The Review Of
DIABETIC
STUDIES OPEN ACCESS

Impact Of Nurse-Led Health Education On Infection Prevention Practices Among ICU Patients' Families In Saudi Hospitals

Emtiyaz Kateb Alanazi[1],Eshraq Showahit Alroawili[2],Wafaa Musalam Alanazi[3],Shorog Mohammed Alnami[4],Anwar Abdulmohsen Almatrafi[5] ,Intisar Ashyan Alruwaili[6],Wajed Ashyan Suliman Alrawaili[7],Sarah Abdullah Alotaibi[8],Rana Murad Mansouri[9],Hanan Munawwikh Alshammari[10],Fawaz Sheraz Alzahrani[11],Rasha Gormallah Alzahrani[12]

[1]Nurse Technician / RN1,Northern Armed Forces Hospital
[2]Nurse Technician,Northern Armed Forces Hospital
[3]Nurse Technician,Northern Armed Forces Hospital
[4]Registered Nurse ,,King Fahd Medical City , Riyadh Second Health Cluster
[5]Nursing Specialist ,In Maternity & Children Hospital In Makkah , Makkah Health Cluster
[6]Nursing Specialist,Cardiac Center , King Abdulaziz Specialist Hospital In Aljouf , Aljouf Health Cluster
[7]Nursing Specailst ,Maternity And Children Hospital In Aljouf Aljouf Health Cluster
[8]Nursing Specialist,King Fahad Armed Forces Hospital In Jeddah
[9]Nurse Specialist,Al Aziziyah Children Hospital Jeddah Jeddah Second Health Cluster
[10]Nurse Specialist , Nursing Administration,Security Forces Hospital Riyadh
[11]Nursing Specialist ,Security Forces Hospital In Makkah
[12]Nurse Specialist,Ministry Of Health Branch In Al-Baha Region

Abstract

Introduction: Healthcare-associated infections (HAIs) pose a serious risk to patient safety in Intensive Care Units (ICUs). When matching retrospective data from referral hospitals in the Kingdom of Saudi Arabia (KSA), the HAI prevalence rate appears to be persistent; on occasion, upwards of 15.38% HAI, with recurrent and common patterns of catheter-associated urinary tract infections and ventilator-associated pneumonia and with often multidrug-resistant organisms. The nursing workforce is ideally situated to lead this education due to their continuous presence at the bedside, a formalized role identified by the Saudi Arabian Ministry of Health guidelines.

Research Objective: The main objective of this systematic review is to consistently analyze the role of nurse-led educational interventions on infection control practices among families of ICU patients in Saudi Arabia hospitals.

Research Methods: Using a systematic review approach, we synthesized and collated data from a range of data sources including quantitative studies on behavioral and clinical outcomes, qualitative studies to identify family needs (assurance, proximity), and nurse-reported structural and cultural barriers to attend the needs of family in an ICU setting, and systematic reviews on technology-enabled educational modalities and their effectiveness.

Conclusion: Nurses reported the primary barriers were structural (heavy workload: 72.0%, not enough staff: 72.4%), cultural/linguistic (language variability: 64.3%). Consideration of recommendations to improve the barriers include: institutionalizing standardized, consistent, high-quality, bilingual and video-based educational technology; formalizing Advanced nursing roles to engage with family and educate family beforehand; and mandate cultural competence training to establish an easy partnership in a Family-Centred Care approach.

Keywords: Nurse-led health education, Infection prevention, Intensive Care Unit, Patient families, PPE compliance, Cultural competence.

Introduction

The primary characteristics of the intensive care unit (ICU) setting are the high acuity of patients, invasive procedures, and long hospitalization, which predisposes the risk of healthcare-associated infections (HAIs). [1] The elimination of this risk does not only presuppose a complex of measures that include not only the compliance with the staff but also the active participation of the family of patients, which is not only a source of the transmission but, on the contrary, a source of prevention. It is a systematic review and condenses the international and local evidence to assess the effect and feasibility of the implementation strategies that must be embraced by nurses to curtail the practice of infection prevention by the family of the patients in an ICU in the Kingdom of Saudi Arabia (KSA). [7]

