RESUMO

As infecções hospitalares apresentam, atualmente, elevada distribuição mundial e representam uma das possíveis causas de morte em pacientes hospitalizados. No Brasil, de acordo com o Ministério da Saúde, a taxa média de infecção hospitalar é de 15,5%. Em contrapartida, na Europa e nos Estados Unidos é cerca de 10%. Objetiva identificar produções nacionais e internacionais sobre os principais fatores de risco para infecção do trato urinário e respiratório em paciente internados na Unidade de Terapia Intensiva. Busca feita 2020, levantamento bibliográfico referente aos últimos cinco anos das publicações científicas das bases de dados Medical Literature Analysis and Retrieval System Online (MEDLINE), na Literatura Latino-Americana e do Caribe em Ciências da Saúde (LILACS) e no Banco de Dados em Enfermagem (BDENF). Utilizando os descritores “Infecção hospitalar” e “Unidade de terapia intensiva”, com o auxílio do operador boleano AND. Resultado: 10.164 trabalhos, destes 1.323 publicados nos últimos cinco anos, 1.511 nos idiomas inglês, português e/ou espanhol, 5.208 disponíveis, dos quais 1.323 se apresentaram em formato de arquivo. Verificou-se que os anos de publicação predominantes foram 2019 e 2015 com 6 artigos publicados em cada (30%), seguindo por 2016 com 5 (25%). Quanto ao idioma, 12 artigos (60%) foram publicados na língua inglesa e 8 em português (40%). Dentre as temáticas identificadas, há predominância de artigos referentes à infecção respiratória, 16 (80%), quando comparado à infecção urinária, 4 (20%), e nenhum artigo aborda as temáticas concomitante. Conclui-se que o uso de protocolos e padronização dos procedimentos são eficientes e que cada profissional é responsável por realizar medidas profiláticas e controle de infecções, ressaltando a importância da educação continuada.


ABSTRACT

Hospital infections currently have a high worldwide distribution and represent one of the possible causes of death in hospitalized patients. In Brazil, according to the Ministry of Health, the average rate of hospital infection is 15.5%. In contrast, in Europe and in the United States, it is about 10%. The study aims to identify national and international productions about the main risk factors for urinary and respiratory tract infection in patients admitted to the Intensive Care Unit. Search made in 2020, with a bibliographical survey referring to the last five years of scientific publications from the databases Medical Literature Analysis and Retrieval System Online (MEDLINE), Latin American and Caribbean Health Sciences Literature (LILACS) and Nursing Database (BDENF), using the descriptors

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“Hospital infection” and “Intensive care unit”, with the assistance of the Boolean operator AND. Result: 10,164 works, of which 1,323 published in the last five years, 1,511 in English, Portuguese and/or Spanish, 5,208 available, of which 1,323 were presented as file. The predominant publication years were 2019 and 2015 with 6 articles published in each (30%), followed by 2016 with 5 (25%). Regarding the language, 12 articles (60%) were published in English and 8 in Portuguese (40%). Among the identified themes, there is a predominance of articles referring to respiratory infection, 16 (80%), when compared to urinary infection, 4 (20%), and no article addresses the themes concomitantly. The use of protocols and standardization of procedures are efficient, and each professional is responsible for carrying out prophylactic measures and controlling infection, emphasizing the importance of continuing education.

Keywords: Hospital infection. Risk factors. Intensive care unit.

INTRODUÇÃO

In Brazil, Hospital Infection (HI) has drawn attention since the 1970s. Since then, the transmission of infectious diseases in the hospital environment began to be recorded, representing a concern for professionals in the health area. Issues such as aseptic techniques, postoperative infections, sterilization of materials and even microbial resistance were already part of publications at the medical and nursing levels back then (1-2).

The HI is currently highly distributed worldwide and represents one of the possible causes of death in hospitalized patients. In Brazil, according to the Ministry of Health, the average rate of hospital infection is 15.5% corresponding to 1.18 episode per client admitted by HI in Brazilian hospitals. In the global perspective, the healthcare-related infections correspond to 7% of patients in developed countries and 10% in developing countries, with urinary tract, surgical site, pneumonia and bloodstream infections as the most frequent (3-4).

