, with the most of the respondents in the 30-49 age range (57.9%). The given distribution gives a general view on the knowledge and practices related to the infection control by incorporating the experiences of relatively young nurses, as well as experienced professionals. The mid-career dominance can affect the overall high knowledge results but both younger and older employees included can also increase the generalizability of the findings and represents diversity of the nursing workforce in the high-acuity settings.

Table1: Age distribution of the participants

Age			
		Frequency	Percent
Valid	20–29 years	39	21.9

	30–39 years	50	28.1
	40–49 years	53	29.8
	50 years and above	36	20.2
	Total	178	100.0

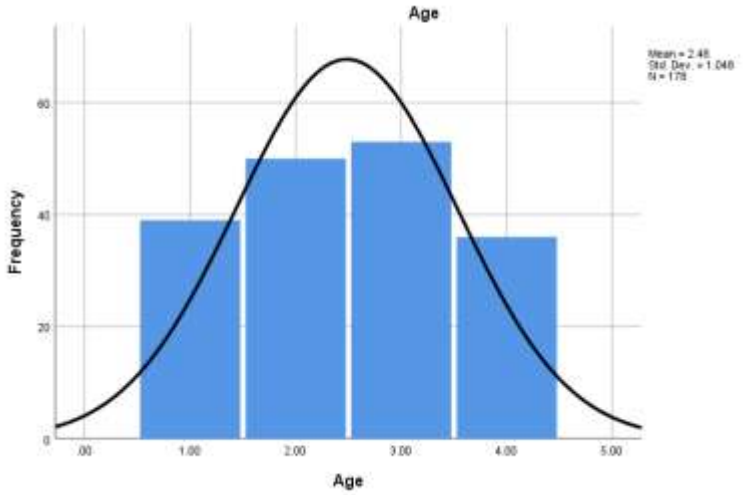

Figure1: Age distribution of the participants

A very evenly distributed range of the nursing experiences is shown in Table 2, with a little higher percentage of nurses that have over 15 years experience (28.7%). It implies that a large number of the sample is a source of considerable clinical experience, which can have a beneficial impact on infection control education and compliance. Still, the fact that there is a significant percentage of less experienced nurses (under 5 years, 25.8) indicates the importance of the ongoing education and training programs in order to provide the uniformity in the practices on all the levels of the experience.

Table2: The nursing experiences distribution of the participants

Years of Nursing Experience			
		Frequency	Percent
Valid	Less than 5 years	46	25.8
	5–10 years	39	21.9
	11–15 years	42	23.6
	More than 15 years	51	28.7
	Total	178	100.0

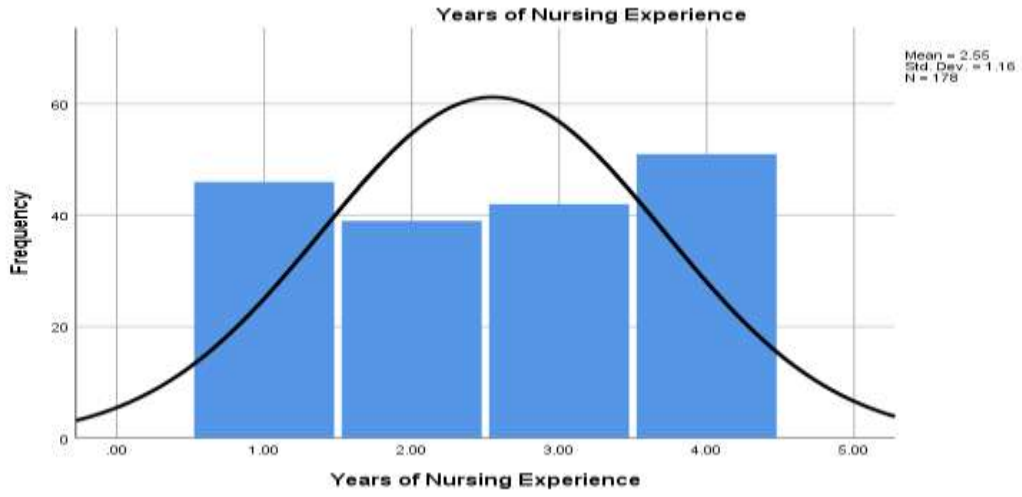

Figure2: The nursing experiences distribution of the participants

Table 3 portrays that the participants are nearly balanced in the Emergency Department (52.2) and Intensive Care Unit (47.8). This enables a significant contrast between two high risk clinical settings having various operational requirements. The minor preeminence of ED nurses might be attributed to the increased turnover and patient acuity in such units that might affect the adherence pattern. The balance will make sure that the study captures the differences in knowledge and unit-specific infection control practices.

