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Nursing care in combating and preventing the risks of hospital infection

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Abstract

The aim of this study was to understand the factors predisposing to the development of hospital infections, as well as to explain the risks of contracting hospital infections to which patients and professionals are exposed in hospitals. The study was conducted through a narrative review research, with the collection of data in books, official publications of the health area and, mainly, published articles. Through this study it was possible to conclude that there are numerous biological risks to which nurses, other health professionals and patients are exposed, which predisposes them to the development of hospital infections. Therefore, it is necessary that nurses receive instructions and training on the biological risks to which they are exposed, as well as on the need for the use of personal protective equipment and other precautionary measures. Here is the warning about the importance of adopting biosecurity measures to avoid exposure to these risks.

Keywords: Biological risks; Hospital infection; Biosecurity.

1. Introduction

Even with all the knowledge already in place regarding hospital infections, their causation agents, determinant factors and control measures, about 720,000 people are still infected in Brazilian hospitals every year, of which 20% evolve to death (Carneiro and Andrade, 2015). According to data from a survey conducted by the Brazilian Biosafety Association (ANBio), in 2011, about 80% of hospitals do not have adequate control, and the rate of hospital infections varies between 14% and 19%, reaching 88.3% in some units (Lima et al., 2015).

According to Perna et al. (2015), in Brazil, hospital infection rates are high, with the highest incidence in teaching or university hospitals compared to other hospitals, due to the variety of diseases, as well as the performance of procedures classified as highly complex, long periods of hospitalization and the contact of patients with various health professionals, including students.

To prevent these infections, in general, measures aimed only at the health care provided to the patient, whether medical, nursing, or other specialties are directed, but other types of prevention are not considered, and these should go beyond the care provided, involving the conditions of the environment in which the patient is inserted, taking into view that the hospital environment, when in poor hygiene conditions, it also contributes significantly to the occurrence of infections, even though care techniques are performed correctly (Carneiro and Andrade, 2015).

It is worth mentioning that, in their work process, the nursing professional has the possibility of acting in different areas and practical dimensions that involve actions of care, educating, managing and researching. These dimensions of his work allow him to work in health, teaching and research organizations, which are composed of several interrelated sectors, one of which is the Material and Sterilization Center (CME) (Taube and Meier, 2007).

CME is where the necessary and highly specialized processing of health products takes place. Among its functions are: "to acquire, receive, clean, decontaminate, pack, sterilize and provide reusable, processed and safe products in clinical procedures performed in consumer units" (Costa et al., 2020, p.2), among them one can mention the wards, intensive care centers, outpatient clinics and surgical centers. Therefore, they are procedures that require qualified and well-trained teams and specialized equipment (Costa et al., 2020).

The CME is a vital and fundamental unit in the hospital context, and the hospital sector is responsible for providing essential products for care. Its function is to provide contamination-free materials to be used in the most varied procedures. Its mission is to supply care and diagnostic services with sterile health products, ensuring the quantity and quality necessary for safe care (Rego et al., 2020).

Thus, MSC is a fundamental sector in the control of Healthcare-Related Infections (AIs), which are conceptually characterized as "adverse reactions to infectious agents or toxins, which were not present or were in incubation at the time of admission to a health facility" (Costa et al., 2020, p.2). Although they are common, AIs are responsible for serious health damage and increased treatment costs (Costa et al., 2020).

The importance of the theme is justified because it is of great relevance that health professionals understand the factors that predispose the risks of hospital infection so that they can implement actions that enable them to mitigate these occurrences and their risks, contributing to the improvement of the quality of health care provided to the patient.

This knowledge is also important for hospital managers to become aware of their responsibility and enable the implementation of a surveillance system, to provide health professionals with better control of hospital infections and prevention of their risks.

In view of the above, this review article aimed to understand the factors predisposing to the development of hospital infections, as well as to explain the risks of contracting hospital infections to which patients and professionals are exposed in hospitals. In addition, relate the main pathogens involved in hospital infections.

