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# **Review of Nosocomial Infection Control Guidelines and Burn Nurses` Performance**

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#### ABSTRACT

Infection control guidelines are the key for preventing nosocomial infection in burn unit. Nosocomial infection control poses challenges in burn unit due to the impaired of immune system of patients and the invasive procedures often required. Nosocomial infections cause significant negative consequences, including extra hospitalization days, additional costs, and even mortality. Adhering to infection control guidelines such as hygienic, sterile procedures is critical preventive infection and maintains patient safety. Nurse's commitment to follows guidelines help in reduces nosocomial infections and creating a safety environment for burn patients.

#### Keywords: Nosocomial Infection, Infection Control Guidelines, Burn Nurse, performance

#### 1. Introduction

Nosocomial infection control guidelines not only contribute to the well-being of burn unit patients but also enhance the overall quality of healthcare. To explore these dynamics, this study brings together the insights of dedicated professionals committed for implemented infection control guidelines in burn units. Managing burn patients with controlling of infections relies on effectively wounds care and the cleaning environment. Nurses play a crucial role in decreasing septic incidents and the negative outcomes of sepsis in burned patient. So, studying nosocomial infection control guidelines positively affects the performance of nurses working in burn units, leading to increase the burned patient's safety, improves the quality of care provided and decreased hospitalization and coasts (**Qattan et al., 2024**).

#### Epidemiology

An estimated 2 million people contract nosocomial infections annually, with 5% to 15% of those infected needing long hospitalization. Nosocomial infections annual direct costs in Europe due to healthcare-associated infections is estimated at approximately EUR 7 billion, including 16 million extra days of hospital stay (CDC,2024). Today, out of every 100 patients in acute-care hospitals, seven patients in high-income countries and 15 patients in low- and middle-income countries will acquire at least one health care-associated infection (HAI) during their hospital stay. Moreover; over 24% of patients affected by health care-associated infection and 52.3% of those patients treated in a critical care unit die each year (WHO, 2024).

Deaths are increased two to threefold when infections are resistant to antimicrobials, as nosocomial infections are a serious problem in hospitals, particularly in burned patients. In Egypt the incidence of HAI was

3.7%, with the burn's unit having the greatest incidence at 48.1%, followed by the general intensive care unit at 20.9% and the neurosurgical intensive care unit at 18.9%. In a study conducted in the province of Mansoura, Egypt, a tertiary care hospital by **Hassan et al. (2020)**.

# **Causes and Risk Factors of Nosocomial infection**

Medical and nursing procedures may increase the risk of nosocomial infection due to the presence of severe underlying health conditions, as well as the potential for contamination from the devices. The use of antimicrobial agents can also influence the character and prevalence of nosocomial infections, as many bacterial pathogens have developed resistance to commonly used antimicrobials (**Orabi et al., 2024**). Nosocomial infections can have a significant impact on disease burden, including morbidity and mortality. In the 21<sup>st</sup> century, the rate of nosocomial infections has been increasing, likely due to the increased use of outpatient treatment, the admission of more severely ill patients to hospitals, and the overuse and misuse of antibiotics, which has led to the development of antibiotic resistance in many microorganisms. Other risk factors for nosocomial infections include medical procedures that bypass the body's natural protective barriers, cross contamination from medical staff to patients, and inadequate cleaning procedures (**Silva et al., 2024**).

There are various intrinsic and extrinsic factors which can increase the risk of nosocomial infections. Intrinsic factors are those that inherent in the patient due to underlying health conditions, while extrinsic factors are those that related to the hospital environment or medical procedures. High risk medical interventions, such as surgical operations and the use of invasive devices, are often cited as major extrinsic factors contributing to nosocomial infections. While intrinsic factors such as age, respiratory and cardiac conditions, immune compromised and patient congenital disease, burned surface area, and the number of comorbidities, were significantly associated with nosocomial infections (**Cui et al., 2024**). In burn unit, nosocomial infections are caused primarily by Escherichia coli, Enterococcus, Pseudomonas aeruginosa, and Candida in addition to fungal infections. Risk factors for nosocomial infections in burn include the use of invasive devices such as vascular catheters and endotracheal tubes, decubitus ulcers and surgical debridement (**Orabi et al., 2024**).