According to the decree n. 2.616/98 of the Ministry of Health, the hospital or nosocomial infection is defined as any infection acquired in the hospital environment that manifests from 72h after admission, during or even after hospital discharge (5). The main risk factors for infections are related to the individual’s immune conditions, invasive methods of treatment and environmental exposure. In this context, critically ill patients present greater vulnerability to acquiring HI, which can strongly contribute not only to the high index of contamination, but also to the high prevalence of morbidity and mortality, requiring that the nursing and health staffs have essential knowledge about the control (6-7).

In this way, the infection becomes one of the major concerns found at hospital level, mainly in Intensive Care Units (ICU), where it is more prevalent and has an important factor involved in patients’ unfavorable outcomes (7). Thus, the nursing team that provides intensive care, the early recognition of conditions suggestive of infection is essential, because, in this way, interventions are guaranteed as effective and safe control measures. Nursing readily identifies in the ICU environment in which its activities are developed (8-4).

The main infections commonly found in patients who are under intensive care are the urinary infection or bacteriuria associated with the use of bladder probe, pneumonia due to mechanical ventilation and bacteremia associated with the presence of central venous access, all with very high morbidity and mortality (9-10).

In the Nursing field, the knowledge about the patients’ profile and the main risk factors for developing infections during hospitalization in the ICU, can assist in designing actions to be implemented with patients in critical condition, in addition to enabling the creation of instruments for evaluation of care indicators and measurement of nursing workload, as well as alert for labor practices that can negatively influence the patient’s health process (6-11).

According to the above, this study aims to identify, through this integrative literature review, what has been produced in national and international journals about the main risk factors for infection of the urinary and respiratory tracts in patients admitted to the Intensive Care Unit. The main contribution of this study is based on systematization and synthesis of the major risk factors indicated by the literature, stimulating new researches in this area and expanding the fields of care of the Nursing staff.

METHOD

This is an integrative review study with a qualitative approach. The analysis of these data allows developing a more comprehensive explanation of a specific phenomenon, in order to facilitate the comprehension of a relevant knowledge in current days (12).

The elaboration of the study was guided by the following question: What are the main risk factors for infection of the respiratory and urinary tracts in patients admitted to the Intensive Care Unit?

Data collection was carried out in January 2020, through a bibliographic survey for the past five years of scientific publications on databases: Medical Literature Analysis and Retrieval System Online (MEDLINE), in Latin American and Caribbean Health Sciences Literature (LILACS) and Nursing Database (BDENF). This library was chosen because of its scope and relevance of scientific publications in the health area. Data collection used the descriptors identified in DeCS: “Hospital infection” and “Intensive care unit”, with the aid of the Boolean operator AND. The inclusion criteria were: publications in the past five years (2015 – 2019), in English, Portuguese and Spanish, available for free download and as articles. The exclusion criteria were: theses and dissertations, other reviews of the integrative type, repeated articles and papers that did not meet the scope of this study.

The search resulted in 10,164 works, with 5,208 available, being 1,511 in English, Portuguese and/or Spanish, 1,323 published in the past five years. For the refinement of articles, there was the reading of the title, excluding the 1,286 articles that explicitly were not suited to the purpose and the criteria defined in this study. The second stage of refinement occurred with the reading of the 37 articles in their entirety.
excluding 14 they did not fit the theme, two were repeated and two were not complete. Therefore, 20 articles comprised the corpus of analysis of this study.

Figure 1: Synopsis of search and refinement of articles.
RESULTS AND DISCUSSION
For better understanding of the process of search and selection of the study sample, Figure 1 represents, schematically, the steps of the search and refinement process. The analysis of the articles found occurred through the construction of a table, Table 1, to synthesize the results covering aspects such as: title, year of publication, language, authors, journals of publication and article theme.

The predominant years of publication were 2019 and 2015 with 6 articles published in each (30%), followed by 2016 with 5 (25%). Regarding the language, 12 articles (60%) were published in English and 8 in Portuguese (40%). Among the themes identified, there is a predominance of articles related to respiratory infection, 16 (80%), when compared to the urinary tract infection, 4 (20%), no article discusses the thematic concomitantly.