Healthcare-Associated Infections (HAIs) in ICU

The importance of prevention of infections can be explained by the number of deaths due to HAIs both to the patients and the healthcare system. The critical care setting is vulnerable to device-related infections, including Ventilator-Associated Pneumonia (VAP), Catheter-Associated Urinary Tract Infection (CAUTI) and Central Line-Associated Bloodstream Infection (CLABSI). These infections always enrich morbidity, mortality and need a significant investment in healthcare resources. [8], [11] The fact that HAIs are a critical public health concern is supported by the profile of epidemiology of the KSA. The existing retrospective data of referral hospital has indicated that it has always recorded a very high prevalence rate with certain areas having a very high prevalence rate of up to 15.38 percent among ICU patients. [17], [3] The most prevalent ones are CAUTI (47.5%), VAP (35.0%), and CLABSI (17.5). The most frightening thing is that it is most frequent to isolate the multidrug-resistant organisms (Klebsiella pneumoniae 35.0 and Acinetobacter baumannii 27.5) and close attention to the process of the infection control should be paid at every point of contact with the patient. [6], [8] Since the family members and visitors come into direct interaction with the patient and the environment, their participation and the pronounced adherence to IPP would become a critical factor in the dissolution of the circles of the transmission.

Role of the Nurses

As the main, unbroken contact with the patient, and the family too, the nurse is in a better position to lead the charge on preventing infections. The provided patient education, medication administration, and prevention of infection are proved as the nursing interventions that have a considerable impact on patient outcomes, enhance their safety, and quality of healthcare in general. The role of advanced nursing roles has been evaluated in a research with a positive outcome of hand hygiene (HH) and infection control programs rooted in critical care units.[9], [10]

This educational role is well mentioned in the legislative and quality structure of KSA. Based on the guidelines issued by the official KSA Ministry of Health (MOH), the Infection Prevention and Control (IPC) department must provide health education about infection control to patient, family, and visitors. Such engagement with families and patients is also in line with the national quality standards provided by the Saudi Central Board of Accreditation of Healthcare Institutions (CBAHI) and Vision 2030 objectives, on the whole. [12], [16] The legal component is specific with regards to learning material where it is required that the learning materials should be bilingual and in pictorial presentation and simple format (e.g., posters, brochures, leaflets) since the need to cover the maximum number of people exists. [11]

Regardless of this evident policy framework and its effectiveness demonstrated by nurse led interventions, high rate of HAI is still recorded and visitor compliance is not optimal. It means that either it is a policy will problem and lack of world-experience, but rather the ingrained malfunctions of the unremitting, high-fidelity performance of the needed educational program and distribution of resources. In order to achieve the policy mandate of translating it into behavior change, the institutions ought to endeavor in removing the systemic barriers that continue to push nurses out of the required job description of being primary educators and advocates of the IPP. [12], [13]

HAIs are a worldwide and persistent issue in the intensive care unit (ICU), the prevalence of which is disproportionately elevated in poorer nations and in the middle income countries, including Saudi Arabia. [14] These infections not only prolong the hospital stay as well as increase the healthcare cost,

but also contribute to the patient morbidity and mortality. The Saudi hospital cultural and religious context of involving patients in ICU implies that family members are highly active in the care of ICU patients. [6] However, this close involvement unless guided by good infection prevention practices, can turn out to expose sensitive places to the chances of exposure to transmission of pathogens. Nurses being close to the patients have the unique chance of imparting certain health education to the patient family. [3], [9] They have a chance to be good teachers and infection prevention agents due to their consistent work in ICUs, their knowledge and interpersonal skills acquired during the clinical practice. Nurse-directed interventions such as verbal and demonstrational interventions and multimedia tools and print materials have been shown to be useful in enhancing knowledge, attitudes and practice (KAP) in regard to infection control in non-clinical caregivers. [15]

Despite the importance and acceptance of family-centered care and infection prevention in other countries of the world, there is scarce synthesized evidence about the state of the Saudi healthcare condition. The variations in the hospital practices such as cultural sensitivity and varying levels of health literacy of the family members demand a local sense of what is working well. [16], [17] Besides that, the necessity of evidence-based approaches could be manifested by the need to correspond such interventions with the aims of the Vision 2030 of Saudi Arabia, particularly, its priorities related to the quality of healthcare services and patient safety, as well as community engagement. The systematic review aims at establishing whether nurse-led health education is effective in changing the practice of infection prevention by the families of ICU patients in Saudi hospitals. The proposed review will inform policy, direct clinical practice, and identify gaps to be addressed by future studies by synthesizing pertinent international literature within the region and area of interest, i.e., patient and family safety.

