

# Prevention of Nosocomial Infection: The Experience of Nurses and the Barriers

**Uduevbolo, Otibhor Kate**

Department of Nursing, College of Health Sciences, School of Basic Medical Sciences, Igbinedion University, Okada, Edo State, Nigeria.

Corresponding author email: [uduevbolo.kate@iuokada.edu.ng](mailto:uduevbolo.kate@iuokada.edu.ng)

Received 2 May 2024; Accepted 27 May 2024; Published 5 June 2024

**ABSTRACT:** Nosocomial infections, also known as Health Care Associated infections (HAIs), pose a significant global health challenge, leading to severe complications for hospitalized patients and contributing to increased morbidity, mortality, and health care costs. This issue is of paramount concern for both patients and health care providers, as these infections are prevalent in both developed and developing countries. Statistics indicate that approximately 7% of hospitalized patients in developed countries and 16% in developing countries are diagnosed with HAIs. The higher prevalence in developing countries can be attributed to various factors such as inadequate infection control practices due to the absence of comprehensive infection control policies and guidelines, as well as insufficient surveillance, overcrowding, limited resources, poor sanitation, and inadequate management of hospital waste. Addressing these challenges is crucial in mitigating the impact of HAIs and improving patient outcomes in health care settings globally. Hospital-acquired infections are a significant concern during a patient's hospital stay, often leading to prolonged hospitalization, increased disability, and a substantial economic burden. Common infections include central line-associated bloodstream infections, catheter-associated urinary tract infections, surgical site infections, and ventilator-associated pneumonia. The pathogens responsible for these nosocomial infections encompass bacteria, viruses, and fungal parasites. Patients are at risk of exposure to these pathogens from various sources within the hospital environment, including healthcare staff and other infected patients. This highlights the importance of stringent infection control measures to minimize the risk of hospital-acquired infections and ensure patient safety. Nosocomial infections, also known as hospital-acquired infections, can be effectively prevented through the implementation of infection prevention and control policies and guidelines. It is crucial to closely monitor the use of antimicrobials and address the issue of antimicrobial resistance. Adopting an antibiotic control policy is essential in this regard. Furthermore, the establishment of an efficient surveillance system at both national and international levels is imperative. Nurses, as front-line healthcare workers, along with all stakeholders in the healthcare system, must make concerted efforts to prevent and control nosocomial infections in hospitalized patients.

**Keywords:** Nosocomial infection, infection prevention, hand hygiene, surgical site infection

Citation: Uduevbolo, O. K. (2024). Prevention of Nosocomial Infection: The Experience of Nurses and the Barriers. *Direct Res. J. Public Health and Environ. Technol.* Vol. 9(2), Pp. 116-126, <https://doi.org/10.26765/DRJPHE01623857850>. This article is published under the terms of the Creative Commons Attribution License 4.0.

## INTRODUCTION

Nosocomial infections, also known as Hospital-Acquired Infections or Healthcare-Associated Infections (HAI), are infections that are typically not present or in the incubation stage at the time of admission, and are acquired after hospitalization, usually manifesting 48 hours after admission (Nwankwo, 2018). Surveillance of these infections is closely monitored by agencies such as the National Healthcare Safety Network (NHSN) of the Center for Disease Control and Prevention (CDC) in order to prevent HAI and improve patient safety. Examples of HAIs include Central Line-Associated Blood Stream Infections (CLABSI), Catheter-Associated Urinary Tract Infections (CAUTI), Surgical Site Infections (SSI),

Hospital-Acquired Pneumonia (HAP), Ventilator-Associated Pneumonia (VAP), and Clostridium Difficile Infections (CDI) (Boev and Kiss, 2017). In recent decades, hospitals have placed significant emphasis on addressing hospital-acquired infections, implementing robust infection tracking and surveillance systems, and adopting preventive strategies to mitigate the incidence of such infections. The impact of hospital-acquired infections extends beyond the individual patient level, with implications for the broader community due to their association with multidrug-resistant infections. It is imperative to identify patients with risk factors for these infections in order to effectively prevent and minimize

their occurrence (Habboush et al., 2023). Despite advancements in understanding and managing these illnesses, they continue to present a substantial threat to global public health. Even the provision of optimal clinical care can be compromised if patients acquire additional infections during their hospitalization. Nosocomial infections, defined as those occurring after 48 hours of hospitalization, are a focal point of various epidemiological surveillance systems, underscoring the significance of this timeframe in monitoring and addressing such infections (El-Gohary and Aljubouri, 2014).

According to Khan et al. (2017), a variety of microorganisms such as *Streptococcus spp.*, *Acinetobacter spp.*, *enterococci*, *Pseudomonas aeruginosa*, *Coagulase negative staphylococci*, *Staphylococcus aureus*, *Bacillus cereus*, *Legionella*, and members of the *Enterobacteriaceae* family are commonly associated with nosocomial infections. These pathogens can be transmitted through person-to-person contact, shared objects and surfaces, the surrounding environment, contaminated water and food, infected individuals, and the skin of healthcare workers. It is crucial for healthcare facilities to implement rigorous infection control measures to prevent the spread of these microorganisms and protect both patients and staff from nosocomial infections.

Nosocomial infections, also known as hospital-acquired infections, can originate from various sources including the external environment, other infected patients, or potentially contaminated healthcare workers. In some cases, the microorganism responsible for the infection may stem from the patient's own skin microbiota and opportunistically cause illness following medical procedures that compromise the skin's natural defense mechanisms. Despite the origin of the infection, it is classified as nosocomial due to its occurrence within a healthcare facility (Monegro et al., 2013). Reliable global data on the prevalence of nosocomial infections is limited, although the World Health Organization (WHO) estimates that approximately 15% of hospitalized patients are affected. These infections contribute to 4-56% of neonatal deaths, with particularly high incidence rates of 75% in regions such as South-East Asia and Sub-Saharan Africa.

