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PREVENTIVE NURSE ACTIONS AND RISK FACTORS ASSOCIATED WITH HEALTH CARE RELATED INFECTIONS: A NARRATIVE REVIEW

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Abstract: In Brazil, it is estimated that 3% to 15% of hospitalized patients develop some kind of Healthcare-Associated Infection (HAI). The vast majority of HAIs are caused by an imbalance in the relationship between the normal human microbiota and the host's defense mechanisms and can affect both patients and healthcare professionals. Therefore, in this narrative review we sought to identify the main infection risk factors related to healthcare and list the main preventive actions taken by nurses within the hospital environment to avoid HAIs. The different risk factors related to healthcare in hospitalized adult patients found in the selected studies were described according to the sites of infection: urinary tract, primary bloodstream infection, surgical site and respiratory tract. And we list four practices that meet a consensus regarding some basic elements necessary for the prevention of HAIs. We can conclude that nurses' actions are essential for both the detection and prevention and control of HAIs.

INTRODUCTION

Hospital Infection (HI) is defined by decree number: 2,616/1998 of the Ministry of Health (MS), as that "acquired after the patient's admission and which manifests itself during hospitalization or after discharge, when it can be related to hospitalization or hospital procedures"[1]. Today IH is incorporated into the concept of Healthcare-Associated Infections (IRAS)[2], and are characterized as a multifactorial public health problem, as they are an important cause of morbidity, mortality, in addition to the costs related to them [3].

In general, the main HAIs are Urinary Tract Infections (UTI), Primary Bloodstream Infections (IPCS), Surgical Site Infections (SSI) and Respiratory Tract Infections. (ITR)[4].

The risk factors related to HAIs are caused by an imbalance in the relationship between the normal human microbiota and the host's defense mechanisms. This is due to the patient's underlying disease, invasive procedures [5] prolonged hospitalization, use of vasoactive drugs and frequent and prolonged use of devices such as: central venous catheter, bladder catheter and mechanical ventilation [6-8], in addition to being a predictor of mortality [7,8].

In ICU patients, the factor of prolonged hospital stay is added, which means that they have higher costs compared to other patients, in addition to increasing the risk of death.5 Another risk factor to be considered is the change in microbial population, generally induced by the use of antibiotics5. In this context are bacteria resistant to multiple antibiotics, popularly known as "superbugs" such as: *Klebsiella Pneumoniae Carbapenemase* (KPC), *Staphylococcus aureus*, *Streptococcus pneumoniae*, *Acinetobacter baumannii* [9].

The COVID-19 pandemic and other major disease outbreaks have exposed the challenges and failures in healthcare environments to prevent infection control, contributing to their spread, harming patients, healthcare professionals and visitors[10]. In addition to other less visible health emergencies such as healthcare-associated infections (HAIs) and antimicrobial resistance (AMR), which harm patients every day in all healthcare systems. In this sense, in 2022 the World Health Organization launched the first report on infection prevention and control, which showed that of patients hospitalized for intensive care, 7% of these in high-income countries and 15% patients in low- and middle-income countries will acquire at least a healthcare-associated infection during your hospital stay. On average, one in 10 affected patients will die for this reason[10].

The conditions for preventing and controlling HAIs have been presented as a parameter for evaluating health services and

reflecting the quality of care provided. [11]. Where good hand hygiene and other cost-effective practices are adopted, 70% of these infections can be prevented [10]. Risk factors, especially in the ICU, cause HAIs to have higher costs compared to other patients, in addition to increasing the risk of death [7]. The increase in costs for adult patients with infections reaches 2.8 times greater, while, in children, the increase is 4.2 times greater.

Although necessary, actions to expand preventive care are still scarce, such as adequate physical structure, nurse actions such as correct hand hygiene, use of personal protective equipment and continuing education[12,13]. Thus, as the knowledge and identification of risk factors for infection, especially in adult patients admitted to the ICU, to improve the nursing diagnosis for the risk of infection and establish a plan for the prevention and treatment of HAIs in adult patients hospitalized in clinical units and surgical [14].

