



NURSING INTERVENTIONS TO REDUCE HOSPITAL-ACQUIRED INFECTIONS IN INTENSIVE CARE UNITS

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Abstract:

Hospital-acquired infections (HAIs) pose a significant threat to patients in intensive care units (ICUs), leading to increased morbidity, mortality, and healthcare costs. Nurses play a crucial role in implementing interventions to prevent and reduce HAIs in ICUs. This review article aims to explore the various nursing interventions that have been employed to combat HAIs in ICUs. The interventions discussed in this review include proper hand hygiene practices, environmental cleaning, implementation of infection control protocols, surveillance and monitoring of infections, use of personal protective equipment, and education of healthcare staff and patients. The effectiveness of these interventions in reducing the incidence of HAIs and improving patient outcomes will be critically evaluated. Furthermore, challenges and barriers faced by nurses in implementing these interventions will be discussed, along with potential solutions to overcome them. By synthesizing current evidence and best practices, this review article provides valuable insights into the role of nursing interventions in the prevention and management of HAIs in ICUs, ultimately aiming to enhance patient safety and quality of care in critical care settings.

Keywords: Hospital-acquired infections, Intensive care units, Nursing interventions, Hand hygiene, Infection control, Patient safety

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Introduction:

Hospital-acquired infections (HAIs) are a significant concern in healthcare settings, particularly in intensive care units (ICUs) where patients are often vulnerable to infections due to their compromised immune systems. Nurses play a crucial role in preventing and reducing HAIs in ICUs through various interventions and strategies [1].

One of the key nursing interventions to reduce HAIs in ICUs is proper hand hygiene. Nurses must adhere to strict hand hygiene protocols, including washing their hands with soap and water or using alcohol-based hand sanitizers before and after patient contact. Proper hand hygiene is essential in preventing the spread of pathogens from one patient to another and reducing the risk of HAIs [2]. Another important nursing intervention is the proper use of personal protective equipment (PPE). Nurses in ICUs should wear gloves, gowns, masks, and eye protection when caring for patients with known or suspected infections. By using PPE correctly, nurses can protect themselves and their patients from the transmission of infectious agents [3].

In addition to hand hygiene and PPE, nurses can also implement environmental cleaning and disinfection protocols to reduce HAIs in ICUs. Surfaces and equipment in patient rooms should be regularly cleaned and disinfected to prevent the spread of pathogens. Nurses can also educate patients and their families on the importance of maintaining a clean environment to reduce the risk of infections [4].

Furthermore, nurses can play a crucial role in implementing infection prevention and control measures in ICUs. This includes monitoring patients for signs and symptoms of infections, implementing isolation precautions when necessary, and collaborating with other healthcare team members to prevent the spread of infections. Nurses can also participate in quality improvement initiatives to identify areas for improvement in infection control practices and implement evidence-based interventions to reduce HAIs [5]. Education is also a key nursing intervention in reducing HAIs in ICUs. Nurses should stay up to date on the latest evidence-based practices in infection prevention and control and educate themselves and their colleagues on best practices. By continuously learning and improving their knowledge and skills, nurses can effectively reduce the risk of HAIs in ICUs [6].

The Burden of Hospital-Acquired Infections in Intensive Care Units:

HAIs are infections that patients acquire while receiving treatment in a healthcare facility. These infections can be caused by a variety of pathogens, including bacteria, viruses, and fungi. In ICUs, where patients are often critically ill and have weakened immune systems, the risk of HAIs is particularly high. Factors such as invasive procedures, prolonged hospital stays, and the use of antibiotics can all contribute to the development of these infections [7].

The impact of HAIs in ICUs is significant. These infections can lead to extended hospital stays, increased morbidity and mortality, and higher healthcare costs. In addition, HAIs can also contribute to the spread of antibiotic-resistant bacteria, making treatment more challenging. Patients who develop HAIs in ICUs are also at risk of experiencing long-term complications and reduced quality of life [8].