# **Types of Nosocomial Infection:**

National Nosocomial Infections Surveillance (NNIS) System in the United States tracks the incidence and types of nosocomial infections in critical care units such as burn unit and has identified a number of common pathogens and high-risk areas for infection, including central line-associated bloodstream infections, ventilator associated pneumonia, surgical wound site and catheter-associated urinary tract infections (**Cheng et al., 2024**). The burned patients are at a high risk for nosocomial infection (NI) as a result of the nature of the burn injury itself, the immune compromising effects of burns, prolonged hospital stays and intensive diagnostic and therapeutic procedures. There are conflicting results from different burn centers regarding the most commonly seen infections in acute burn care. Some reports suggest that burn wound infection is the most common type of infection, whereas other reports show predominance of pneumonia and primary blood stream infection. These differences might be related to the variation in the rates of usage of invasive devices such as ventilators and different types of catheters (Silva et al., 2024).

Central line-associated bloodstream infections (CLABSI) are deadly nosocomial infections with the death incidence rate of 12%-25%. Catheters are placed in central vein to provide fluid and medicines, but prolonged use can cause serious bloodstream infections resulting in compromised health and increase in care cost. Although there is a decrease of 46% in CLABSI from 2008 to 2013 in US hospitals yet an estimated 30,100 CLABSI still occur in ICU and acute facilities wards each year (**Peixoto et al., 20^{4}**). Catheter associated urinary tract infections (CAUTI) CAUTI is the most usual type of nosocomial infection globally. CAUTIs are caused by endogenous native micro flora of the patients. The urinary catheters serve as a conduit for entry9 of bacteria whereas the imperfect drainage from catheter retains some volume of urine in the bladder providing stability to bacterial residence. CAUTI can develop complications such as, orchitic: epididymitis and prostatitis in males, in addition to pyelonephritis, cystitis and meningitis in all patients (**Kelly et al., ^{4, 4, 4}**).

Surgical site infections (SSI) are nosocomial infections occur in 2%–5% of patients subjected to surgery. These are the second most common type of nosocomial infections that mainly caused by Staphylococcus aureus resulting in prolonged hospitalization and risk of death. The pathogens causing SSI arise from endogenous micro flora of the patient. The incidence may be as high as 20% depending upon procedure and surveillance criteria used (**Cheng et al., 2024**). Nosocomial Pneumonia occurs in several different patient groups. The most important are patients on ventilators in intensive care units. There is a high case fatality rate associated with ventilator-associated pneumonia, although the attributable risk is difficult to determine because patient comorbidity is so high. Microorganisms colonize the stomach, upper airway and bronchi, and cause infection in the lungs (pneumonia). The organisms are often endogenous from the digestive system or nose and throat, but may be exogenous, often from contaminated respiratory equipment in most critically burned patients (**Masri et al., 2024**).

Nosocomial bacteremia or septicemia represents a small proportion of nosocomial infections (approximately 5%) but case fatality rates are high — more than 50% for some microorganisms. The incidence is increasing; particularly for certain organisms such as multi resistant coagulase-negative Staphylococcus and Candida spp. Infection may occur at the skin entry site of the intravascular device, or in the subcutaneous path of the catheter (tunnel infection). Organisms colonizing the catheter within the vessel may produce bacteremia without visible external infection. The resident or transient cutaneous flora is the source of infection. The main risk factors are the length of catheterization, level of asepsis at insertion, and continuing catheter care (Nahra et al., 2024).

The percentage of total burned surface area (TBSA) is a significant risk factor for burn wound infections, although it is not a risk factor for the device-associated infections. Duration of urinary catheters and ventilation use are identified as risk factors for the corresponding hospital-acquired infection. Effective infection control policy, decreased usage of invasive devices, better infection control procedures and improved aseptic technique while inserting devices could decrease the rates of NI in burn units (**Zabihi et al., 2024**).