Table3: Current Work Unit of the participants

Current Work Unit			
		Frequency	Percent
Valid	Emergency Department	93	52.2
	Intensive Care Unit (ICU)	85	47.8
	Total	178	100.0

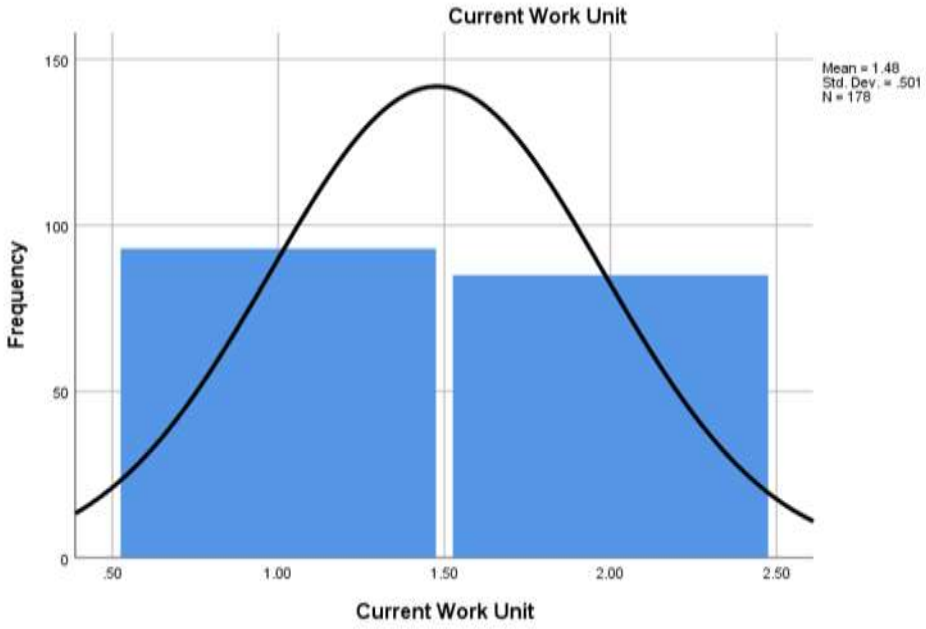

Figure3: Current Work Unit of the participants

2. Mean and Std. Deviation of Responses

Table 4 demonstrates that the scores of infection control knowledge, the compliance with the practices and the perception of the institutional support are high. Isolation precautions (M = 4.573) and hand hygiene (M = 4.556) had the highest compliance and this indicates that these practices are prioritized in high-risk units. A slight difference in the mean scores of aseptic techniques (M = 4.399) reveals the points of focus on the hands-on training. Standard deviations imply a medium variability of the staff, which means that most nurses comply with IPC measures quite well, but some of them might need reinforcement.

Table4: Mean and Std. Deviation of Responses

Descriptive Statistics		
Items	**Mean**	**Std. Deviation**
I am knowledgeable about standard infection control precautions.	4.5112	.77561
I understand the correct procedures for hand hygiene in clinical settings.	4.4944	.73835

I am aware of the appropriate use of personal protective equipment (PPE).	4.5000	.76098
I understand the modes of transmission of healthcare-associated infections.	4.5112	.81815
I am familiar with hospital policies and guidelines related to infection prevention and control.	4.5337	.72990
I consistently perform hand hygiene before and after patient contact.	4.5562	.68864
I properly use personal protective equipment according to clinical guidelines.	4.4831	.72271
I follow established protocols for the safe disposal of medical waste.	4.5056	.76835
I adhere to aseptic techniques during invasive procedures.	4.3989	.77634
I comply with isolation precautions when caring for patients with infectious diseases.	4.5730	.73473
I have received adequate training on infection prevention and control.	4.4438	.84351
My workplace provides sufficient supplies of personal protective equipment.	4.4831	.74580
Infection control policies are clearly communicated within my unit.	4.5393	.72962
Regular audits and monitoring improve compliance with infection control practices.	4.4888	.77561
Management actively supports adherence to infection prevention guidelines.	4.4494	.78849