The incidence of nosocomial infections varies significantly between high-income countries, where it ranges from 3.5% to 12%, and middle- and low-income countries, where it ranges from 5.7% to 19.1%. Moreover, in developed nations, the prevalence is reported to be 15% among hospitalized patients, but it can be as high as 37% among patients admitted to the Intensive Care Unit (Iliyasu et al., 2016). In Africa, the prevalence of nosocomial infections is relatively high, although the available data are limited. A systematic review and meta-analysis of studies conducted between

2000 and 2018 estimated the prevalence of nosocomial infections in Africa to be 12.2% (95% confidence interval, 9.8-14.8%) (Alemu et al., 2020).

The prevalence of nosocomial infections in Nigeria has been found to be significant, with a reported overall prevalence of 20.2% according to a meta-analysis conducted in the country. These infections, including surgical site infections, urinary tract infections, and bloodstream infections, contribute substantially to morbidity and mortality among hospitalized patients. Moreover, they are associated with increased healthcare costs and prolonged hospital stays. Efsthathiou et al. (2019) have highlighted the lack of knowledge and awareness among patients as one of the primary reasons for the high incidence of nosocomial infections in hospital settings.

It is suggested that well-informed and knowledgeable patients are more likely to take precautions to prevent such infections. These findings underscore the importance of patient education and awareness in mitigating the burden of nosocomial infections in healthcare facilities.

The reduction of nosocomial infections is a global priority, and various approaches have been recommended to achieve this, including the implementation of infection prevention and control measures, prudent use of antibiotics, and the promotion of patient education and engagement (Adejumo et al., 2020). Healthcare-associated infection (HCAI) is a prevalent complication in healthcare management, posing a serious health risk by increasing patients' morbidity and mortality, prolonging hospital stays, and escalating associated costs. Effective infection prevention and control play a pivotal role in delivering high-quality healthcare to patients and ensuring a safe working environment for healthcare professionals. It is imperative to minimize the risk of infection transmission to patients and staff within hospitals through the implementation of robust infection control programs. The prevention and control of infections are essential for the efficient functioning of the healthcare system and constitute a significant aspect of modern healthcare (Jeyasheelan et al., 2020). Preventing HCAI in patients is a collective concern within healthcare facilities and is the responsibility of all individuals and services involved in healthcare provision.

## Objectives

Outline the infection prevention and control measures, and the strategies to prevent nosocomial infections.

Review the experience of Nurses on nosocomial infection.

Describe the barriers to prevention of nosocomial infection.

## LITERATURE REVIEW

### Conceptual review

Nosocomial infections, derived from the Latin term nosocomium meaning hospital infection, refer to infections that occur in hospital inpatients and were neither present nor in the incubation stage at the time of the patient's admission to the hospital. Due to the challenges in determining the presence of an incubating infection, a practical approach is to consider any bacterial infection as nosocomial if it becomes evident 48 to 72 hours after admission. These infections have a significant impact on global healthcare, leading to increased mortality rates and financial burdens. According to the World Health Organization (WHO), hundreds of millions of patients worldwide experience nosocomial infections annually, making them a major contributor to illness and mortality (WHO, 2019).

Nosocomial infections are a significant concern in Nigeria, largely attributed to inadequate infection prevention and control measures, limited resources, and a lack of awareness, as well as suboptimal perception and knowledge among healthcare professionals and patients. Moreover, the excessive use of antibiotics in the country has led to the proliferation of antibiotic-resistant bacteria, further complicating the management of nosocomial infections (Chukwu et al., 2020). Addressing these multifaceted challenges requires a concerted effort to improve healthcare practices, resource allocation, and public education to effectively mitigate the burden of nosocomial infections in Nigeria.

### Etiology/risk factors for hospital acquired infection

The risk factors for hospital-acquired infections is dependent on the infection control practices at the facility, the patient's immune status, and the prevalence of the various pathogens within the community. The risk factors for HAI include:

- i. Immunosuppression,
- ii. Older age,
- iii. Neonate
- iv. Length of stay in the hospital,
- v. Multiple underlying comorbidities,
- vi. Frequent visits to healthcare facilities,
- vii. Mechanical ventilatory support,
- viii. Recent invasive procedures,
- ix. Indwelling devices, and stay in an intensive care unit (ICU).

### Types of Healthcare-Associated Infections (HAIs)

Some types of HAIs are related to the procedures or devices used to provide healthcare. These include:

### Central line-associated bloodstream infection (CLABSI)

A central line, also called a central venous catheter, is placed into a major vein near your heart to give medicines and take blood (Bell and O'Grady, 2017).

### Surgical site infection (SSI)

These infections happen when you have surgery. They can be in your skin or deeper within your body and more serious.

### Catheter-associated urinary tract infection (CAUTI)

Catheter-associated urinary tract infection (CAUTI) presents a significant challenge within healthcare settings. The use of catheters to aid urine drainage substantially elevates the risk of urinary tract infections (UTIs), which are the most prevalent type of healthcare-associated infection (HAI) affecting the kidneys, bladder, urethra, and ureters. Alarming, approximately 75% of these UTIs can be attributed to catheter use, particularly when the catheter is in place for an extended period. It is imperative to prioritize the implementation of effective strategies aimed at minimizing the occurrence of CAUTI and mitigating its impact on patient health (Flores-Mireles et al., 2019).