2. Material and Methods

A narrative review was carried out, with the collection of data in books, official publications of the health area and, mainly, published articles, searched through the databases PubMed, Virtual Health Library and Google Academic. After a pre-selection of articles, its contents were read, with the objective of deepening the knowledge on the subject, seeking the answers to the problematization of the study, in order to achieve the proposed objectives. Articles published in the last 20 years, between 2000 and 2020, published in English and Portuguese and found to be available.

3. Results and discussion

19 references were selected, 2 of which were normative (one from the Federal Government and another from the Federal Nursing Council), 1 book and 16 scientific articles. Regarding the language, there were 15 publications in Portuguese and 4 in English. Its content is discussed below.

The dominant scientific production in the health area and the development of intervention procedures have been demanding new nursing practices that are not directly related to care, such as control of hospital infections, quality control, organ collection for donation, management of hospital hygiene, among others (Bartolomei and Lacerda, 2006).

Infections related to health services are common complications resulting from diagnostic and therapeutic procedures, and represent one of the main problems of the quality of health care. These infections can be classified as endogenous, when the causation agents are present in the individual himself, or as exogenous, when microorganisms come from the external environment. The control of exogenous infections, when related to health services, depends on the prevention practice exercised by professionals in this area regarding a series of measures, including the reprocessing of dental-hospital materials, which is an important measure of anti-infectious protection and includes the validation and monitoring of all stages (Tipple et al., 2011).

However, despite the existing advances in the health field, in order to ensure that the care provided is safe and effective at all levels of care, there is still the occurrence of hospital or nosocomial infections, which are defined according to Ordinance Nº. 2616 of May 12, 1998, in its Annex II, item 1.2.1 as: "the one acquired after the patient's admission and that manifests itself during hospitalization or after discharge, when it may be related to hospitalization or hospital procedures" (Brazil, 1998).

Therefore, hospital infection is not limited only to the care provided to the patient, it also involves the environment in which it is inserted, since ineffective cleaning and disinfection increase the risks of contamination (Carneiro and Andrade, 2015).

The length of stay is one of the main determinants of the risk of nosocomial infections (Wolkewitz et al., 2017), and patients who are hospitalized end up exposed to a wide variety of pathogenic microorganisms, especially those found in intensive care units (ICUs), where the use of broad-spectrum and potent antimicrobials is the rule, in addition to the common routine of invasive procedures (Perna et al., 2015). These procedures with invasive devices are a gateway to infections, and among such devices stand out intravascular catheters, especially the Central Venous Catheter (CVC), which are the most used in ICUs for the administration of medications (Silva et al., 2017).

It is already well established in the literature that hospital-acquired infections are more common in long-term patients who have been in the pediatric intensive care unit (PICU) for more than three days with concomitant invasive measures. Up to 40% of these children acquire hospital infection and/or sepsis after remaining in the pediatric intensive care unit for 14 days. Among this population, children with known immunocompromise at baseline are at higher risk of acquiring hospital infection, which is partly related to their inability to fight the infection (Carcillo et al., 2016).

Infections that occur in health services are common and considered a public health problem,

generating a negative impact on morbidity and mortality, hospitalization time as well as costs related to diagnostic and therapeutic procedures (Perna et al., 2015). Among them is surgical site infection (SSI), a well-known complication of general surgery. Although the overall rate of SSI is relatively low, it is the most common hospital infection, and adversely affects patient outcomes and health costs. Most of the risk factors determined are related to the surgeon and the procedure. A reduced rate of SSI and better results can be achieved by controlling modifiable risk factors such as these (Isik et al., 2015).

One of the pathogens of interest is respiratory sinticial virus (RSV), which causes a significant burden on public health, and outbreaks among vulnerable patients in hospital environments are particularly worrisome. It is an important cause of severe respiratory disease in children, particularly those at high risk of acute lower respiratory tract infections. RSV is also common in adults, especially the elderly and other high-risk groups, such as immunocompromised ones. RSV outbreaks among vulnerable hospitalized patients are of particular concern, as affected patients are more likely to spend more time in the hospital, with an increased risk of morbidity and mortality (French et al., 2016).