Table 1 - Title, year of publication, language, authors, journal of publication and theme of the articles researched. Crato-CE, 2020.

<table>
<thead>
<tr>
<th>TITLE</th>
<th>YEAR</th>
<th>LANGUAGE</th>
<th>AUTHORS</th>
<th>JOURNAL OF PUBLICATION</th>
<th>THEME</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICU-acquired pneumonia: is it time to use this term?</td>
<td>2018</td>
<td>ENGLISH</td>
<td>TORRES, A.</td>
<td>Copyright © 2018 Wolters Kluwer Health, Inc. All rights reserved.</td>
<td>Respiratory Infection</td>
</tr>
<tr>
<td>Healthcare-associated respiratory infections in the intensive care unit can be reduced by a hand hygiene program: a multicenter study.</td>
<td>2018</td>
<td>ENGLISH</td>
<td>FINCO, G.; MUSU, M.; LANDONI, G. et al</td>
<td>Australian Critical Care 31</td>
<td>Respiratory Infection</td>
</tr>
<tr>
<td>Title</td>
<td>Year</td>
<td>Language</td>
<td>Authors</td>
<td>Journal/Academic Field</td>
<td>Infection Type</td>
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<tr>
<td>Diagnosis and Treatment of Ventilator-Associated Infection: Review of the Critical Illness Stress-Induced Immune Suppression (CRISIS) Prevention Trial Data.</td>
<td>2016</td>
<td>ENGLISH</td>
<td>WILLSON, D. F.; et al</td>
<td>Pediatric Critical Care Medicine</td>
<td>Respiratory Infection</td>
</tr>
<tr>
<td>The critical nurse work environment, physician staffing, and risk for ventilator-associated pneumonia</td>
<td>2016</td>
<td>ENGLISH</td>
<td>COSTA, D.K.; YANG, J.J.; MANOJOVICH, M.</td>
<td>American Journal of Infection Control</td>
<td>Respiratory Infection</td>
</tr>
<tr>
<td>Urinary tract infections in intensive care unit patients - a single-center, 3-year observational study according to the INICC project.</td>
<td>2016</td>
<td>ENGLISH</td>
<td>DUSZYNSKA, W.; ROSENTHAL, V.D.; SZCZESNY, A et al</td>
<td>Anaesthesiology Intensive Therapy</td>
<td>Urinary Infection</td>
</tr>
<tr>
<td>The effectiveness of a bundle in the prevention of ventilator-associated pneumonia.</td>
<td>2016</td>
<td>ENGLISH</td>
<td>FERREIRA, C. R.; et al</td>
<td>The Brazilian Journal of Infectious Diseases</td>
<td>Respiratory Infection</td>
</tr>
<tr>
<td>Infection control in delayed bladder catheterization in an intensive care unit.</td>
<td>2015</td>
<td>PORTUGUESE</td>
<td>CHAVES, N.M.O; MORAES, C.L.;</td>
<td>Revista de Enfermagem do Centro Oeste Mineiro</td>
<td>Urinary Infection</td>
</tr>
<tr>
<td>Adherence to preventive measures for pneumonia associated with mechanical ventilation.</td>
<td>2015</td>
<td>PORTUGUESE</td>
<td>ALMEIDA, K.M.V.; BARROS, O.M.C.; SANTOS, G.J.C. et al</td>
<td>Revista Enfermagem da UFSM</td>
<td>Respiratory Infection</td>
</tr>
<tr>
<td>Oral care and nosocomial pneumonia: systematic review.</td>
<td>2015</td>
<td>PORTUGUESE</td>
<td>VILELA, M. C. N; et al.</td>
<td>Revista Einstein</td>
<td>Respiratory Infection</td>
</tr>
<tr>
<td>Ventilator-associated pneumonia: present understanding and ongoing debates.</td>
<td>2015</td>
<td>ENGLISH</td>
<td>NAIR, G.B.; NIEDERMAN, M.S.</td>
<td>Intensive Care Med</td>
<td>Respiratory Infection</td>
</tr>
</tbody>
</table>

Source: Created by the authors (2020).