### Ventilator-associated pneumonia (VAP)

Ventilator-associated pneumonia (VAP) is a significant concern within healthcare settings, particularly for patients who require mechanical ventilation. The utilization of a ventilator, along with associated tubes, can create a pathway for pathogens to infiltrate the lungs, ultimately leading to the onset of pneumonia. This risk is further amplified in instances where the tubes are employed to administer oxygen directly to the lungs. The identification of healthcare-associated infections (HAIs) such as VAP necessitates a comprehensive understanding of the specific pathogens responsible for instigating these infections. A variety of infectious agents are commonly implicated, each presenting distinct challenges in terms of prevention and treatment. It is essential for healthcare professionals to maintain a vigilant approach in monitoring and addressing the risk factors associated with VAP and other HAIs, thereby ensuring the safety and well-being of patients.

### Gram-negative bacteria

Gram-negative bacteria are known for causing a range of infections, including pneumonia, bloodstream infections, and meningitis. One notable example is Acinobactere infections, which are typically associated with healthcare

facilities. These infections can pose a significant risk to patients and require careful management and treatment. It is important for healthcare providers to remain vigilant in identifying and addressing Gram-negative bacterial infections to ensure the best possible outcomes for affected individuals.

**Clostridioides difficile** (*C. diff*): which is a germ that can cause colon inflammation and a very contagious form of diarrhea.

### **Methicillin-resistant *Staphylococcus aureus* (MRSA)**

Methicillin-resistant *Staphylococcus aureus* (MRSA) is a type of infection that has developed resistance to commonly used antibiotics such as penicillin, amoxicillin, and methicillin. In non-healthcare settings, MRSA typically manifests as a skin infection. However, within healthcare facilities, MRSA infections can be severe and potentially life-threatening. In addition to MRSA, there are other types of infections that have developed resistance to different classes of antibiotics, including carbapenem and vancomycin. These infections present a significant challenge in the treatment of bacterial diseases and require careful management and monitoring to prevent further spread and complications.

**Hepatitis:** a group of viral infections that affect the liver and are easily transmitted in healthcare facilities.

### **Treatment / Management**

In the realm of managing hospital-acquired infections, adherence to standard goal-directed therapy is of paramount importance, as emphasized by Cilloniz et al (2019). This entails the timely intervention for sepsis, administration of appropriate antibiotics, fluid resuscitation, and vigilant monitoring for signs of organ dysfunction. After the implementation of fluid resuscitation, it is imperative to conduct regular assessments of both clinical and hemodynamic responses. The selection and timing of antibiotic therapy initiation are critical components of treatment. The choice of empiric antibiotics should be based on the presence of risk factors for multidrug-resistant (MDR) pathogens and the overall clinical stability of the patient.

(a) Antibiotics should be started early within an hour if possible, and if central line-associated bloodstream infection is suspected, two sets of blood cultures, one from a peripheral venous site and the other from the central venous catheter site, should be obtained before initiation of antibiotic therapy.

(b) In case of hypotension, hypoperfusion, or organ dysfunction, the catheter must be removed without delay, and the tip should be sent for culture.

(c) When suspecting catheter-associated urinary tract infections, the old catheter must be removed, and a

(d) urine sample from the newly placed catheter must be obtained, preferably before initiating antibiotics.

(e) For catheter-associated UTIs, seven days of antibiotics are typically recommended. However, in case of a delayed response or bacteremia, the antibiotic course could be extended to 10 - 14 days.

(f) Reducing usage, minimizing dwelling, antimicrobial catheters, and antibiotic prophylaxis in certain situations help in the prevention of CAUTI.

(g) For *Clostridium difficile* infections, oral vancomycin is usually the drug of choice and sometimes might need altering the underlying antibiotics regimen for primary infection. Metronidazole is an alternative medication. Newer medications include fidaxomicin (Al-Momami et al., 2018).

(h) Proper hand hygiene and appropriate infection prevention strategies need to be followed while caring for surgical sites postoperatively.

(i) Also, antibiotic prophylaxis and skin decontamination are important factors in the prevention of SSI.

(j) Universal standard (infection control) measures, such as hand washing with soap and water or using alcohol-based disinfectant before and after each patient visit, are vital in reducing rates of transmission of MDR pathogens.

### **Complications**

Sepsis

Meningitis

Endocarditis

Osteomyelitis

Peritonitis

ARDs

### **Routine of acquisition of nosocomial infections**

#### **Infection from index patient's own microbiota:**

(a) Surgical site infections caused by skin bacteria, especially *S. aureus*, introduced into the surgical wound at or soon after surgery.

(b) Catheter-associated urinary tract infections caused by Enterobacteriaceae (coliforms), such as *E. coli*, introduced into the bladder from the urethra during catheterization

#### **Direct patient transmission**

Respiratory infections resulting from direct patient transmission occur when oropharyngeal bacteria, such as *Streptococcus pneumoniae*, enter the lower respiratory tract due to factors such as impaired swallowing

coordination, decreased level of consciousness, endotracheal intubation, or respiratory toileting. These conditions can lead to the migration of bacteria from the mouth and throat to the lungs, increasing the risk of respiratory infections. It is important for healthcare professionals to closely monitor and address these risk factors to prevent the transmission of infections within healthcare settings.

### **Patient-to-patient transmission**

Pathogens can be transmitted directly between patients through:

Direct contact

Respiratory route

Through the shared use of contaminated medical devices  
From shedding of pathogens into the clinical environment

### **Healthcare workers as a source of infection:**

Healthcare workers can serve as a potential source of infection for patients under their care. This risk is particularly significant when considering healthcare workers who are infected or colonized with various pathogens. For example, surgeons who are carriers of blood-borne viruses such as hepatitis B and C pose a potential threat to patients undergoing surgical procedures. Additionally, ward staff members who are experiencing respiratory infections can also inadvertently transmit these illnesses to vulnerable patients. It is imperative for healthcare facilities to implement stringent infection control measures and regular screening protocols to minimize the risk of healthcare workers serving as a source of infection for patients.