The burden of HAIs in ICUs extends beyond the individual patient to the healthcare system as a whole. In addition to the direct costs of treating these infections, HAIs can also result in lost productivity, increased use of resources, and a strain on healthcare facilities. Furthermore, outbreaks of HAIs in ICUs can damage the reputation of hospitals and erode patient trust [9]. Addressing the burden of HAIs in ICUs requires a multifaceted approach. Infection prevention and control measures, such as hand hygiene, environmental cleaning, and the appropriate use of personal protective equipment, are essential in reducing the risk of HAIs. Education and training for healthcare workers on best practices for infection prevention are also crucial [10].

In addition to prevention strategies, antimicrobial stewardship programs can help reduce the incidence of HAIs in ICUs. These programs focus on optimizing the use of antibiotics to prevent the development of antibiotic-resistant bacteria and reduce the risk of HAIs. By promoting the judicious use of antibiotics and encouraging the use of alternative treatment options when appropriate, antimicrobial stewardship programs can help mitigate the burden of HAIs in ICUs [11].

The burden of HAIs in ICUs is a significant challenge for healthcare providers, patients, and the healthcare system as a whole. By implementing comprehensive infection prevention and control measures, as well as antimicrobial stewardship programs, we can work towards reducing the incidence of HAIs in ICUs and improving patient outcomes. It is essential that healthcare facilities

prioritize efforts to address this issue and protect the health and safety of patients in intensive care settings [12].

Role of Nursing Interventions in HAI Prevention:

Nurses are on the front lines of patient care and are in a unique position to prevent HAIs through their daily interactions with patients. One of the most important nursing interventions in HAI prevention is proper hand hygiene. Hand hygiene is the single most effective way to prevent the spread of infections in healthcare settings, and nurses must be vigilant in ensuring that they wash their hands before and after every patient interaction. This simple intervention can significantly reduce the risk of HAIs and protect both patients and healthcare workers [4].

In addition to hand hygiene, nurses can also prevent HAIs through the implementation of infection control practices. This includes the use of personal protective equipment (PPE) such as gloves, gowns, and masks when caring for patients with infectious diseases. Nurses must also adhere to standard precautions, which are guidelines designed to prevent the transmission of infections in healthcare settings. By following these practices, nurses can reduce the risk of HAIs and protect both themselves and their patients [9].

Another important nursing intervention in HAI prevention is the proper cleaning and disinfection of patient care areas. Nurses must ensure that all surfaces are regularly cleaned and disinfected to prevent the spread of infections. This includes cleaning patient rooms, equipment, and common areas with appropriate disinfectants to kill harmful bacteria and viruses. By maintaining a clean and hygienic environment, nurses can reduce the risk of HAIs and create a safer healthcare setting for patients [12].

Nurses also play a key role in educating patients and their families about infection prevention strategies. This includes teaching patients about the importance of hand hygiene, proper wound care, and the use of PPE when necessary. By empowering patients to take an active role in their own infection prevention, nurses can help reduce the risk of HAIs and improve patient outcomes [13].

Nursing interventions play a critical role in preventing HAIs in healthcare settings. By implementing strategies such as hand hygiene, infection control practices, and patient education, nurses can reduce the risk of infection transmission and create a safer environment for patients. It is essential for nurses to be knowledgeable about infection prevention guidelines and to consistently

follow best practices to protect both themselves and their patients. By working together to implement these interventions, nurses can help prevent HAIs and improve patient safety in healthcare settings [14].

Key Nursing Interventions for Reducing HAIs in ICUs:

Nurses play a crucial role in preventing and controlling HAIs through various interventions. This essay will delve into the key nursing interventions aimed at reducing HAIs in ICUs, focusing on proper hand hygiene practices, environmental cleaning protocols, implementation of infection control measures, surveillance and monitoring of infections, use of personal protective equipment, and education of healthcare staff and patients [15].