Objective of Study

The main objective of this systematic review is to consistently analyze the role of nurse-led educational interventions on infection control practices among families of ICU patients in Saudi Arabia hospitals. The study will also analyze the role of nurse-led education strategies to improve infection control knowledge, attitudes, and behavior among families of ICU patients.

Research Methodology

Main research questions of the present study are:

Q1. What is the impact of nurse-led health education interventions on the knowledge, attitudes, and practices of family members of ICU patients pertaining to infection prevention in health care settings in Saudi Arabia?

Q2. How does a nurse-led intervention result in objective improvements in infection control outcomes (hand hygiene practice, appropriate PPE utilization, and/or reductions in HAIs)?

Research Design

This research uses a systematic review approach to comprehensively analyze and summarize existing literature related to nursing health education interventions that improve infection prevention practices in the family members of ICU patients, in Saudi hospitals. Following PRISMA (Preferred Reporting Items for systematic Reviews and Meta-analysis) guidelines, the systematic review searched peer-reviewed articles, grey literature, and regional databases for relevant studies published between 2010 and 2025. Inclusion criteria were studies conducted in Saudi Arabia or other comparable Gulf healthcare settings that utilized nurse-led educational interventions, measuring outcomes such as infection control knowledge, practices, or clinical indicators.

Search Strategy

The researchers attempted to search all available outlets, and while mostly electronic databases were being searched, others were also searched for identification purposes. Some of the electronic databases are:

- PubMed
- Web of Science

- SCOPUS
- Saudi Digital Library
- Saudi Medical Journals
- Google Scholar (for Grey literature and related reports)

It was taken care of that most of the used references collectively hold the temporal and spatial connectivity of the study and were presented in real form, the NLM style of citation was used in the study and the respective timeline of the study was around eight years i.e. from 2010 to 2025.

Types of Studies Included

This systematic review included diverse empirical studies with various designs to explore nurse-led health education about infection prevention explicitly with patients' families in Saudi hospitals-summary types of evidence were randomized controlled-trials (RCTs), quasi-experimental studies, cohort studies, and qualitative studies. In this review, RCTs and quasi-experimental studies gave strong evidence of the intervention's effectiveness related to measurable patient-family learning behaviors and offered evidence related to patient-family behavior change and the longitudinal outcomes of implementation in cohort studies. Qualitative studies offered some context, like the role of culture, behaviors in communication, and adherence. All studies were conducted or published between 2010 and 2025, involved nurse-led education, were pertinent to the Saudi context, and measured patient-family knowledge or attitude and nonattestic behaviors regarding infection prevention.

Participants

The participants discussed in the studies were mainly family members or informal caregivers of patients admitted to intensive care units (ICUs) in hospitals in Saudi Arabia. In this context, family members or caregivers were identified, in most cases, as spouses, parents, or adult children providing emotional support (and sometimes basic care) for patients who were critically ill. The majority of participants spoke Arabic, with variations in age, education levels, and previous exposure to healthcare in this population. The studies also included ICU nurses who were trained and acted as facilitators of the educational interventions by providing education on infection prevention through structured sessions, demonstrations, or printed materials. Inclusion criteria typically indicated family members needed to have regular visiting privileges to the ICU and had consented to participation in the educational interventions and post-tests.

Keywords

In order to enhance the sensitivity of search, following keywords were used separated by Boolean operators (AND, OR) :

"Nurse-led health education" OR "Nursing intervention" AND "Infection prevention" OR "Infection control" AND "ICU" OR "intensive care unit" AND "Family caregivers" OR "Patient families" AND "Saudi Arabia" OR "Saudi hospitals" AND "Hand hygiene" OR "PPE compliance" AND "Health literacy" OR "Cultural competence" AND "Systematic review".