### **Infections from the environment**

Infections from the environment can pose a significant risk to immune-compromised patients, particularly through the airborne spores of environmental fungi, such as *Aspergillus* species. These patients are especially vulnerable to such infections, and it is important to take measures to minimize their exposure to these environmental pathogens. Proper ventilation, air filtration, and infection control protocols can help reduce the risk of these infections and protect the health of immune-compromised individuals.

### **Strategies to prevent Healthcare-Associated Infections**

Healthcare-associated infections (HAIs) pose a significant risk to patients receiving medical care, particularly those with medical devices or undergoing surgical procedures (Figure 1). Fortunately, the majority of these infections are preventable.

**Official Publication of Direct Research Journal of Public Health and Environmental Technology: Vol. 9, 2024, ISSN 2734-2182**

Over the past decade, there have been significant advancements in the prevention and management of HAIs, driven by legislative, regulatory, and organizational initiatives. Despite these improvements, there remains a gap between the evidence-based strategies for prevention and their implementation in clinical practice, particularly in terms of healthcare workers' behavior. Addressing this gap is crucial for effectively reducing the incidence of HAIs and improving patient safety in healthcare settings (Figure 1).

### **Hand hygiene**

Proper hand hygiene is paramount in healthcare settings as it is the most effective, straightforward, and cost-efficient method for mitigating the prevalence of Healthcare-Associated Infections (HAIs) and curbing the transmission of antimicrobial resistance (AMR). Thorough hand cleaning among healthcare workers plays a pivotal role in preventing the dissemination of microorganisms, particularly those that have developed resistance to antibiotics, posing significant challenges in treatment.

The 5 Moments for World Health Organization (WHO) hand hygiene approach defines the key moments when health-care workers should perform hand hygiene.

1. Before touching a patient,
2. Before clean/aseptic procedures,
3. After body fluid exposure/risk,
4. After touching a patient, and
5. After touching patient surroundings.

Despite the widely recognized importance of hand hygiene in mitigating the spread of pathogenic microorganisms, there continues to be suboptimal compliance with hand hygiene protocols in numerous healthcare environments globally. Within many healthcare facilities, adherence to prescribed hand-washing guidelines remains unacceptably deficient. Hand hygiene serves as a reflection of individuals' awareness, attitudes, and practices pertaining to infection prevention and control.

### **Environmental hygiene**

Environmental hygiene is a critical component of infection prevention within healthcare facilities. Contaminated surfaces in hospitals are known to contribute significantly to the spread of microorganisms, including dangerous pathogens such as *Clostridium difficile*, Methicillin-Resistant *Staphylococcus Aureus* (MRSA), and Vancomycin-Resistant Enterococci (VRE). It is essential to maintain proper hygiene of surfaces and equipment that come into contact with both patients and healthcare personnel in order to minimize the risk of exposure. Research indicates that hospitals can serve as a

## strategies to prevent healthcare-associated infections

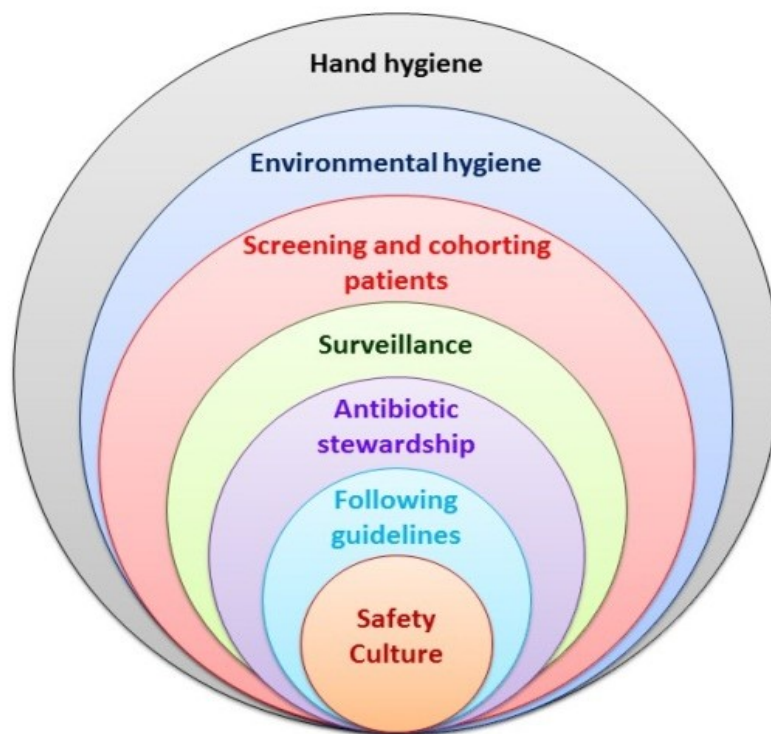


Figure 1: Strategies to prevent Healthcare-Associated Infections  
Khan, Baig & Mehboob, 2017.

significant reservoir for a variety of nosocomial pathogens, present in areas such as surfaces, medical equipment, and water systems. Therefore, stringent measures to ensure cleanliness and disinfection are crucial in preventing the transmission of infections within healthcare settings. Healthcare settings are multifaceted environments with numerous critical factors to consider. Microbial contamination can originate from inpatients, their relatives, and healthcare workers alike. The primary goal of environmental hygiene is to diminish the presence of infectious agents on surfaces and mitigate the potential for microorganisms to be transferred from one individual or object to another. By doing so, the aim is to minimize the risk of cross-infection within healthcare facilities.