3. Correlation

Table 5 shows that infection control knowledge and compliance have strong positive relationships ($r = 0.62$, $p < 0.01$), which has underlined that the higher the knowledge, the higher the likelihood of being adhered. The correlation with institutional support ($r = 0.4855$) indicates moderate relationships between institutional support and determinants such as training and organizational structures though personal motivation and unit culture are still key factors. These results are consistent with already available literature and allow improving IPC outcomes through a combination of education, monitoring, and institutional reinforcement.

Table5: Correlations Between Knowledge, Compliance, and Institutional Support

Correlations				
		Infection Control Knowledge	Compliance with Infection Control Practices	Institutional Support and Training Related to Infection Control
Infection Control Knowledge	Pearson Correlation	1	.62**	.48**
	Sig. (2-tailed)		0	0
Compliance with Infection Control Practices	Pearson Correlation	.62**	1	.55**
	Sig. (2-tailed)	0		0
Institutional Support and Training Related to Infection Control	Pearson Correlation	.48**	.55**	1
	Sig. (2-tailed)	0	0	

Discussion

In this paper, the authors evaluated the level of knowledge on infection control, adherence to infection prevention measures, and the ascent of institutional support among nursing personnel operating in intensive care units (ICUs) and emergency departments (EDs). These results indicate that the level of knowledge among the participants is high, as the mean score of all the knowledge items is more than 4.4, which means that nurses are, in general, highly informed about the standard of infection control precautions, hand-hygiene procedures, and the use of personal protective equipment (PPE). The findings are consistent with the existing studies in Saudi Arabia and Bahrain that described high levels of knowledge among nurses, especially with regards to general concepts of infection control, although a particular gap was found in hand hygiene and isolation measures (AlJohani et al., 2021; Alnasser et al., 2021). These studies are supported by our findings, which imply that the knowledge necessary should not be considered a sufficient impetus to foster a full adherence to the infection control practices.

The evaluation of adherence to infection control practices conducted in the current study showed moderate compliance where the mean scores were found to be between 4.39 and 4.57. Isolation precautions adherence was the highest and the aseptic technique adherence at invasive procedures had lower scores by a small margin. This tendency reflects one of the frequent issues that were noted in the literature: despite nurses having knowledge, it does not always translate into practical compliance (Casarotto et al., 2022; Şenol et al., 2022). This mismatch might be attributed to multiple factors, such as workload pressures and the inability to predict patient flows and the complexity of interventions faced in high-acuity units, especially the EDs and ICUs (Mukhopadhyay, 2018; Sole et al., 2020). It is worth noting that ED nurses of our sample were slightly more compliant with hand hygiene and PPE use than ICU nurses. This disparity could be due to the dynamic nature of emergency care, where a close contact with potentially infectious patients would support the perceived significance of protective practices, in line with the observations by Roychowdhury et al. (2021) in COVID-19 hospital environments, which found that frontline employees have more consistent hygiene practices than non-clinical employees.

It is positively rated institutional support, such as the provision of PPE, understanding of infection control policies, training, and the active participation of the management (mean scores 4.444.54). Knowledge and compliance and institutional support had significant correlations between them ($r = 0.62$; $r = 0.55$ between knowledge and compliance and compliance and institutional support respectively), which highlights the critical role of institutional factors and individual factors. This is a similar conclusion of Vaismorardi et al. (2020), who highlighted the importance of education and integration of institutional support, regular feedback, and monitoring in order to obtain the long-term adherence.

The results of the study also show that training interventions are considered as moderately acceptable (mean 4.44), which can be improved. Despite the fact that the majority of participants indicated to be familiar with infection control measures, their scores on compliance, especially in aseptic methods, show that, with the continuation of the training and simulation sessions, the implementation processes could be improved. Past research in India and Saudi Arabia reveals the same trends: the nurses are knowledgeable and tend to lack the complete transfer of knowledge into practice because of environmental, procedural, or behavioral obstacles (Barker et al., 2017; Alissa and Alqadi, 2025). Such specific interventions as in-service education, real-time audits, and reinforcement strategies might thus close this knowledge-practice gap.