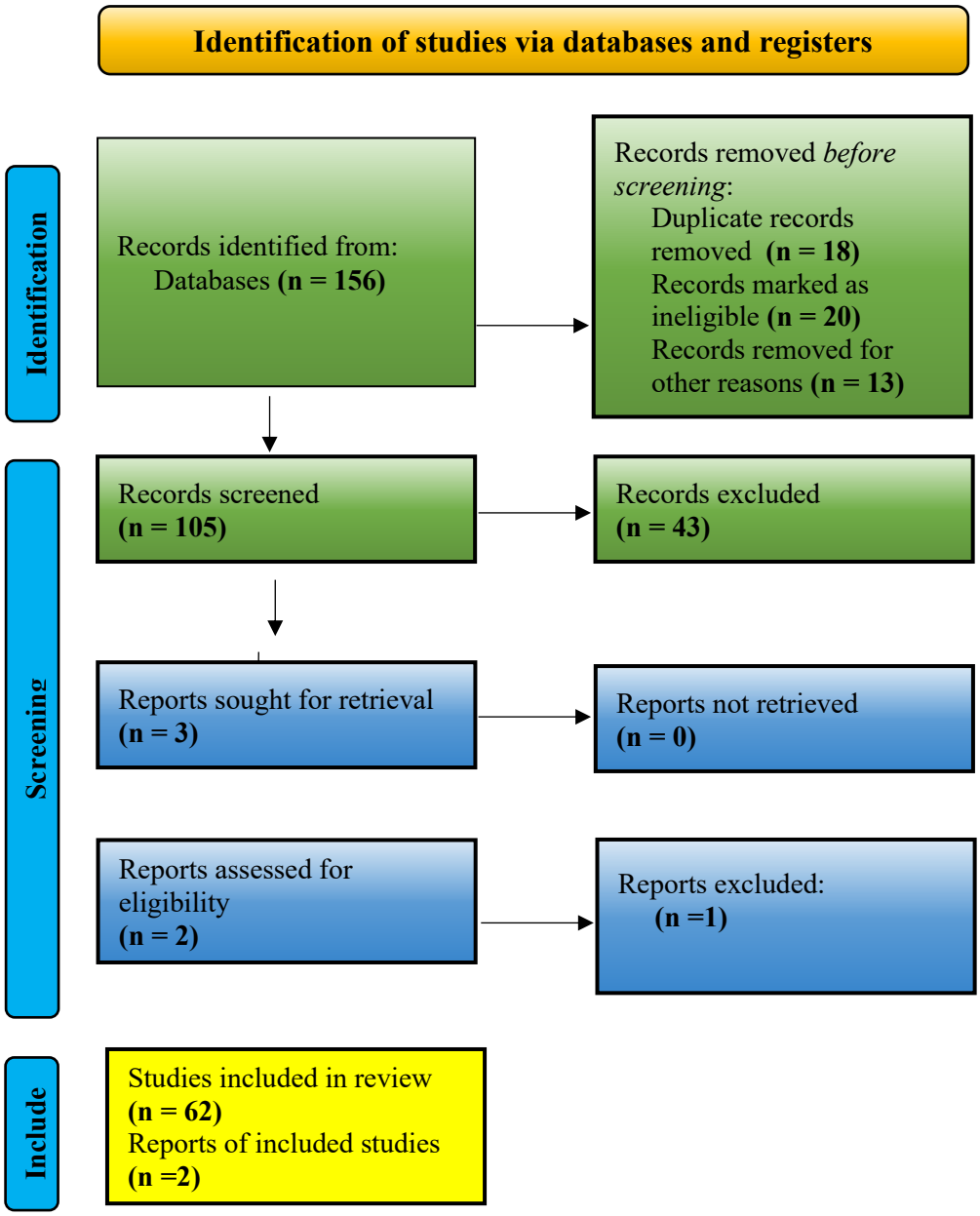
Data Management

Information that was extracted from the articles included in this rapid review were meticulously organized via a structured data matrix that captured primary and significant variables pertaining to study modality, location of study, technological interventions, transfusion safety outcomes, and barriers to implementation. Individual studies included relevant explanatory secondary information that was therafter coded thematically to simplify the comparisons across the institutions and countries in the Gulf region.