### Screening and cohorting patients

Early detection of multidrug-resistant organisms is a crucial element in the implementation of any effective infection control program. Extensive evidence supports the practice of actively screening preoperative patients for Methicillin-Resistant Staphylococcus (MRSA) and subsequently decolonizing carriers, which has been

shown to significantly reduce postoperative MRSA infections. Decolonization with nasal mupirocin has proven to be particularly effective in this regard. In addition, surveillance cultures for Carbapenem-Resistant Enterobacteriaceae (CRE) have been recommended as part of a comprehensive strategy to combat its spread. Active screening for CRE through rectal surveillance cultures has demonstrated high effectiveness when integrated into a broader infection control initiative within healthcare facilities. The isolation or cohorting of colonized or infected patients remains a fundamental aspect of infection prevention and control, further emphasizing the importance of these measures in combating multidrug-resistant organisms.

The primary purpose of patient isolation is to prevent the transmission of microorganisms from infected or colonized patients to other individuals within a healthcare setting, including other patients, hospital visitors, and healthcare workers. This measure is crucial in halting the potential spread of highly resistant bacteria from one patient to another. While isolation measures are essential components of any comprehensive infection prevention and control program, their consistent and rigorous

application is often hindered by factors such as cost, time requirements, and patient discomfort. Nonetheless, the implementation of effective isolation protocols remains imperative in safeguarding the well-being of both patients and healthcare personnel.

### **Surveillance**

It is widely acknowledged that surveillance systems allow the evaluation of the local burden of HAIs and AMR and contribute to the early detection of HAIs including the identification of clusters and outbreaks. Surveillance systems for HAIs are an essential component of both national and facility infection prevention and control programs. National surveillance systems should be integral to a public health system. However, recent data on the global situational analysis of AMR, showed that many regions reported poor laboratory capacity, infrastructure, and data management as impediments to surveillance.

### **Antibiotic stewardship**

Optimal infection control programmes have been highlighted as critical components of any complete AMR management plan, especially by reducing the spread of resistant microbes among patients. The successful control of AMR in acute care institutions, however, necessitates judicious antibiotic administration. Antibiotic stewardship programmes (ASPs) can help reduce antibiotic use, reduce *Clostridium difficile* infections, and save healthcare expenditures.

The primary goal of most antibiotic stewardship programmes is to avoid the emergence of antibiotic resistance while affecting various organisms at the same time. Thus, ASPs can primarily be considered in terms of horizontal infection prevention. Additionally, ASPs can help avoid surgical site infections by optimizing the use of surgical antibiotic prophylaxis.

### **Following guidelines**

A good infection prevention programme requires staying up to date on the most recent information about the transmission of illnesses and preventative techniques. While many infection control treatments focus on minimizing organism transmission, it is equally crucial to discover risk-reduction methods. Both the World Health Organization (WHO) and the Centres for Disease Control and Prevention (CDC) have recently issued guidelines for preventing surgical site infections (SSIs). However, knowledge, attitude, and awareness of infection prevention and control strategies are frequently lacking, and there is a significant gap between the best evidence and clinical practice in terms of SSI prevention. Despite data supporting the usefulness of best practices, many

physicians do not follow them, and evidence-based processes and techniques that have been shown to lower the incidence of SSIs are underutilized in everyday practice.

### **Patient safety**

Patient safety is defined as the absence of preventable injury to a patient during the course of health care and the decrease of the risk of unnecessary harm connected with health care to an acceptable level. Improving patient safety in today's global hospitals necessitates a systematic approach to combating healthcare-associated infections (HAIs) and antibiotic resistance. They complement one another. A concerning rate of increase is being seen in the prevalence of healthcare-associated infections (HAIs), including catheter-associated urinary tract infections, hospital-acquired/ventilator-associated pneumonia, surgical site infections, and *C. difficile* infections. Aside from lengthening hospital stays and requiring additional diagnostic and therapeutic interventions, which add to the costs already associated with the patient's underlying disease, these infections arise during medical treatment and cause serious illnesses and deaths in patients (morbidity and mortality).

### **Experiences/roles of the nurse on nosocomial infection prevention**

Infection prevention has been a primary priority in the field of patient safety. Infection preventionists often provide a variety of services to healthcare organizations; however, the nurse who provides care at the bedside has the most direct impact on infection prevention, resulting in better patient outcomes. The nurse is the member of the healthcare team in charge of implementing infection prevention techniques for the patient. Some of the most basic tactics that lead to positive patient outcomes include:

### **The practice and promotion of hand hygiene**

The most effective technique to minimize infection transmission is through proper hand cleanliness. Healthcare workers' hands are the most prevalent means of transmitting healthcare-associated infections from patient to patient and within the hospital setting. Hand hygiene is the most effective way to prevent the spread of antibiotic resistance and HAIs, however most healthcare workers do not follow best practices. Hand hygiene can help minimize the spread of HAIs by conducting it before and after each patient encounter, after contact with environmental surfaces and equipment/medical devices, and before and after donning gloves. It is critical to cultivate the habit of frequently completing hand hygiene when doing patient-care duties and procedures or

handling medical devices and equipment.

### **Consistent use of aseptic technique**

Aseptic technique refers to a collection of specialized practices and processes that are carried out under precisely regulated settings in order to reduce pathogen contamination. It is used to achieve and maintain asepsis (the absence of pathogenic organisms) in the clinical setting. The aseptic approach protects the patient from infection and limits the spread of microorganisms.