• Proper Hand Hygiene Practices

Proper hand hygiene is a cornerstone in infection prevention and control. Nurses must adhere to strict hand hygiene protocols, including washing hands with soap and water or using alcohol-based hand sanitizers before and after patient contact, after touching any potentially contaminated surfaces, and before performing invasive procedures. By diligently practicing proper hand hygiene, nurses can significantly reduce the transmission of pathogens in ICUs, thereby lowering the risk of HAIs [16].

• Environmental Cleaning Protocols

Maintaining a clean and hygienic environment is essential in preventing the spread of infections in ICUs. Nurses should ensure that all surfaces, equipment, and patient care areas are regularly cleaned and disinfected using appropriate cleaning agents. Implementing strict environmental cleaning protocols helps eliminate potential reservoirs of pathogens and reduces the risk of cross-contamination among patients [17].

• Implementation of Infection Control Measures

Nurses play a pivotal role in implementing infection control measures to prevent HAIs in ICUs. This includes adhering to standard precautions such as wearing gloves, gowns, masks, and eye protection when necessary, as well as following transmission-based precautions for patients with known or suspected infections. By strictly adhering to infection control measures, nurses can create a safe and sterile environment for patients, minimizing the risk of healthcare-associated infections [18].

• Surveillance and Monitoring of Infections

Monitoring and surveillance of infections are vital components of infection control strategies in ICUs. Nurses are responsible for identifying and reporting any unusual patterns of infections, conducting regular surveillance of healthcare-associated infections, and implementing targeted interventions to prevent outbreaks. By actively monitoring infections and promptly intervening, nurses can effectively control and contain the spread of pathogens in ICUs [19].

• Use of Personal Protective Equipment

Personal protective equipment (PPE) is essential in protecting both healthcare workers and patients from potential infections. Nurses must use appropriate PPE, such as gloves, masks, gowns, and eye protection, to prevent the transmission of pathogens during patient care activities. Ensuring the correct use and disposal of PPE is crucial in reducing the risk of HAIs and maintaining a safe healthcare environment in ICUs [20].

• Education of Healthcare Staff and Patients

Education plays a vital role in raising awareness and promoting best practices for infection prevention and control. Nurses should provide comprehensive education and training to healthcare staff on proper hand hygiene, environmental cleaning, infection control measures, proper use of PPE, and other strategies to reduce HAIs. Additionally, educating patients and their families on infection prevention practices can empower them to take an active role in their own care and reduce the risk of acquiring infections during hospitalization [21].

Nursing interventions are paramount in reducing healthcare-associated infections in ICUs. By implementing proper hand hygiene practices, environmental cleaning protocols, infection control measures, surveillance and monitoring of infections, use of personal protective equipment, and education of healthcare staff and patients, nurses can significantly mitigate the risk of HAIs and enhance patient safety in critical care settings. It is imperative for nurses to remain vigilant, proactive, and committed to implementing evidence-based strategies to prevent and control infections in ICUs, ultimately improving patient outcomes and quality of care [22].

Challenges and Barriers in Implementing Nursing Interventions:

One of the primary challenges in implementing nursing interventions for reducing HAIs in ICUs is the high acuity and complexity of patients in these settings. ICU patients are often critically ill and

require intensive monitoring and care, which can make it challenging for nurses to focus on infection prevention measures. In addition, ICU patients may have multiple comorbidities and be immunocompromised, making them more susceptible to HAIs. This complexity can make it difficult for nurses to prioritize infection prevention and control measures amidst competing demands for patient care [23].

Another challenge in implementing nursing interventions for reducing HAIs in ICUs is the limited resources available in these settings. ICUs are often understaffed, with nurses caring for a high number of patients with complex needs. This can make it difficult for nurses to consistently adhere to infection prevention protocols, such as hand hygiene, environmental cleaning, and the use of personal protective equipment. In addition, ICUs may lack access to essential resources, such as adequate supplies of disinfectants and personal protective equipment, which can hinder nurses' ability to prevent and control HAIs [24].