Based on the above, the objective of this article was to carry out a literature review to identify the main infection risk factors related to healthcare and list the main preventive actions taken by nurses within the hospital environment to avoid HAIs.

MATERIAL AND METHODS

This narrative literature review compiled and discussed original, epidemiological articles, narrative and systematic reviews on the topics of nurses' preventive actions in HAIs and risk factors for infection related to health care. The search in the scientific literature was carried out with the Boolean operators AND / OR, using keywords such as "hospital infection", "multi-resistant bacteria", "microbial resistance to antibiotics", "HAI prevention", "control of hospital infections", "intensive care unit", "health care infection", "hospital infection management". The inclusion criteria were articles that addressed the risk factors for HAIs in adults over 18 years of age, of both sexes, hospitalized; and articles that addressed and listed nurses' preventive actions published in Portuguese, English and Spanish. The excluded articles were editorials, theses, dissertations, experience reports, event summaries and book chapters. The databases were: Virtual Health Library, Medical Literature Analysis and Retrieval System online (PubMed), Excerpta Medica (Embase), SCOPUS, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Latin American Literature and Caribbean in Health Sciences (LILACS) and Scientific Electronic Library Online (SciELO).

RESULTS

With the topic of infection related to health care, risk factors and preventive actions, we found many studies. However, we selected 52 articles to compose this review. For better understanding, the different risk factors related to health care in hospitalized adult patients were described according to the sites of infection: urinary tract, primary bloodstream infection, surgical site and respiratory tract. As in the literature, there is no single method that meets the requirements for preventing HAIs, but there is a consensus regarding some necessary basic elements. In this study, four practices were listed that meet this consensus for the prevention of HAIs.

RISK FACTORS FOR HAIs

ICU nurses have a central role in the prevention and management of HAIs, as they are involved in basic hygiene care, clinical observation and monitoring of body sites sensitive to infection (for example, catheter insertion sites), as well as monitoring systemic signs of infection [15].

In this sense, there are scales that assess the severity of the risk of infection, which

can be applied by nurses. As is the case with the "Infection Risk Assessment Scale in Hospitalized Adults", also called the RAC (Rodriguez-Almeida-Cañon) scale. This type of instrument helps with prevention and guides the choice of the type of intervention[16].

Studies have shown that some risk factors for HAIs are related to clinical conditions and the patient's profile, such as advanced age, on average over 60 years old, is related to an increased risk of infection. [17,18,19,20,21,22] and mortality from infection increases from the age of 80, the other factors are related to interventions during the ICU stay [23].

In addition to age characteristics, males stand out as a population associated with a higher risk of healthcare-related acquired pneumoni.[24,25,26] The other HAIs are more common in males [24,27,21,28], together with cardiovascular comorbidities, probably due to the higher prevalence of cardiovascular diseases in this population [27].

RISK FACTORS URINARY TRACT INFECTIONS

Urinary Tract Infections (UTIs) are those that affect the patient's urinary system and comprise between 3% and 7% of all HAIs in an ICU. Age over 64 corresponds to an intrinsic factor, highly associated with an increase in this infection rate.[29,30,31,21,32] Evidence shows that 80% of UTIs are related to the use of a urinary catheter, and its presence is already considered an important and independent risk factor for the development of HAIs.[29,30,31] The length of stay with this device is also a relevant risk factor for UTI, increasing the risk rate of infection by 5% each day the catheter is used.[29,31] Microorganisms found in the urinary tract of individuals who develop a UTI while in intensive care are the *Candida sp* and *Klebsiella pneumoniae*[29,33] and *Acinetobacter baumannii*.[21]

RISK FACTORS FOR PRIMARY BLOODSTREAM INFECTIONS (IPCS)

IPCS are among the most common HAIs found in intensive care patients, with prevalence rates ranging from 4 to 49%.[34,35,31]. This variation depends on other associated risk factors, such as the presence of invasive devices, such as hemodialysis catheters.,[35,36,32] Venoarterial Extracorporeal Membrane Oxygenation (ECMO -*Extracorporeal Membrane Oxygenation*)[37]; central venous catheter [17,35,25,31,32] and arterial catheter.[31,32]. In addition, the length of time these catheters are in place, which exponentially increases the risk of developing HAIs.[24,14,31] However, many IPCS do not have a determined cause, being defined as idiopathic primary bacteremia [17].

