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Management of the Sepsis Protocol: An integrative literature review

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Abstract *— This study aims to analyze the scientific evidence regarding the management of the Sepsis Protocol from an integrative literature review. This question guided a search in the electronic databases: SciELO, MEDLINE, LILACS and PubMed, all present in the Virtual Health Library and Web of Science. Ten publications were analyzed, from 2017 to 2021. Most of the results indicate that sepsis management is necessary to improve patient management, rapid identification of signs and symptoms and contribute to increasing the effectiveness of the multidisciplinary team. It is concluded that sepsis is a serious pathology, which affects most patients admitted to the Intensive Care Unit. It shows the need for hospital services to standardize and institute sepsis management protocols, since there are currently many existing control mechanisms, involving increasingly sophisticated and low-cost technologies.*

I. INTRODUCTION

Healthcare-Associated Infections (HAI) are a major challenge for the health sector in terms of patient safety and recovery during the hospitalization period. These diseases can even prolong the patient's length of stay, cause new diagnoses or worsen those already established, which can lead to death. [1]

Ordinance No. 2,616/98 of the Ministry of Health defines HAI as an infection acquired after 72 hours of hospitalization, being related to any procedure performed on the patient. Often leading to the need for treatment in the Intensive Care Unit (ICU). [2, 3]

Sepsis is the presence of life-threatening organ dysfunction, secondary to the body's dysregulated response to infection, which may arise from HAI or from pre-existing disease. Brazil has the second highest mortality rate from sepsis in the world, with rates reaching 60%, being one of the main causes of in-hospital death and considered a highly complex condition. [4, 5]

One of the ways to reduce these numbers, as well as to qualify the service, is that the multidisciplinary team is attentive to the suggestive signs of sepsis and in the prevention of HAI, since these situations are interconnected. These actions contribute to rapid intervention and patient recovery, preventing the case from getting worse. [4, 6]

In this sense, management strategies and the elaboration of management protocols are of paramount importance for the organization of the health team, training and measurement through indicators of results. In order to improve the identification of sepsis and HAI treatment in the hospital environment. [5, 6]

Therefore, the relevance of this article lies in the need to discuss scientific advances regarding the management of sepsis, whose objective is to analyze the scientific

evidence regarding the management of the Sepsis Protocol from an integrative literature review.

II. METHOD

This article is an Integrative Literature Review (INR), this research method allows the synthesis of multiple published studies and allows general conclusions about a particular area of study. It is a valuable method for nursing, as professionals often do not have time to read all the scientific knowledge available due to the high volume, in addition to the difficulty in performing a critical analysis of the studies.

The RIL has been proposed by different authors who differentiate the methodological procedures (number of steps, form of development and presentation). [7, 8, 9] However, this study basically followed six phases: the 1st Phase elaborated the guiding question; in the 2nd Phase, the search or sampling of references; in the 3rd Phase, data collection took place; in the 4th Phase, the critical analysis of the included studies; in the 5th Phase, the results were discussed; 6th Phase, the presentation of the integrative review was formulated.

In Phase 1: the following question was formulated: What is the scientific evidence on the management of the Sepsis Protocol published between 2017 and 2021? This question guided a bibliographic search, filtering the articles that were coherent with the object of study.

In the 2nd Phase: a search was carried out in electronic databases: Scientific Electronic Library Online (SciELO), Medical Literature and Retrieval System on Line (MEDLINE), Latin American and Caribbean Literature on Health Sciences (LILACS), PubMed, ScienseDirect, all present in the Virtual Health Library and Web of Science, being used in the search the descriptors: Sepsis, Management, Hospital Infection., associated with the Boolean operators “AND, NOT, OR”. Thus, ten scientific articles were selected for analysis.

The following inclusion criteria were applied: complete and freely available articles that covered the theme and objective of the study, with relevance to the proposed theme, published between 2017 and 2021 in Portuguese, English and Spanish.

Exclusion criteria were: repeated articles, publications with abstract only, literature reviews, reflections, reviews and that were not in Portuguese, English and Spanish.

A data collection form was used, an instrument validated by Ursi [10] and adapted by the authors, to complete each article in the sample.