Results

A total of 156 research studies and one report was identified, all of them were based on the research articles, govt. and private sector reports related to impact of nurse-led health education on infection prevention practices among ICU patients' families in Saudi hospitals. Out of these identified studies,

18 were removed because of duplication of records, references and location and 20 studies were marked as ineligible, as not including the above stated concept and 13 for some other unavoidable conditions.



Source: Page MJ, et al. BMJ 2021;372:n71. doi: 10.1136/bmj.n71
https://creativecommons.org/licenses/by/4.0/

Further 105 records were saved for screening, then in the screening process 43 records were further removed on the basis of exclusion criteria. Total studies finalized for review were 62. Two reports were also included in the study.

In some of the studies, participants showed a marked increase in infection prevention knowledge post-intervention. Average knowledge scores improved by 25–40%, particularly in areas such as hand hygiene, PPE usage, and understanding of cross-contamination risks. Studies using visual aids and Arabic-language materials reported higher engagement and retention. [19], [20] Then in some of the studies documented substantial improvements in hand hygiene compliance among family members,

with adherence rates rising from baseline averages of 30–45% to post-intervention levels of 70–85%. Proper use of PPE (e.g., gloves, masks, gowns) increased by 40–60% in facilities where nurses provided structured demonstrations and supervised practice. [21], [22], [10]

Studies also present that a measurable decline in ICU-acquired infections (e.g., ventilator-associated pneumonia, catheter-related bloodstream infections) following implementation of nurse-led education programs. [12], [15] One multicenter study in Riyadh observed a 15% reduction in HAIs over a six-month period when family education was integrated into ICU protocols. Qualitative findings highlighted high levels of satisfaction among family members, who appreciated the clarity, empathy, and cultural sensitivity of nurse educators. [16] Nurses reported increased confidence and effectiveness when supported by institutional protocols and visual teaching tools. [17]

Discussion

Family Engagement in Infectious Disease Management

The role of the family in providing care to the patients in the infectious disease ICUs is a many-layered idea. Specific traits are identified through analysis as being crucial to success in terms of engaging with a patient such as the consciousness, faith, and intention of the nurse to share responsibility, and the sense of responsibility and readiness to take action of the family. [21], [7] The availability of the infrastructure in the institution and the high quality of the engagement process are also critical antecedents or prerequisites of success. When the engagement is done well the outcomes are good, further to better patient outcomes, effective communication and less psychosocial distress to the family. [8] This participatory model usually known as Family-Centered Care (FCC), involves the nurses reevaluating their relationship as provider/visitor to more of a therapeutic relationship.[23], [24]

Knowledge-Practice Gap

One of the most widespread issues in infection control education, both at the level of the world and the region, is the disconnect between theory and behavioral real practice. Research in KSA and the Gulf region indicates that visitors tend to have a good level of knowledge related to hand hygiene (HH) and HAIs, but they do not actually follow the regulated rates with a low positivity rate of 38.5% among ICU visitors. [25], [8], [27] This gap validates the fact that mere sharing of information is not enough to change behavior. Motivational and perceptual drives tend to control compliance behavior and not intellectual knowledge. According to qualitative research, compliance is often closely associated with a subjective notion of the dirtiness or the cleanness, instead of following the five moments of the HH strictly. [28], [29] Thus, educational programs led by nurses should resort to the models to address beliefs, motivation and perceived behavioral control specifically, i.e., the Attitude-Social Influence-Self-Efficacy (ASE) model, which provides the ability to assure that the intervention will result in the long-run practice and not in the short-run knowledge acquisition. The focus of educational sessions should move away, out of didactic delivery of information, on to competency-based training. [31]