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The information from the articles originated the following thematic categories: risk factors for Respiratory Infection in patients admitted to the ICU and risk factors for Urinary Infection in patients admitted to the ICU.

Risk factors for Respiratory Infection in patients admitted to the ICU

Respiratory infections can be associated with various types of etiologic agents, including viruses, currently being recognized as the main cause of morbidity and mortality in adults with acute respiratory insufficiency. The most frequent agents are the influenza virus, rhinovirus, coronavirus, respiratory syncytial virus, human metapneumovirus, parainfluenza virus and adenovirus, being the clinical severity similar to bacterial and fungal infectious agents (13).

The authors demonstrated that healthcare-associated infections remain a major public health problem. In their study with 642 patients, there were 148 healthcare-associated infections. The pneumonia was the infection with greater number of cases (47.3%), followed by bloodstream infection (21.6%) and urinary tract infection (14.9%) (14).

The diagnosis of hospital infections of the lower respiratory tract is associated with long periods of hospitalization and increased use of antibiotics, with Ventilator-Associated Pneumonia (VAP) as one of the most prevalent infections in ICU (15). In this way, preventing ventilator-associated pneumonia (VAP) is a daily purpose and difficult and to achieve that goal, there is need to qualify professionals for the implementation of preventive measures. In addition to the accomplishments of permanent education processes to reduce risks and improve the assistance, in order to reduce the rates of hospital infections (16).

A study conducted in six ICU showed that 60% of pneumonia acquired in that environment has a direct relationship with the use of mechanical ventilation, scoring as an important factor to be considered in the provision of preventive care within the ICU (17).

A survey that addressed the incidence of VAP in a Brazilian ICU showed that, of the 190 hospitalized patients, 90.5% used Mechanical Ventilation (MV), of whom 23.2% had VAP, whose overall mortality rate was of 72.7%. The same study reaffirms the positive association between the occurrence of pneumonia and hospitalization length over 15 days, time on MV over 10 days, considering them as factors influencing in the development of respiratory infection (18).

On the other hand, another study points out other risk factors for the development of VAP, such as hospitalization length greater than or equal to five days, previous treatment with antibiotics over 90 days, high frequency of resistance to antibiotics, immunosuppressive therapy and multiple healthcare-related risk factors (19).

In Spain, a prospective cohort study with 4427 patients showed some risk factors for the development of Pneumonia acquired in the process of hospitalization. Due to the multicausality of factors found, the author chose to separate them into extrinsic (mechanical ventilation, urinary catheter and nasogastric tube) and intrinsic (traumatic brain injury and decreased level of consciousness), thus showing that many factors must be considered in the preventive actions in the hospital environment (20).

In addition to bringing an analysis of factors contributing to acquiring healthcare-related Pneumonia, the aforementioned study brought as differential the approach of protective factors such as the use of Bi-level Positive Airway Pressure (BPAP), Continuous Positive Airway Pressure (CPAP) and the presence of infection before admission. However, the author makes it clear that the plausibility of the last statement is questionable, given the difficulty to identify the Pneumonia associated with the care provided to a patient with signs and symptoms of a pre-existing active infection (20).

Seven hospitals participated in the Dutch national surveillance of ventilator-associated pneumonia (VAP) and its risk factors. We analyzed time-independent and time-dependent risk factors for VAP. The major independent risk factors included age, COPD and current sedation score (the higher the greater the risk) (23).

The use of bundles in ICU has been shown as a damage-preventing strategy related to the theme, providing benefits to patients (19). Knowing this, a Brazilian study carried out an intervention using a bundle to an ICU team, containing the main care directed to patients on mechanical ventilation, proving the reduced rates of VAP after adopting measures such as: adequacy of the filter position; high bedhead; oral hygiene with chlorhexidine and control of the cuff pressure. This showed that the quality of care can interfere beneficially in the patient’s clinical condition (22).