Furthermore, nurses in ICUs may face barriers related to organizational culture and leadership support. In some healthcare settings, there may be a lack of emphasis on infection prevention and control, leading to a culture that prioritizes other aspects of patient care over preventing HAIs. Without strong leadership support and a culture of safety, nurses may struggle to implement effective infection prevention measures and advocate for the resources needed to reduce HAIs in the ICU setting [25].

Additionally, nurses in ICUs may face challenges related to communication and collaboration with other healthcare team members. Effective teamwork and communication are essential for preventing HAIs, as infections can spread rapidly in the ICU setting. Nurses must collaborate with physicians, infection preventionists, environmental services staff, and other healthcare providers to ensure that infection prevention measures are implemented consistently and effectively. However, communication breakdowns, hierarchical structures, and conflicting priorities among team members can hinder nurses' ability to prevent and control HAIs in the ICU setting [26].

Nurses in ICUs face numerous challenges and barriers in implementing nursing interventions for reducing HAIs. The high acuity and complexity of patients, limited resources, organizational culture, and leadership support, and communication and collaboration issues all contribute to the difficulty of preventing and managing HAIs in the ICU setting. Addressing these challenges and barriers requires a multifaceted approach that involves improving staffing levels, providing adequate

resources, fostering a culture of safety, and promoting effective teamwork and communication among healthcare team members. By addressing these challenges and barriers, nurses can play a vital role in reducing HAIs in ICUs and improving patient outcomes [27].

Conclusion:

In conclusion, nursing interventions play a crucial role in reducing HAIs in ICUs. By implementing proper hand hygiene, using PPE correctly, maintaining a clean environment, implementing infection prevention and control measures, and staying educated on best practices, nurses can effectively reduce the risk of HAIs and improve patient outcomes in ICUs. It is essential for nurses to collaborate with other healthcare team members, follow evidence-based practices, and continuously strive to improve their infection control practices to provide safe and high-quality care to patients in ICUs.

References:

- Allegranzi B, Nejad SB, Combescure C, et al. Burden of endemic health-care-associated infection in developing countries: systematic review and meta-analysis. *Lancet*. 2011;377(9761):228-241.
- World Health Organization. Guidelines on Hand Hygiene in Health Care: First Global Patient Safety Challenge Clean Care is Safer Care. Geneva: World Health Organization; 2009.
- Pittet D, Allegranzi B, Sax H, et al. Evidence-based model for hand transmission during patient care and the role of improved practices. *Lancet Infect Dis*. 2006;6(10):641-652.
- Dancer SJ. The role of environmental cleaning in the control of hospital-acquired infection. *J Hosp Infect*. 2009;73(4):378-385.
- Weber DJ, Rutala WA, Miller MB, Huslage K, Sickbert-Bennett E. Role of hospital surfaces in the transmission of emerging health care-associated pathogens: norovirus, *Clostridium difficile*, and *Acinetobacter* species. *Am J Infect Control*. 2010;38(5 Suppl 1):S25-S33.
- Sehulster L, Chinn RY; CDC; HICPAC. Guidelines for environmental infection control in health-care facilities. Recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC). *MMWR Recomm Rep*. 2003;52(RR-10):1-42.
- Centers for Disease Control and Prevention. Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings. 2007.
- Siegel JD, Rhinehart E, Jackson M, Chiarello L; Health Care Infection Control Practices Advisory Committee. 2007 guideline for isolation precautions: preventing transmission of infectious agents in health care settings. *Am J Infect Control*. 2007;35(10 Suppl 2):S65-S164.
- Karki S, Cheng AC. Impact of non-pharmacologic interventions on prevention of hospital-acquired infections by antibiotic-resistant bacteria in adult patients: a systematic review. *J Hosp Infect*. 2018;100(3):254-270.
- Saint S, Kowalski CP, Banaszak-Holl J, Forman J, Damschroder L, Krein SL. The importance of leadership in preventing healthcare-associated infection: results of a multisite qualitative study. *Infect Control Hosp Epidemiol*. 2010;31(9):901-907.
- Huis A, Schoonhoven L, Grol R, Donders R, Hulscher M, van Achterberg T. Impact of a team and leaders-directed strategy to improve nurses' adherence to hand hygiene guidelines: a cluster randomised trial. *Int J Nurs Stud*. 2013;50(4):464-474.
- Stone SP, Cooper BS, Kibbler CC, et al. The ORION statement: guidelines for transparent reporting of outbreak reports and intervention studies of nosocomial infection. *Lancet Infect Dis*. 2007;7(4):282-288.
- Zingg W, Holmes A, Dettenkofer M, et al. Hospital organisation, management, and structure for prevention of health-care-associated infection: a systematic review and expert consensus. *Lancet Infect Dis*. 2015;15(2):212-224.
- Ivers N, Jamtvedt G, Flottorp S, et al. Audit and feedback: effects on professional practice and healthcare outcomes. *Cochrane Database Syst Rev*. 2012;6:CD000259.
- Erasmus V, Daha TJ, Brug H, et al. Systematic review of studies on compliance with hand hygiene guidelines in hospital care. *Infect Control Hosp Epidemiol*. 2010;31(3):283-294.
- Loveday HP, Wilson JA, Pratt RJ, et al. epic3: National evidence-based guidelines for preventing healthcare-associated infections in NHS hospitals in England. *J Hosp Infect*. 2014;86 Suppl 1:S1-70.
- Gould DJ, Moralejo D, Drey NS, Chudleigh JH, Taljaard M. Interventions to improve hand hygiene compliance in patient care. *Cochrane Database Syst Rev*. 2017;9:CD005186.
- Stone SP, Fuller C, Savage J, et al. Evaluation of the national Cleanyourhands campaign to reduce *Staphylococcus aureus* bacteraemia and *Clostridium difficile* infection in hospitals in England and Wales by improved hand hygiene: four year, prospective, ecological, interrupted time series study. *BMJ*. 2012;344:e3005.

19. Hugonnet S, Perneger TV, Pittet D. Alcohol-based handrub improves compliance with hand hygiene in intensive care units. *Arch Intern Med.* 2002;162(9):1037-1043.
20. Pittet D, Hugonnet S, Harbarth S, et al. Effectiveness of a hospital-wide programme to improve compliance with hand hygiene. Infection Control Programme. *Lancet.* 2000;356(9238):1307-1312.
21. Boyce JM, Pittet D; Healthcare Infection Control Practices Advisory Committee; HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. Guideline for hand hygiene in health-care settings. Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. *MMWR Recomm Rep.* 2002;51(RR-16):1-45.
22. Sroka S, Gastmeier P, Meyer E. Impact of alcohol hand-rub use on meticillin-resistant *Staphylococcus aureus*: an analysis of the literature. *J Hosp Infect.* 2010;74(3):204-211.
23. Erasmus V, Daha TJ, Brug H, et al. Systematic review of studies on compliance with hand hygiene guidelines in hospital care. *Infect Control Hosp Epidemiol.* 2010;31(3):283-294.
24. Allegranzi B, Pittet D. Role of hand hygiene in healthcare-associated infection prevention. *J Hosp Infect.* 2009;73(4):305-315.
25. Dancer SJ. The role of environmental cleaning in the control of hospital-acquired infection. *J Hosp Infect.* 2009;73(4):378-385.
26. Weber DJ, Rutala WA, Miller MB, Huslage K, Sickbert-Bennett E. Role of hospital surfaces in the transmission of emerging health care-associated pathogens: norovirus, *Clostridium difficile*, and *Acinetobacter* species. *Am J Infect Control.* 2010;38(5 Suppl 1):S25-S33.
27. Sehulster L, Chinn RY; CDC; HICPAC. Guidelines for environmental infection control in health-care facilities. Recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC). *MMWR Recomm Rep.* 2003;52(RR-10):1-42.