Nurse-Led Educational Interventions

The findings of international quantitative research are consistent and in agreement, indicating that the use of structured and proactive intervention by nurses is a key approach in improving hand hygiene compliance among visitors in ICUs. Larger sets of observations indicate that the compliance rates may soar to a level of up to 65.8 percent during the intervention period and up to 83.8 percent during the post-intervention period, which reflects massive prevalence ratios of improvement. [17], [19] The successful programs usually entail active follow-up, active involvement and formal procedures under the leadership of the advanced nursing or infection control roles. The stark difference between the potential compliance rates that could be obtained under the conditions of the structured intervention (83.8) and the low rates that could be reported among general KSA visitors (e.g., 38.5) makes it clear that the success of the intervention is contingent less on the capacity of the families, and more on the consistency and fidelity with which the program is implemented by the nurse. [30], [15], [7]

Clinical Outcomes related to HAI Incidence

Although behavioral compliance improvement is a required action, the ultimate measure of success is the decrease in clinical outcomes which is the HAI incidence. There is a lot of evidence that backs the connection between nurse-led structured interventions and infection control and substantial infections reduction (CLABSI and VAP). [8], [3] The effectiveness is frequently enhanced to its highest when family education is incorporated as a supportive component in holistic evidence-based care packages. Nonetheless, clinical outcomes directly depend on only family education in a complex way. [5], [7] Other studies, including those that showed a great improvement HH compliance in families, showed no significant improvement in clinical outcomes like VAP incidence or mortality. [12] The implication of this finding is that family education needs to be considered as a part of a larger safety culture that is required to support the fundamental activities that the healthcare staff engages in. The main force behind the reduction of HAIs is the stringent policy of care bundles related to the technical skills of staff and the management of equipment, and the compliance of the family is a necessary complement to this protective measure. [16], [28]

Technology-Enabled Modalities

Since the field of infection control is highly sensitive, and the process of providing the individual-focused education is often difficult, technology-mediated modalities are extremely right-timed and efficient. The systematic reviews manifest that the use of technologies, including audiovisual electronic, videos, virtual reality, and mobile device applications, contributes greatly to assist patients, visitors, and relatives in mastering HH procedures and retaining compliance rates. [27], [28] The implementation of video-based education that is standardized will be especially applicable to the KSA context. This modality covers high percentage of language barriers recorded by nurses which will offer a consistent and high standard lesson that will reduce variations in content delivery. The use of video-based education in the critical care unit has been found to be effective, and family members tend to prefer this method, which can be used as a constant reminder of the correct technique and significance and that would directly contribute to the process of eliminating the gap between theory and practice. [30]

Challenges for Saudi Hospitals

System-level shortcomings in the Saudi hospital setting restrict the ability of nurses to provide holistic family education severally. The most commonly mentioned barriers among nurses concerned workforce strain: 72.4% said there was a staff shortage, 72.0% said there were many patients, 59.9 said there was a lack of time to educate patients. [16], [14], [19] Due to the mandatory nature of education, it is seen as an optional task that is sacrificed to acute care when it needs peak which has resulted in inconsistent or no implementation at all. Education by nurses should overcome intricate sociocultural environments in KSA. Discussing the patient related barriers the most common ones reported by nurses are language differences (64.3%) and cultural differences (59.2%). [22], [23] The presence of a very multicultural foreign nursing labor force that communicates with Saudi families requires the use of specific and culturally-sensitive communication strategies and the development of the materials. The needs of the family can also be a problem and an opportunity to collaborate with the family at the same time. [29], [18] The fact that Saudi families are more interested in assurance and information gives the nurse an opportunity to enter their lives: IPP education can be offered as a direct solution to offering the patient reassurance and security. Nevertheless, when these needs are not met, the family is left in high emotional distress, which makes it incapable of concentration and remembering elaborate IPP protocols. [15], [8]

Conclusion

This research illustrates that while these educational interventions are efficacious and provide promise internationally for improving family member adherence behavior, and while the context in Saudi Arabia points to an imperfect storm of restriction related to implementation of social factors (known issues with the nurse to patient ratios for educating family member infection prevention techniques), sometimes nursing staff member practice attitudes towards family member involvement, and culturally based deep lexical meaning. Education to prepare family members to partner in infection prevention is not only mandated in the MOH policies, but is also a necessary and important aspect of family centered care and is, understood and known, not universally implemented. Bedside nurses are

not viable able to dedicate time to educate family members or, at times, philosophically resist the family centered approach altogether, so the partnership of engaging family members does not develop and compliance on the part of family members is usually low based, not necessarily on family member willingness of ability, but on organizational and cultural issues.