The union of types of comprehensive care is important to the favorable clinical evolution of the patient hospitalized in the ICU, an example of this is the adoption of the FAST HUG tool, which is a check-list containing guidelines on nutrition, analgesia, sedation, thromboembolic prophylaxis, elevation of the bedhead, prophylaxis for pressure injury and glycemic control. A study conducted in Minas Gerais demonstrated that, even with severe patients, the use of this instrument demonstrated a significant reduction in the rates of VAP, mortality and hospital costs (23).

In addition to all the actions mentioned here, a survey conducted in four ICU in Italy demonstrated that the introduction of a training program of the team about the process of hand hygiene resulted in a significant reduction of respiratory infections of the upper and lower tract, with a reduction of 76% and 68%, respectively. It stresses the importance of hand hygiene to reduce healthcare-related infections, including those related to the respiratory system (24).

Studies have shown that there is weakness in the care and exposure of patients to risk situations, since the protocol for prevention of pneumonia associated with mechanical ventilation is not fully met, being the oral hygiene one of the interventions that showed the lowest index of compliance (25-4).

A good strategy in the prevention of infections related to the respiratory tract is the incorporation of the dental surgeon in this environment, adding to the actions of this professional the complexity of integral care with the patient. Since the care with the oral region, mainly with the use of 0.12% chlorhexidine solution, has been shown as effective method to reduce nosocomial Pneumonia (26).

The adoption of a multiprofessional team in care provision has been shown to be a tool to reduce the VAP levels. According to the authors Costa and Yang (27), the Open ICU (non-intensivist physician manages the care) have a greater
interaction between the professional categories, especially with the nursing staff, providing an environment of cooperative work, consequently leading to reduced VAP rates.

**Risk factors for Urinary Infection in patients admitted to the ICU**

Urinary tract infections related to the use of bladder catheter feature high prevalence in intensive care units. A survey carried out in patients hospitalized in an ICU of a university hospital in northern Minas Gerais showed that the prevalence of infection of the urinary tract, especially the one related to bladder catheter, was 16.6% of the 169 patients analyzed. The risk factors presented were hospitalization length greater than or equal to 15 days and use of the bladder catheter greater than or equal to 10 days (28).

Thus, the urinary tract infections in patients with bladder catheter can be a serious complication of hospitalization in intensive care unit. A prospective study was performed in the 20-bed ICU at the University Hospital of Wroclaw, Poland. The main pathogens of urinary tract infections were Enterococcus spp. (22%), Acinetobacter baumannii (20%), Klebsiella pneumoniae (18%), Pseudomonas aeruginosa (13%) and Candida spp. (13%) (29).

A research discusses the control of infection by delayed bladder catheter in the ICU, and showed that the protocol on the prevention of urinary tract infections (UTI) in the institution studied did not meet recommendations in relation to techniques for removal of the catheter, in irrigation, in replacement of the drainage system with disinfection of connection due to unexecuted aseptic technique or in need for disconnection, and that the techniques and recommendations for the management of blocked flow were not described. Therefore, in the assessment of the study indicators, the infrastructure, process and results are weakened in their execution (30).

Therefore, the main risk factors are the length of the bladder catheter and the female sex for the development of infections of the urinary tract acquired in the intensive care unit. In this way, these risk factors in ICU patients must be analyzed in the planning of preventive measures against infections of the urinary tract in this scenario (31).

**FINAL THOUGHTS**

Within the Intensive Care Unit, the respiratory tract is the main target of infections, due to the use of mechanical ventilation. Even with all the care and control, the infection is still present, making it a public health problem. Eliminating the HI is an extremely complex task, mainly by dealing constantly with contaminated materials.

The articles pointed out that the HI can be minimized from the use of protocols for the standardization of procedures, with clearly demonstrated efficiency and safety, and, among the measures indicated, there are: correct hand hygiene and use of personal protective equipment, avoiding cross-contamination inside the unit and preserving the health of the professional who is performing a certain action. However, each professional is responsible for performing prophylactic measures for infection control. In this context, we emphasize the importance of education and continuous training of professionals who deal directly or indirectly with contaminated materials, combining theory and practice.

**REFERENCES**


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