Another pathogen of importance is Klebsiella pneumoniae, which has the potential to cause severe morbidity and mortality. It is an opportunistic agent, predominantly isolated from hospitalized, immunosuppressed individuals with underlying diseases such as diabetes mellitus or chronic pulmonary obstruction (Perna et al., 2015).

There is also Staphylococcus aureus, which can survive on dry surfaces for long periods of time. It is one of the most common bacterial species, and is the most virulent of its genus. Since the early 1970s, methicillin-resistant S. aureus strains, identified by the acronym MRSA (S. aureus resistant to methicillin), also resistant to other beta-lactams, such as cephalosporins, have also appeared. MRSA bacteria quickly spread in hospital settings, thus limiting antibiotic therapy to combat infections caused by these strains to glycopeptides and those such as vancomycin and teicoplanin (Lima et al., 2015).

To avoid part of the risks related to hospital infection there is the CME (Material and Sterilization Center), which is the unit responsible for processing and cleaning all health products that will be used in the various sectors of the hospital. Therefore, it is the place for cleaning, preparation, packaging, sterilization, storage and distribution of medical-hospital articles. Defined as a functional unit for the processing of health products, the MSC is an area subordinated to the nursing service, being considered a technical support unit, which aims to provide adequately processed health products, thus providing conditions for direct care and health care for hospitalized individuals (Rego et al., 2020).

Due to the complexity of the actions involved in the CME, the work carried out there also exposes the worker to the most diverse risks, which can be chemical, physical, biological and ergonomic, citing as examples the "manipulation of solutions and aerosols; heat above that permitted by legislation and lighting; handling with blood and excretion such as body fluids with viruses, bacteria or fungi, repetitive movements and exaggerated work rhythm" (Lima et al., 2018, p. 2362).

Therefore, as Rego et al. (2020) stand out, it is a pressing need to rethink the way of working, as well as interaction among professionals, using technologies also focused on the health of nursing workers, especially those who work in sectors such as the MSC, where in addition to the enormous physical and

emotional strain they experience in their work, there is this great risk of infection to which they are exposed.

It is also noteworthy the fact that, among health professionals, the professional category most affected by traffic accidents with biological material is that of nursing. This is due to the category being the one with a larger number of professionals in the health area, besides being more directly in contact with risk factors, providing direct care to the patient. In addition, nurses are the ones who perform procedures that vary more frequently from minor to more complex, ordering varying degrees of attention, such as: collection of material for examinations, parenteral administration of medications, washing of surgical instruments, among others. The nursing team is equivalent to a majority within a health facility, so there should be a greater concern with them (Marques et al., 2019).

In addition, the Code of Ethics of Nursing Professionals states that the client should be assured of harm-free nursing care resulting from malpractice, negligence or recklessness; carefully evaluate their technical and legal competence and only accept charges or attributions, when capable of safe performance for themselves and for the clientele; to be responsible for misconduct committed in their professional activities, regardless of whether it was practiced individually or as a team (COFEN, 2017).

Study conducted by Almeida et al. (2009) reveals that the non-medication by nurses has as conditioning factors: ignorance of professionals regarding the risk of acquiring an infectious disease, unavailability of personal protective equipment (IEs) or underestimation of risk.

In this context, it is important that the institution or unit makes a risk analysis, so that the development of the work, performed by health professionals in patient care, continues to manage its actions, to prevent the production of direct damages own or indirect by the health team, in patient care, based on the specific regulatory and regulatory requirements and current legislation. Risk management involves identifying, analyzing the situation, reflecting with the multidisciplinary team, changing and modifying the cause of the problem that generates risk (Feldman, 2004).

4. Conclusion

There are numerous biological risks to which nurses, other health professionals and patients are exposed, especially in ICUs, which predisposes them to the development of hospital infections, including some that put them at risk.