# **Nosocomial Infection Control Guidelines**

Guidelines of nosocomial infection are defined as set rules or instruction that provides information on how to maintain good health as standard precautions and recommendations for cleaning and sterilization healthcare procedures. To implement these guidelines the nurse should have the needed knowledge, skills, and positive attitude toward burn, burned patient management, and infection control guidelines (**Takahashi et al., 2024**). The nurse should be knowledgeable about care of burned patient and techniques used to prevent infections in these patients. The lack of knowledge can contribute to suboptimal healthcare-seeking behaviors, medical attention, and increasing challenges in adhering to preventive strategies. Inadequate nurse performance exacerbates the risk of nosocomial infections, emphasizing the importance of fully informing individuals about protecting themselves from infectious threats. Addressing these disparities and promoting overall health outcomes requires a focus on improving health education and raising awareness (**Sallam et al., 2024**).

Prevention of nosocomial infections is the responsibility of all the staff. Everyone must work cooperatively to reduce the risk of infection for patients and staff. This includes personnel providing direct patient care, management, physical plant, provision of materials and products, and training of health workers. Infection control guidelines are comprehensive and include surveillance and prevention activities, as well as staff training. There must also be effective support at the national and regional levels (**Ren et al., 2024**).

# Nosocomial Infection control guidelines will impress burn nurse performance

Nurses at burn units typically follow this role to prevent nosocomial infections as: assess burn wounds for signs of infection, such as increased redness, swelling, purulent drainage, or foul odor, use appropriate cleansers and dressings for burn wounds, and change them according to the established protocol to maintain a moist wound environment. Strict adherence to hand hygiene before and after patient contact, and before performing any procedures (Vieira et al., 2024).

Patient and families education about signs of infection and the importance of keeping wounds clean and dry, monitor patients for systemic signs of infection, such as fever or changes in vital signs, and report any concerns promptly, administer prophylactic or therapeutic antibiotics as ordered, while being mindful of antibiotic stewardship to prevent resistance, implement appropriate isolation precautions for patients with confirmed or suspected infections to prevent cross-contamination, environmental controls ensure the burn unit is clean and well-maintained, including regular disinfection of surfaces and equipment and collaboration work closely with infection control teams to identify and address potential outbreaks or infection trends within the burn unit (**Takasi et al ., 2024**).

Providing positive relationships with patient based on their mental and physical conditions through selfintroduction, familiarizing herself with the patient's condition in general and evaluating the health condition. Furthermore; provides patients and family social support during their hospital stay based on their age, educational level, and ability to teach (Jolly et al., 2024). Communication with positive attitude. Attitudes help us to understand how people perceive issues and processes in care and determine what they deem important, good, relevant and appropriate. To understand attitudes how to provide collaborative, patient- centered care; however, they are poorly understood. It explores the function of attitudes, considers how they are formed and reflects on the process of attitude change, examining how persuasion can be used to enable individuals to revisit behaviors that seem problematic or less effective. A gap remains on what knowledge should be given to improve the attitudes and perceptions towards mental health. (Belbase et al., 2024).

#### Conclusion

By following the Infection control Guidelines, nurses not only reduce the risk of infections but also enhances the overall quality of care provided and at reflects to patient safety. The adherence to nosocomial infection guidelines is a cornerstone of good nurse performance achieves the standardized nurse's care. **Disclosure**  I declare that I have no conflicts of interest related to this work.

# Tables and graphs







Osman, A. H., Darkwah, S., Kotey, F. C., Odoom, A., Hotor, P., Dayie, N. T., & Donkor, E. S. (2024). Reservoirs of Nosocomial Pathogens in Intensive Care Units: A Systematic Review. *Environmental Health Insights*, 18, 11786302241243239.

Fig (2) Routes of Nosocomial infection

### Routes of acquisition of nosocomial infections

- 1. Infection from index patient's own microbiota
- 2. Direct patient transmission
- 3. Indirect patient to patient transmission
- 4. Transmission from healthcare worker (HCW)
- 5. Transmission from environment



Kelly, T., Ai, C., Jung, M., & Yu, K. (2024). Catheter-associated urinary tract infections (CAUTIs) and non-CAUTI hospital-onset urinary tract infections: Relative burden, cost, outcomes and related hospital-onset bacteremia and fungemia infections. Infection Control & Hospital Epidemiology, 1-8.