RISK FACTORS FOR SURGICAL SITE INFECTIONS

Surgical Site Infections are those that develop in the surgical wound and adjacent tissues after surgery. Since the surgical procedure includes breaking the patient's tissue integrity, which in itself favors the development of HAI.[38] Risk factors for SSI were identified with the aim of formulating infection prevention protocols and programs in the transoperative and postoperative periods. Risk factors include: presence, location and time of use of drains in surgical wounds.[39]; and prolonged surgery time.[14,38] Moraes et al., 2020 describes that for every hour after the surgical procedure, the probability of developing infection doubles.[38]

RISK FACTORS FOR RESPIRATORY TRACT INFECTION

Respiratory tract infections include diseases of the patient's upper and lower airways and can be influenced by intrinsic and extrinsic risk factors. ICU patients often progress to a condition in which mechanical ventilation (MV) is necessary, due to impaired gas exchange due to pulmonary

and/or neurological injuries. Therefore, the use of mechanical ventilation and the length of time the tube is present constitute the main extrinsic risk factors for the development of respiratory tract infections.[14,40,41,42,21,32,22] As well as the greater risk of infection by resistant bacteria.[42]

In addition to the risk factors directed to specific sites, other risk factors stood out as predictors of more frequent infections, such as length of stay in the ICU [14,34,39,17,34,39,17,33,18,20,21,22], use of invasive devices [44,45,25,30,31,18,19,20,28,46], advanced age[17,18,19,20,21,22], comorbidities: diabetes mellitus [14,47,30,48,49,50], arterial hypertension [27], chronic obstructive pulmonary disease [32] and smoking.[51]

The identification of risk factors for infection in patients makes it possible to direct interventions with more assertive multidisciplinary approaches to achieve best practices and contribute to reducing the outcomes of HAI indicators [10].

The control of HAIs is considered the responsibility of all health professionals who provide direct care to patients, since the hospital environment constitutes a vast and excellent habitat for bacteria and viruses. [52]. Although HAI is an infectious process acquired in the hospital environment, most of the time its occurrence is due to factors such as inadequate hand washing, handling of materials and performance of techniques that do not respect the principles of asepsis and lack of strict control in the processing of products. sterilized materials, indiscriminate use of antibiotics. In this sense, Anvisa created the National Program for the Prevention and Control of Infections Related to Healthcare (PNPCIRAS), which aims to reduce, at a national level, the incidence of HAIs and Microbial Resistance (MR) in healthcare services, through implementing evidence-based infection prevention and control practices [3] (. The World Health Organization (WHO) report reveals that, where good hand hygiene and other cost-effective practices are adopted, 70% of these infections can be prevented [10].

In order of importance, the nurse's main actions to prevent HAIs are: (1) correct hand hygiene - washing hands with water and liquid soap, with or without antiseptic, and rubbing hands with alcoholic preparations; (2) correct use of personal protective equipment (PPE) during care - gloves, lab coat, sleeveless waterproof apron, eye protection (glasses or face shields) and mouth mucosa protection (masks, face shields); (3) training health professionals in the use of PPE on: which items are part of them (continuous use), when and where they must put on and take off, correct sequence of putting on and removing; (4) promote education and qualifications in infection prevention and control at all levels, from management to assistance.

FINAL CONSIDERATIONS

The nurse's role plays a crucial role in the process of preventing HAIs through the execution of simple practices during care, directly affecting the health of the patient and himself. As HAIs are expected to increase in the coming years as a result of intensified care, an aging population, the increasing prevalence of serious underlying illnesses in ICU patients, and the continued spread of multidrug-resistant organisms in the hospital and community.

It is through a practical and evidence-based approach that protects patients, healthcare professionals and visitors to healthcare facilities, preventing preventable infections, including those caused by antimicrobial-resistant pathogens, acquired during the provision of healthcare.

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