The study age and experience distribution indicate that the sample was evenly distributed per age category and professional experience, which may be used to generalize the results of the study of nursing practices in high acuity settings. Interestingly, the correlation analysis has not revealed significant differences that may occur according to age and experience, which means that the adherence behaviors are less reliant on demographic features and more on the organizational culture, resources availability, and reinforcement of behavior. This finding is consistent with the results of Ghazanfari et al. (2022) who stated that institutional setting, peer influence and supervisory practices are significant predictors of compliance rather than individual experience per se.

The comparison of our results with the literature points out some commonalities and new perspectives. The positive correlation between knowledge and practice adherence is very strong, which supports the previous findings in the Eastern Province of Saudi Arabia, where Aliss et al. (2025) found that educational interventions were helpful in enhancing compliance. On the same note, the positive

correlation between institutional support and adherence to the practice is also in line with the systematic review by Vaismoradi et al. (2020), which has found administrative support and resource availability as the most important facilitators of patient safety and compliance with infection control. Nevertheless, as well, there are certain nuances in the use of knowledge: on the one hand, the overall compliance is high, but on the other hand, focusing more on specific procedures, such as aseptic technique, may be slightly lower, so intensive practical training can be offered, especially in relation to procedures with high risks of HAIs.

This results implicate greatly on preventing infections in high risk units in hospitals. High knowledge and moderately high compliance with strong institutional support are positive factors, which may indicate that nurses in EDs and ICUs are equipped to prevent HAIs, in general. Nevertheless, the weaknesses in particular practices, especially aseptic technique during invasive procedures, point to the fact that continuous quality improvement is needed. They can be interventions such as structured refresher training, practical simulation training, peer audit and drawing up unit specific checklists to further enforce compliance. Furthermore, the connection between knowledge and practice could be reinforced by improving the level of leadership interaction and feedback as proposed by Şenol et al. (2022) and Casaroto et al. (2022).

The second aspect is also interesting, as compliance was also high when it came to isolation precautions, but environmental cleaning was not directly measured, which is in line with the results of Ghazanfari et al. (2022), who made a strong emphasis on environmental cleaning as a longstanding challenge. Future studies ought to examine the obstacles to adherence in the environment and processes, especially those within ICU units where multidrug-resistant organisms represent a significant issue. Interdisciplinary education that includes nurses, physicians, and support staff might also enhance the more unified infection control culture, which the multidisciplinary approach highlighted by Almutairi et al. (2025) suggests.

Further, the findings highlight the relevance of the continuous monitoring and audit system. The subjects felt that frequent audits were helpful (mean 4.48), which is related to the guidelines provided by WHO that States that the continuous monitoring is one of the most important measures to maintain high levels of compliance (World Health Organization, 2021). By incorporating these audits with feedbacks, adherence may be maintained and deviations to normal practises corrected right away.

Lastly, the research is also a contribution towards the wider discussion on infection control in the high-acuity hospital units. In contrast to investigations in a regular clinical or an outpatient facility, our study is focused specifically on EDs and ICUs, where the acuity of patients, invasive procedures, and the need to act fast increase the likelihood of HAIs. Through good knowledge and adherence with greater institutional backing, the present study offers the evidence that the use of specific organizational techniques, as well as continuous training and observation, can effectively maintain the infection control practices even in the high-pressure settings. However, the minor flaws that can be noted indicate that additional interventions, especially the ones that focus on procedural skills and real-time reinforcement, are required to obtain maximum compliance and patient safety outcomes.

Conclusion

The study indicates that nurses in the emergency and intensive care units have a high knowledge in terms of infection control and compliance to practices. The results affirm that there is a close positive correlation between knowledge and compliance and that institutional support does play a significant role in strengthening the adherence behaviors. Such findings highlight the significance of long term education, formal training and involvement of leaders in promoting infection prevention standards. Although there was high compliance when self-reported, it would be appropriate to add future studies that include observational audit to test the consistency of behavior. The reinforcement of institutional structures and sustained professional growth programs is needed to keep healthcare-associated infections at a minimum and improve patient safety in high-risk clinical environments.

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