In the case of ICU patients, they require higher diagnostic procedures and more routine care, increasing the nurse's contact with these clients, consequently increasing the risks of work accidents with biological risk. However, these risks can be avoided with the use of appropriate prevention measures, such as the use of EPIs, which is often neglected by nurses and even by the hospital institution.

Therefore, it is necessary that nurses receive instructions and training on the biological risks to which they are exposed, as well as on the need for the use of EPIs and other precautionary measures, such as vaccination. Thus, it is essential that health professionals have adequate information about the importance of safety in the hospital environment, and it is essential that all workers in the sector participate in the prevention of these accidents, which can be avoided with the use of appropriate biosafety measures.

It then highlights the importance of adopting biosafety measures to avoid exposure to these biological

risks. The need for further studies on the subject is also reinforced, mainly emphasizing the biosafety measures appropriate to each situation, considering that it is a theme of extreme relevance for quality of health and work environment for nursing.

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6. References

1. Almeida, A.N.G., Tipple, A.F.V., Souza, A.C.S., & Brasileiro, M.E (2009). Risco biológico entre os trabalhadores de enfermagem. *Rev. Enferm. UERJ., 17*(4):595-600. https://repositorio.bc.ufg.br/bitstream/ri/16249/5/Artigo%20-%20Andr%C3%A9%20Nunes%20Gomes%20de%20Almeida%20-%202009.pdf, accessed 20 dez 2020.
2. Bartolomei, S.R.T., & Lacerda, R.A (2006). Trabalho do enfermeiro no Centro de Material e seu lugar no processo de cuidar pela enfermagem. *Rev. Esc. Enferm. USP., 40*(3):412-417. http://dx.doi.org/10.1590/S0080-62342006000300014.
3. Brasil. Ministério da Saúde (1998). Portaria n.º 2616, de 12 de maio de 1998. *Brasília: Ministério da Saúde*. https://bvsms.saude.gov.br/bvs/saudelegis/gm/1998/prt2616_12_05_1998.html, accessed 19 dez 2020.
4. Carcillo, J.A., Dean, J.M., Holubkov, R., Berger, J., Meert, K.L., Anand, K.J.S., & et al (2016). Inherent risk factors for nosocomial infection in the long stay critically Ill child without known baseline immunocompromise: a post-hoc analysis of the crisis trial. *Pediatr Infect Dis J., 35*(11):1182-1186. https://doi.org/10.1097/INF.0000000000001286.
5. Carneiro, J.T., & Andrade, R.M (2015). Análise do processo de limpeza utilizado pela equipe de higienização para o controle da infecção hospitalar. *RITEC,1*(1):55-62. https://docplayer.com.br/71214785-Analise-do-processo-de-limpeza-utilizado-pela-equipe-de-higienizacao-para-o-controle-da-infeccao-hospitalar.html, accessed 19 dez 2020.
6. Costa, R., Montenegro, H.R.A., Silva, R.N., & Almeida Filho, A.J (2020). Papel dos trabalhadores de enfermagem no centro de material e esterilização: revisão integrativa. *Esc. Anna Nery Rev. Enferm.,24*(3):e20190316. https://www.scielo.br/pdf/ean/v24n3/1414-8145-ean-24-3-e20190316.pdf, accessed 19 dez 2020.
7. COFEN - Conselho Federal de Enfermagem (2017). Resolução 564/2017 – Código de ética dos profissionais de enfermagem. http://www.cofen.gov.br/resolucao-cofen-no-5642017_59145.html, accessed 19 dez 2020.
8. Feldman, L.B (2004). O enfermeiro analista de risco institucional. *Rev Bras Enferm., 57*(6):742-745. http://dx.doi.org/10.1590/S0034-71672004000600023.
9. French, C.E., McKenzie, B.C., Coope, C., Rajanaidu, S., Paranthaman, K., Pebody, R., & et al (2016).