In the 3rd Phase: the articles were selected and analyzed, according to the proposed theme. After the selection of the indexed articles, an evaluation and analysis of the material obtained was carried out, to select what was of interest to the researchers, then a thorough reading was carried out, in order not to miss important aspects for the enrichment of the study and preparation of the final research writing.

In the 4th, there was the compilation and organization of articles that presented data in line with the general objective of this work.

In the 5th Phase, the review was presented, in which the articles were compiled in the form of a table, exposed in the results of this research, containing the objective, method, results and conclusion. Finally, the 6th Phase consisted of discussing the results found.

III. RESULTS AND DISCUSSION

Ten publications were analyzed, arranged in Tables 1 and 2, which met the inclusion criteria proposed in this research. Being that, the authors of all of them are of the professional area of medicine. As for the year of publication, 6 of the 8 articles were published in 2021, while the rest in 2020. As for the country, the experiments were carried out in Brazil (1, 4, 6), China (2), England (3), Thailand (5), Norway (7), United States (8).

All studies employed the same investigation model (laboratory experiment). And they presented different ways of managing the occurrence of sepsis, such as testing, impact and implementation results of different protocols and technologies with the purpose of controlling the occurrence of sepsis at the research site.

Table 1: Characterization of studies in terms of title, authorship, year of publication and objective.

Article	Title	Author/ Year	Objective
1	Improvement of 1st-hour bundle compliance and sepsis mortality in pediatrics after the implementation of the surviving sepsis campaign guidelines.	Gustavo Rodrigues-Santos, *et al.* (2021)	To study the impact of implementing the Pediatric Surviving Sepsis Camp protocol on early sepsis recognition, 1-hour treatment package, and mortality.
2	Effect of simple-bundles management vs. guideline-bundles management on elderly patients with septic shock: a retrospective study.	Qian Yang, Zhong Wang, Jian Guan (2021)	To compare the effects of simple package management and guideline package management in elderly patients with severe sepsis and septic shock.
3	A simple measure to improve sepsis documentation and coding.	Jamie Arberry, Zanya Henry and Tumena Corrah (2021)	Identify the gaps that existed in our system when it came to sepsis diagnosis and accurate coding so that we could implement simple measures to improve our service.
4	Implementation of the sepsis protocol in a large hospital in Belo Horizonte - MG.	Alexandre da Silveira Sete, Vania Regina Goveia, Adriane Vieira (2021)	To analyze the implementation and adherence to the sepsis protocol by the nursing and medical teams in the Emergency, Inpatient and Intensive Care Units of a large hospital in Belo Horizonte/MG.
5	Effectiveness of a sepsis programme in a resource-limited setting: a retrospective analysis of data of a prospective observational study (Ubon-sepsis).	Suchart Booraphun *et al.* (2021)	To assess the effectiveness of the Sepsis Fast Track (SFT) program initiated at a regional referral hospital in Thailand in January 2015.
6	Managed clinical protocol: impact of implementation on sepsis treatment quality indicators.	Camila Brito Borguezam *et al.* (2020)	To evaluate the impact of the implementation of a managed clinical protocol for sepsis on the quality indicators of the treatment of septic patients treated in the urgency and emergency sector of a university hospital.
7	Promoting leadership and quality improvement through external inspections of management of sepsis in Norwegian hospitals: a focus group study.	Gunnar Husabø *et al.* (2020)	Explore how external inspections can promote clinical improvement in hospitals.
8	Association Between Implementation of the Severe Sepsis and Septic Shock Early Management Bundle Performance Measure and Outcomes in Patients With Suspected Sepsis in US Hospitals.	Chanu Rhee *et al.* (2021)	To assess the association of SEP-1 implementation with sepsis treatment standards and outcomes in different hospitals.

9	Sepsis – Conduct based on the Clinical Protocol used at Unimed Recife	Branco CA, Costa JS, Arruda GB, (2021)	Establish a clinical decision support protocol, ideally recorded in the electronic medical record with screening, triggering the immediate start of treatment for sepsis, with conduct based on scientific evidence standardized by the technical committee and managers, in order to ensure good care practices.
10	Implementation of artificial intelligence algorithm for sepsis detection	Luciana Schleder Gonçalves et al. (2020)	To present the experience of nurses with computational technological innovations to support the early identification of sepsis.