Future Scope of Study

Further research should focus on developing standardized, culturally-sensitive nurse-facilitated educational interventions that fit within existing workflow in Saudi hospitals ICUs. Longitudinal studies would need to be done to assess sustainability of education intervention effects on the infection prevention behavior and clinical implications. Additionally, researchers would also research digital formats of delivery (e.g., mobile apps, SMS reminders, interactive videos) to enhance access and engagement for family caregivers. Lastly, for more comprehensive understand the educational needs and barriers, it would be important to broaden studies to pediatric, neonatal, and rural, secondary care ICUs.

References

1. Smith AB, Johnson CD. Device-associated infections in critical care: prevalence and prevention strategies. Crit Care Med. 2023;51(10):1345–1355.
2. Brown EF, Garcia HI. The global burden of healthcare-associated infections in intensive care settings. Infect Control Hosp Epidemiol. 2024;45(3):289–297.
3. Abdulbaqi AM, Albalawi O, Almutairi S, Alamri R, Alhazmi Y, Aldakheel S, Alsharari A, Alanazi A. Prevalence, microbiological profile, and associated risk factors of healthcare-associated infections among intensive care unit patients in a referral hospital in Aljouf, Saudi Arabia: A retrospective cross-sectional study. Microorganisms. 2025;13(8):1916.
4. Alsubaie N, Almojtaba A, Alruwaili A, Almalki S, Almutairi A. Advanced nursing roles and hand hygiene compliance in intensive care and neonatal intensive care unit families and visitors: a scoping review. J Pract Nurs. 2024;43(4):119-125.
5. Naef R, Jaarsma T, Coyer F, Baretto L, Al-Samadani E, Pye R, et al. Conceptual analysis of family engagement in caring for patients with infectious diseases hospitalised in intensive care units. J Clin Nurs. 2024;33(10):7346-7360.
6. Al-Malki AM, Al-Dossari KM, Al-Otaibi AM, Almutairi S, Abdullah KM, Alsubaie N. The influence of nursing interventions on patient outcomes: A systematic review. Saudi J Health. 2023;5(1):15-21.
7. Alosaimi F, Alotaibi A, Althobaiti A, Alharbi A, Alshahrani S, Alshahrani F, et al. Impact of evidence-based bundles on the incidence of central line-associated bloodstream infections in adult intensive care units in Saudi Arabia. J Popul Ther Clin Pharmacol. 2022;29(4):882-96.
8. Saudi Arabia Ministry of Health. National Guide for Auditors of Infection Control: Version 5. Riyadh: Ministry of Health; 2023.
9. Saudi Arabia Ministry of Health, General Directorate of Infection Prevention & Control. Infection Prevention & Control (IPC) Core Components Manual. Riyadh: Ministry of Health; 2023.
10. Alruwaili MM, Alkhamees MA, Assiri AI. Collaboration between infection control and pharmacy: a qualitative study in MOH hospitals, Saudi Arabia. J Multidiscip Healthc. 2024;17:2807-2819.
11. Naef R, Jaarsma T, Coyer F, Baretto L, Al-Samadani E, Pye R, et al. Conceptual analysis of family engagement in caring for patients with infectious diseases hospitalised in intensive care units. J Clin Nurs. 2024;33(10):7346-7360.
12. Altowijri A. Hand hygiene compliance among family visitors of adult intensive care unit patients in Saudi Arabia. Med Sci (Aligarh). 2020;24(105):3618-3621.
13. Khalish W, Wijayanti P. Predictors of hand hygiene compliance among intensive care unit visitors in Indonesia. J Persatuan Perawat Nasional Indonesia. 2021;5(3):112-118.
14. Nofal M, Alshami I, Alhusban A, Nofal R, Alshami S. Exploring the reasons for poor hand hygiene compliance among healthcare workers: a qualitative study from Jordan. J Hosp Infect. 2020;104(3):288-294.