Risk of nosocomial respiratory syncytial virus infection and effectiveness of control measures to prevent transmission events: a systematic review. *Influenza Other Respir Viruses., 10*(4):268-90. https://doi.org/10.1111/irv.12379.

10. Isik, O., Kaya, E., Dundar, H.Z., & Sarkut, P (2015). Surgical site infection: re-assessment of the risk factors. *Chirurgia (Bucur)., 110*(5):457-61. https://www.revistachirurgia.ro/pdfs/2015-5-457.pdf, accessed 19 dez 2020.
11. Lima M.D.P., Chaves, B.J.P., Lima, V.S., Silva, P.E., Soares, N.S.C.S., & Santos, I.B.C (2018). Riscos ocupacionais em profissionais de enfermagem de centros de material e esterilização. *Rev. Cuid. (Bucaramanga)., 9*(3):2361-2368. http://dx.doi.org/10.15649/cuidarte.v9i3.544.
12. Lima, S.F.P., Borges, M.A., Parente, R.S., Victória Júnior, R.C., & Oliveira, M.E (2015). Staphylococcus aureus e as infecções hospitalares – revisão de literatura. *Rev UNINGÁ, 21*(1):32-39. http://revista.uninga.br/index.php/uningareviews/article/view/1616/1227, accessed 19 dez 2020.
13. Marques, J.S., Damacena, D.E.L., Santana, R.D.S., Neves, V.L.S., Farias, M.D.D.S.B., Chaves, R.D. C.C., & et al (2019). Acidentes de trabalho com materiais perfurocortantes em profissionais de enfermagem. *Brazilian Journal of Surgery and Clinical Research – BJSCR., 26*(3):115-119 https://www.mastereditora.com.br/periodico/20190504_113143.pdf, accessed 19 dez 2020.
14. Perna, T.D., Puiatti, M.A., Perna, D.H., Pereira, N.M., Couri, M.G., & Ferreira, C.M (2015). Prevalência de infecção hospitalar pela bactéria do gênero Klebsiella em uma Unidade de Terapia Intensiva. *Rev. Soc. Bras. Clín. Méd, 13*(2):119-123. http://files.bvs.br/upload/S/1679-1010/2015/v13n2/a4740.pdf, accessed 19 dez 2020.
15. Rego, G.M.V, Rolim, I.L.T.P, D'eça Júnior, A., Sardinha, A.H.L., Lopes, G.S.G., & Coutinho, N.P.S (2020). Qualidade de vida no trabalho numa central de materiais e esterilização. *Rev. Bras. Enferm., 73*(2):e20180792. http://dx.doi.org/10.1590/0034-7167-2018-0792.
16. Silva, P.R., Queiroz, A.L.F., Buriti, M.E.O., Ferreira, M.D.T., & Pinto, A.C.M.D (2017). A importância do profissional da saúde na prevenção de infecção hospitalar causado por cateter venoso central. *Mostra Interdisc Curso Enferm.,3*(2):1-4. http://publicacoesacademicas.unicatolicaquixada.edu.br/index.php/mice/article/view/3287/2806, accessed 19 dez 2020.
17. Taube, S.A.M., & Meier, M.J (2007). O processo de trabalho da enfermeira na central de material e esterilização. *Acta Paul. Enferm, 20*(4):470-475. http://dx.doi.org/10.1590/S0103-21002007000400014.
18. Tipple, A.F.V., Pires, F.V., Guadagnin, S.V.T., & Melo, D.S (2011). O monitoramento de processos físicos de esterilização em hospitais do interior do estado de Goiás. *Rev. Esc. Enferm. USP., 45*(3):751-757. http://dx.doi.org/10.1590/S0080-62342011000300029.
19. Wolkewitz, M., Zortel, M., Palomar-Martinez, M., Alvarez-Lerma, F., Olaechea-Astigarraga, P., & Schumacher, M (2017). Landmark prediction of nosocomial infection risk to disentangle short- and long-stay patients. *J Hosp Infect., 96*(1):81-84. http://dx.doi.org/10.1016/j.jhin.2017.01.017