# (Fig 3) chain of Nosocomial Infection



Masri, I. H., Busack, B., & Shorr, A. F. (2024). Improving Outcomes in Nosocomial `Pneumonia: Recent Evidence and More Challenges. Pathogens, 13(6), 495

#### References

Belbase, R. J., Budhathoki, R., Prasain, A. R., Prasain, R., Nepal, D., & Basnet, A. K. (2024). A Study to

Assess the Knowledge, Attitude and Practice of Health Workers Regarding Nosocomial Infection at Selected Hospitals of Birtamode Municipality, Jhapa.

Control for Disease Control and Prevention. (2023) Guidelines and Guidance Library | Infection Control | CDC

accessed at 24 April 2023

Cui, Z., Li, Y., Qin, Y., Li, J., Shi, L., Wan, M., ... & Liu, C. (2024). Through M1/M2 macrophage

polarization, polymyxin B-targeted liposomal photosensitizer promotes wound healing and cures MDR A. baumannii burn infections. Controlled Release Journal, 366, 297-311.

Hassan, R., El-Gilany, A. H., El-Mashad, N., & Azim, D. A. (2020). An overview of healthcare-associated

infections in a tertiary care hospital in Egypt. Infection prevention in practice, 2(3), 100059.

- Jolly, P. E., Li, Y., Thomas, A., Braun, A., Padilla, L. A., Thompson, S., & Aung, M. (2024). Knowledge, attitudes, and practices of Jamaican healthcare workers on nosocomial infection control. Journal of Infection Prevention, 17571774241245430
- Kelly, T., Ai, C., Jung, M., & Yu, K. (2024). Catheter-associated urinary tract infections (CAUTIs) and non CAUTI hospital-onset urinary tract infections: Relative burden, cost, outcomes and related hospital-onset bacteremia and fungemia infections. Infection Control & Hospital Epidemiology, 1-8.
- Masri, I. H., Busack, B., & Shorr, A. F. (2024). Improving Outcomes in Nosocomial `Pneumonia: Recent Evidence and More Challenges. Pathogens, 13(6), 495
- Nahra, R., Darvish, S., Gandhi, S., Gould, S., Floyd, D., Devine, K., ... & Rachoin, J. S. (2024). Impact of Povidone Application to Nares in Addition to Chlorhexidine Bath in Critically III Patients on Nosocomial Bacteremia and Central Line Blood Stream Infection. Journal of Clinical Medicine, 13(9), 2647.
- Orbay, H., Corcos, A. C., Ziembicki, J. A., & Egro, F. M. (2024). Challenges in the management of large burns. Clinics in Plastic Surgery
- Osman, A. H., Darkwah, S., Kotey, F. C., Odoom, A., Hotor, P., Dayie, N. T., & Donkor, E. S. (2024). Reservoirs of Nosocomial Pathogens in Intensive Care Units: A Systematic Review. Environmental Health Insights, 18, 11786302241243239.
- Qattan, S. Y. M., Al Zaydan, S. M. S., Almalki, A. A. S., Almari, B. M. S., Jassas, M. M. A., Alasmary, M. S. M., ... & Algarni, M. A. S.(2024) Nosocomial Infections: Prevention, Control and Surveillance.
- Silva, A. R., Hoffmann, N. G., Fernandez-Llimos, F., & Lima, E. C. (2024Evaluation of the Brazilian

Nosocomial Infections Surveillance System's Data Quality. Journal of Infection and Public Health.

- Takasi, P., Purbarar, F., Tamizi, A., & Ghardashpoor, E. (2024). High rate of negligence induced burns in children: a rising cause for concern of the world's burn community. Journal of Nursing Reports in Clinical Practice, 2(2), 118-120.
- World Health Organization. (2023). Tracking Universal Health Coverage: 202<sup>r</sup> Global Monitoring Report.
- Zabihi, M. R., Rashtiani, S., Akhoondian, M., & Farzan, R. (2024). A narrative review of the function of

nursing care in the treatment of post-burn epidermal cancer. Journal of Nursing Reports in Clinical Practice, 2(3), 172-179.