### **Cleaning and disinfection practices**

In the healthcare setting, it is common for nurses and other healthcare workers to utilize medical devices on multiple patients. It is imperative that these devices are thoroughly cleaned and disinfected between each use to mitigate the risk of pathogen transmission. Research has demonstrated the resilience of pathogens on environmental surfaces within the healthcare environment, with some remaining viable for weeks. This underscores the importance of diligent cleaning practices to prevent potential transmission of infections. There is a concern among housekeeping staff regarding potential damage to the equipment, leading to avoidance of handling such devices. Consequently, pathogens and dust can accumulate, creating a potential vector for the spread of infection. It is essential for all healthcare personnel to recognize the critical role of proper cleaning and disinfection protocols in maintaining a safe and hygienic environment for patient care.

### **Use of standard precautions**

Standard precautions are essential for infection control and prevention in all patient care settings. These precautions apply to the handling of blood, bodily fluids, secretions, and excretions, regardless of whether they contain visible blood. It is crucial for healthcare workers to utilize personal protective equipment (PPE) such as fluid-resistant cover gowns, disposable gloves, masks, and eye protection to ensure their safety while providing care. Proper removal of PPE followed by thorough hand hygiene is imperative to prevent the transmission of infections to other patients and staff. Healthcare organizations have a responsibility to provide this protective equipment to all healthcare workers at no cost. If such protection is not readily available in the workplace, it is essential to address this issue promptly.

### **Patient assessment and additional precautions**

Upon completing the initial nursing assessment of a patient, it is imperative to promptly notify the physician of any unexpected signs and symptoms.

This proactive approach not only reduces the transmission of infections but also expedites the initiation of appropriate patient treatment. As the primary point of contact for patients, nurses are often the first to identify and report any unanticipated symptoms, necessitating the implementation of strategies to mitigate the spread of infectious agents within the healthcare environment.

### **Patient education**

Patient education is an essential component of comprehensive healthcare delivery. Nurses play a pivotal role in imparting knowledge to patients and their families regarding their medical conditions and treatment plans. By providing clear explanations and rationale for various strategies and interventions, nurses empower patients to actively participate in their own care. Effective patient education not only promotes better understanding of the illness or disease process, but also contributes to improved health outcomes and overall well-being.

### **Use of safety devices**

Federal legislation in the form of Occupational Safety and Health Administration regulations requires the use of engineering and work practice controls to eliminate or minimize employee exposure to blood-borne pathogens. It's important to protect yourself from potential harm by using available safety devices when performing tasks or procedures requiring the use of sharps.

### **Removal of unnecessary invasive devices**

Nursing practice includes evaluating and reporting a patient's response to treatment. Removal of certain devices such as urinary catheters, central lines, and peripheral I.V. lines when the patient no longer needs them is important to returning patients to their optimum level of health and avoiding HAIs.

### **Use of bundle strategies for infection prevention**

The adoption of bundle strategies for infection prevention has been proposed as an effective approach to reducing healthcare-associated infections (HAIs) such as ventilator-associated pneumonia (VAP) and central line-associated bloodstream infection (CLABSI). Evidence has shown that the use of bundles can effectively decrease the incidence of these infections. For instance, the VAP prevention bundle includes measures such as elevating the head of the bed, implementing comprehensive oral care, and conducting sedation vacations. Similarly, the CLABSI prevention bundle focuses on best insertion practices, including the use of maximal barrier precautions during insertion, cleaning the site with chlorhexidine gluconate, and avoiding femoral

sites. The maintenance bundle for CLABSI prevention involves changing dressings regularly, scrubbing the needleless hub before accessing the site, and removing unnecessary lines. These bundle strategies offer a comprehensive and systematic approach to infection prevention in healthcare settings.

### **Fit for duty**

Communicable diseases can be transmitted to patients who are under the care of healthcare workers who report for work when they're ill. You have the responsibility to look after your own health to avoid compromising patient safety. Dedicated nurses struggle with making the decision to stay away from work when duty calls and they know their presence will be missed by their peers and patients. Fit for duty includes meeting basic physical requirements for safely performing essential functions of the job without compromising patient safety. This means that staff members are free of active symptoms such as fever, cough, sore throat, and gastrointestinal illness.

### **Barriers to prevention of nosocomial infections**

#### **All medical staff do not wash their hands when they should**

The single most important and effective means for preventing infections is proper hand hygiene. Unfortunately, this is a challenge for healthcare staff because of the demands of constant patient care. The advent and scientifically proven value of waterless alcohol-based hand gels, foams, and liquids has added a powerful weapon to the arsenal of effective hand hygiene products.

#### **There could be a delay in diagnosing the infection**

In the process of diagnosing infections, there may be delays due to the outsourcing of laboratory testing by hospitals. This can result in a delay in obtaining the necessary laboratory results, particularly for "stat" tests. While bacterial culture results typically take around forty-eight hours, gram stains offer a more rapid turnaround, providing valuable information for acute care infection control efforts. It's important to note, however, that gram staining does not provide definitive results, and final culture review is essential for accurate diagnosis and treatment adjustments if needed.

#### **There could be a delay in starting the right antibiotic**

Upon occasion, there may be a delay in commencing the appropriate antibiotic treatment. Initial treatment is often based on the anticipated causative organisms. Subsequently, upon receipt and review of culture results

by the physician, the treatment plan will be reassessed. It is important to note that certain organisms may exhibit resistance to specific antibiotics. In the event of resistance, a change in antibiotic therapy is warranted. Resistance is characterized by the lack of effectiveness of an antibiotic in slowing or eradicating the organism. Conversely, when an organism is sensitive to a particular antibiotic, it will be susceptible to its effects. It is worth noting that some healthcare providers may inadvertently prescribe an incorrect antibiotic or dosage due to insufficient knowledge or failure to consult the culture and sensitivity report when available.