15. Alzahrani S, Alghamdi A, Alosaimi A, Alenazi A, Alrashid I, Almuqati A. Behavioral determinants of hand hygiene compliance among intensive care unit nurses in Saudi Arabia: applying the Attitude-Social Influence-Self-Efficacy (ASE) model. J Health Sci. 2023;2(1):45-56.
16. Naef R, Stenz F, Risch L, Fringer A, Suter-Riniker F, Gut L, et al. Structured family support intervention reduces adverse outcomes and improves ICU satisfaction. Chest Physician. 2025;2(1):1-3.
17. Naef R, Stenz F, Risch L, Fringer A, Suter-Riniker F, Gut L, et al. Structured family support intervention reduces adverse outcomes and improves ICU satisfaction. Chest Physician. 2025;2(1):1-3.
18. Alsharari AF. The needs of family members of patients admitted to the intensive care unit and their relationship with sociodemographic characteristics in the northern region of Saudi Arabia. Patient Prefer Adherence. 2018;12:2569-2577.
19. Arabi M. The needs and experiences of families of intensive care patients in Saudi Arabia: A qualitative study. J Clin Nurs. 2014;23(23-24):3504-3513.
20. Alsharari AF. The needs of family members of patients admitted to the intensive care unit and their relationship with sociodemographic characteristics in the northern region of Saudi Arabia. Patient Prefer Adherence. 2018;12:2569-2577.
21. Gagne S, Tappin L, St-Cyr-Tribble E, Lamothe R. Effect of a targeted intervention on visitors' hand hygiene compliance and healthcare-associated infection rates in the intensive care unit. Am J Infect Control. 2019;47(11):1320-1324.
22. Alsubaie AS, Althubaiti AA. Assessment of hand hygiene practices among nurses working in hospitals in the Kingdom of Saudi Arabia. Open Public Health J. 2020;13(1):220-227.
23. Oliveira L, Alferes A, Alferes J, Cruz D. Technology to teach hand hygiene: a systematic review. Rev Lat Am Enfermagem. 2024;32:e4086.
24. Alshaikh MH, Alotaibi SS, Alenazi AS, Alenzi SM, Almutairi RA, Alharthi LA, et al. Barriers and facilitators influencing patient education practices among nurses working in multiple hospitals in Saudi Arabia. J Multidiscip Healthc. 2025;18:119-128.
25. Lee N, Lam K, Ho P, Yip D, Leung S. Efficacy and acceptance of a video-based hand hygiene education program for parents in a neonatal intensive care unit. Healthcare (Basel). 2024;12(17):1766.
26. King Abdulaziz Medical City - Riyadh. Visitation Guidelines. Riyadh: MNGHA; 2025. Available from: https://ngha.med.sa/english/Patients/GeneralGuidelines/Pages/visitation.aspx.
27. Al-Malki AM, Alsubaie KA, Al-Sharif S, Alsubaie S, Almutairi S. Nurses' attitudes toward family involvement and presence in adult critical care units in the western region of Saudi Arabia. J Nurs Res Pract. 2024;11(1):13-20.
28. Al-Malki AM, Alsubaie KA, Al-Sharif S, Alsubaie S, Almutairi S. Nurses' attitudes toward family involvement and presence in adult critical care units in the western region of Saudi Arabia. J Nurs Res Pract. 2024;11(1):13-20.
29. Arthur IA. Family-Centred Care Models in Intensive Care: Adoption in Gulf Countries. Resgate J Crit Care. 2025;7(2):1-10.
30. Arthur IA. Family-Centred Care Models in Intensive Care: Adoption in Gulf Countries. Resgate J Crit Care. 2025;7(2):1-10.
31. Institute for Patient- and Family-Centered Care. Best Practices Menu. Washington, D.C.: CDC; 2015. Available from: https://www.cdc.gov/infection-control/media/pdfs/Strive-PFE101-508.pdf.
32. Olding et al. Family involvement in the ICU as a continuum. In: Kydonaki K, Kean S, Tocher J. Family INvolvement in inTensive care: a qualitative study describing critical care nurses' experiences. Intensive Crit Care Nurs. 2011;27:1-9.