#### **There are strains of bacteria and viruses that are not killed by antibiotics**

The "super bugs" may invade a patient's body and cause death. Antibiotics are lifesaving and at the same time lead to the development of microbial resistance to these drugs.

#### **There are multiple opportunities for staff (or the patient) to transmit the organism from the patient to someone else**

In the hospital setting, there are several opportunities for both staff and patients to inadvertently transmit infectious organisms to others. While accommodations can be made for patients requiring isolation, it is important to recognize that a hospital stay is temporary, and patients may need to leave their rooms for various reasons such as therapy, diagnostic tests, and surgery. Additionally, patients may also need to visit other patients, use common areas like the lounge, or even go to the cafeteria, all of which can complicate efforts to control infections. Therefore, patient transport to different locations within the hospital presents challenges in infection control that must be carefully managed.

#### **Treatment of infections is expensive**

Another barrier includes the costs of medical care, which have risen at the same time payments for care provided have declined. Coincidentally, patients in hospitals today tend to be much sicker; and people living longer increases subjection to chronic diseases, often requiring more sophisticated and costly care. This conundrum demands greater resource availability, yet less is available.

#### **Staffing for most infection control departments is limited and can be another major barrier to fighting infections**

For years the infection control community has unsuccessfully attempted to identify the proper infection

control specialists and epidemiologist-to-patient ratio, as health care is in constant flux.

### **The art and science of acute care infection control is far more complex than it was in the 1960s**

The landscape of acute care infection control has evolved significantly since the 1960s, when the focus was primarily on hospital-acquired infections of penicillinase-producing staphylococci. The advent of intensive care units and the treatment of critically ill patients, coupled with the challenges associated with longer life expectancy and compromised immune systems, has greatly increased the complexity of infection control in acute care settings. While advancements in medical technologies and interventions have undoubtedly improved patient outcomes, they have also introduced new risks for additional infections and complications. As a result, the art and science of acute care infection control has become a multifaceted and demanding endeavor.

#### **Implication to nursing**

##### **Protection of health care workers**

Healthcare worker safety, especially for nurses, is paramount in the prevention of exposure to infectious agents. Adhering to standard precautions is crucial in creating a secure working environment. This includes maintaining proper hand hygiene, utilizing personal protective equipment (PPE) such as gloves, gowns, and masks, and ensuring the safe handling and disposal of sharps. These measures are essential in minimizing the risk of infection transmission and ensuring the well-being of healthcare workers.

##### **Prevention of healthcare-associated infections (HAIs)**

In the healthcare domain, the prevention of healthcare-associated infections (HAIs) is of paramount importance. These infections can spread through various pathways, such as from patient to patient, healthcare worker to patient, or vice versa. Nurses play a crucial role in implementing standard precautions to actively prevent the introduction and spread of infectious agents within healthcare settings. Through their efforts, they significantly contribute to reducing the incidence of HAIs and the resulting harm to patients. This proactive approach highlights the commitment of healthcare professionals to upholding a safe and healthy environment for both patients and staff.

##### **Enhanced patient safety**

Adherence to standard precautions is crucial in ensuring the safety of both healthcare workers and patients.

**Official Publication of Direct Research Journal of Public Health and Environmental Technology: Vol. 9, 2024, ISSN 2734-2182**

By consistently practicing proper hand hygiene, nurses play a key role in minimizing the risk of infection transmission among patients, especially in settings where individuals with various health conditions are being cared for. This unwavering dedication to safety is fundamental in upholding the well-being of all individuals within healthcare environments.

#### **Compliance with regulatory' bodies and guidelines**

Healthcare institutions are required to comply with guidelines and recommendations established by regulatory bodies to effectively control and prevent infections. It is essential for nurses to consistently adhere to standard precautions in order to meet these requirements and create a safe and compliant healthcare environment. Compliance with these regulations not only ensures the well-being of patients and staff, but also upholds the integrity of the healthcare institution.

#### **Public health impact**

The escalation of global pandemics, exemplified by the emergence of COVID-19, has underscored the critical significance of infection control and prevention. Nurses who steadfastly adhere to standard precautions play a pivotal role in safeguarding public health by averting the transmission of infectious diseases within the broader community (Sehulster and Chinn, 2023).

#### **Education and awareness**

Standard precautions are essential for educating healthcare workers and patients on infection control practices. Nurses, in particular, play a crucial role in providing education to their peers, patients, and families regarding the significance of hand hygiene, respiratory etiquette, and other preventive measures. This empowerment enables individuals to actively participate in their own healthcare and infection prevention efforts.

#### **Disease transmission prevention**

In order to effectively prevent the transmission of infectious diseases, it is imperative for nurses to strictly adhere to infection control procedures. This adherence is essential for minimizing the risk of infections spreading within healthcare settings, particularly among vulnerable individuals who may be more susceptible to infections. By following these procedures, nurses play a fundamental role in maintaining a safe and healthy environment and safeguarding the well-being of both patients and healthcare providers.

**Quality of care:** Infection control plays a crucial role in elevating the quality of care delivered by nurses.

Adhering to evidence-based guidelines enables nurses to proactively prevent infections, leading to increased patient satisfaction and bolstering trust in the healthcare system. This strong emphasis on infection control not only enhances patient outcomes but also underscores the commitment to providing high-quality care within the healthcare setting.

### Reduced healthcare costs

The implementation of robust infection control strategies by nurses can significantly reduce the burden of healthcare-associated infections. This, in turn, can lead to a decrease in extended hospital stays, the need for additional treatments, and ultimately result in reduced healthcare costs for both patients and healthcare facilities. By effectively preventing infections, nurses play a crucial role in contributing to cost savings within the healthcare system.

### Conclusion

Hospital-acquired infections pose significant risks to patients, leading to prolonged hospital stays and increased healthcare costs. These infections have been known to elevate morbidity and mortality rates. Nurses play a crucial role in preventing such infections through measures such as practicing proper hand hygiene, disinfecting the skin, wearing protective gear, and following standard precautions for infection control. Additionally, they must take precautions to avoid needlestick injuries and exposure to respiratory secretions. Through these diligent nursing practices and effective control measures, there has been a notable decrease in the occurrence of hospital-acquired infections.

### Recommendations/suggestion

Education of healthcare workers about infection control procedures, e.g hand washing using aseptic techniques when performing invasive procedure and securing catheters.

Disinfection of hospital rooms/wards and decreasing environmental contamination.

Healthcare team committee: consisting of a pharmacist should be established to ensure that the empirical use of antibiotics is not routine and ensuring that certain antibiotics cannot be used without prior approval from the committee.

### REFERENCES

Adejumo P, Edet A, Okpokoro E (2020). Factors influencing

- patients' adherence to infection prevention and control practices in a Nigerian teaching hospital. *J. Hosp. Infect* 202G;104(2):221.
- Al-Momani LA, Abughanimeh O, Boonpheng B, Gabriel JG, Young M (2018). Fidaxomicin vs Vancomycin for the Treatment of a First Episode of Clostridium Difficile Infection: A Meta-analysis and Systematic Review. *Cureus*. 2018 Jun 11;10(6):e2778.
- Alemu W, Belachew T, Yimam Y (2020). Healthcare-associated infections and their determinants among patients admitted to general hospitals in Ethiopia: A systematic review and meta-analysis. *BMC Infect. Dis.* 2020;20(1):178. doi: 10.1186/s12879-020-05237-7.
- Bell T, O'Grady NP (2017). Prevention of Central Line-Associated Bloodstream Infections. *Infect Dis Clin North Am.* 2017 Sep;31(3):551-559.
- Boev C, Kiss E (2017). Hospital-Acquired Infections: Current Trends and Prevention. *Crit Care Nurs Clin North Am.* 2017 Mar;29(1):51-65.
- Centers for Disease Control and Prevention. *Diseases and Organisms in Healthcare Settings. Health-Care Associated Infections (HAIs)*. (2016). <https://www.cdc.gov/hai/organisms/>. Accessed 5 June 2023.
- Chukwu EE, Oladele DA, Awoceru OB, Afocha EE, Lawal RG, Abdus-Salam I, (2020). A national survey of public awareness of antimicrobial resistance in Nigeria. *Antimicrob. Resist Infect Control* 2G20;9[1J]:72. doi: 10.1186/s13756-020-00739-0.
- Cillóniz C, Dominedó C, Torres A (2019). An overview of guidelines for the management of hospital-acquired and ventilator-associated pneumonia caused by multidrug-resistant Gram-negative bacteria. *Curr Opin Infect Dis.* 2019 Dec;32(6):656-662.
- Efstathiou G, Papastavrou E, Raftopoulos V, Merkouris A (2019). Patients' perceptions and knowledge of healthcare-associated infections: A literature review. *Am. J. Infect Control.* 2019;47(12):1478-1484.
- El-Gohary MA, Aljubouri S (2014). Neonatal appendicitis with perforation: A case report. *J. Pediatr. Surg. Case Rep.* 2014;2(7):353-354. doi: 10.1016/j.epsc.2014.07.008.
- Flores-Mireles A, Hreha TN, Hunstad DA (2019). Pathophysiology, Treatment, and Prevention of Catheter-Associated Urinary Tract Infection. *Top Spinal Cord Inj Rehabil.* 2019 Summer;25(3):228-240.
- Habboush Y, Yarrarapu SNS, Guzman N (2023). *Infection Control. StatPearls [Internet]. StatPearls Publishing; Treasure Island (FL): Sep 4, 2023.*
- Jeyasheelan V, Suga S, Myneni S, Ravikumar D, Kumar M, Sivagnanam P, (2020). Knowledge and perception on prevention of hospital acquired infections [HAI] among health care professionals in tertiary care teaching hospital. *J. Pure Appl Microbiol.* 2020;14(14):1527-1536. doi: 10.22207/JPAM.14.2.51.
- Khan HA, Baig FK, Mehboob R (2017). Nosocomial infections: Epidemiology, prevention, control and surveillance. *Asian pac. J. Trop. Biomed.* 2017; 7:478-482.
- Iyasu G, Dayyab FM, Habib ZG, Tihamiyu AB, Abubakar S, Mijinyawa MS, (2015). Knowledge and practices of infection control among healthcare workers in a Tertiary Referral Center in North-Western Nigeria. *Ann. Afr. Med.* 2016;15[1]: 34-40. doi: 10.4103/1596-3519.161724.
- Nwankwo EO (2018). Epidemiology of healthcare-associated infections in Nigeria: A systematic review and meta-analysis. *BMJ Open.* 2018;8(6):e020431.
- World Health Organization. (2019). *Health Care Associated Infections Fact Sheet.* [https://www.who.int/gpsc/country\\_work/gpsc\\_ccisc\\_fact\\_sheet\\_en.pdf](https://www.who.int/gpsc/country_work/gpsc_ccisc_fact_sheet_en.pdf).