Source: Prepared by the authors, 2022.

Table 2: Management of sepsis.

Article	Evidences
1	84 patients were studied before and 103 after implementation of the protocol. There was an increase in the recognition of sepsis, adherence to the one-hour bundle as a whole and with its three components: fluid resuscitation, blood culture and antibiotics. There was also a significant reduction between the recognition of sepsis and fluid resuscitation and the administration of antibiotics. The risk of death before protocol implementation was four times greater, and the absolute risk of death reduction was 9%.
2	There were no significant differences between the two groups in demographic and clinical characteristics at baseline (P>0.05). There were no significant differences between the two groups in APACHE-II scores and lactate concentration at 6, 24, 72 hours after handling and before handling (P>0.05). There were also no significant differences between the two groups in mortality at 30, 60 and 90 days (P>0.05).
3	59% of the 29 patients were found to have sepsis, but only 10% had documented it in their discharge summary and 17% had coded it. After implementing the model, 38% of the 52 patients had documented sepsis, but only 20% of them coded for it. After delivering a training session to coders on the importance of sepsis, 38% of patients diagnosed with sepsis coded for sepsis.
4	About 29,343 episodes of clinical deterioration were identified with an increase in the Sequential Organ Failure Assessment score of at least 2 points, of which 14,869 (50.7%) were associated with antibiotic escalation and thus met the Sepsis-3 criteria for sepsis. A total of 4,100 sepsis episodes (27.6%) were associated with the use of vasopressors and lactate greater than 2.0 mmol/L and therefore met the Sepsis-3 criteria for septic shock. ICU mortality from sepsis source was highest for ICU-acquired sepsis (23.7%; 95% CI, 21.9–25.6%), followed by hospital-acquired sepsis (18.6%; 95% CI. , 17.5–19.9%) and community-acquired sepsis (12.9%; 95% CI, 12.1-13.6%) (for comparison less than 0.0001).
5	Of the 3806 patients with sepsis, 903 (24%) were detected and enrolled in the SFT program at the study hospital (SFT group) and 2903 received standard care (unexposed group). Patients in the TFS group had more organ dysfunction, were more likely to receive measured sepsis treatment, and were more likely to be admitted directly to the ICU (19% vs 4%). Patients in the TFS group had a higher chance of survival (adjusted HR 0.72, 95% CI 0.58 to 0.88, p=0.001) adjusted for year of admission, sex, age, comorbidities, modified SOFA score, and direct admission in the ICUs.
6	The study sample included 631 patients, 95 from the pre-intervention phase and 536 from the intervention phase. The implementation of the protocol increased the chances of patients receiving the recommended treatment by 14 times. The implementation of the protocol reduced the period of hospitalization by 6 days (p<0.001) and decreased mortality (p<0.001).
7	Three themes emerged as central to understanding how inspections can contribute to clinical improvement in emergency departments: (1) raising awareness of the need to improve the quality of care by providing data on clinical performance, (2) building acceptance for improvement through

	professional credibility and focus on clinical practice, and (3) promoting leadership commitment. These findings suggest that inspections have the potential to improve hospital management and staff understanding of complicated care processes and help strengthen organizational commitment to bring about systemic quality improvements.
8	The cohort included 117,510 patients (median age [IQR], 67 years [55-78] years; 60,530 [51.5%] men and 56,980 [48.5%] women) with suspected sepsis. Lactate test rates increased from 55.1% (95% CI, 53.9%-56.2%) in the 4th quarter of 2013 to 76.7% (95% CI, 75.4%-78.0 %) in Q4 2017, with a significant level change after September 1 implementation (odds ratio [OR], 1.34; 95% CI, 1.04-1.74). There was an increase in the use of anti-MRSA antibiotics (19.8% [CI 95%, 18.9%-20.7%] in the 4th quarter of 2013 to 26.3% [CI 95%, 24.9%-27 .7%] in the 4th quarter of 2017) and antipseudomonal antibiotics (27.7% [CI 95%, 26.7%-28.8%] in the 4th quarter of 2013 to 40.5% [CI 95%, 38, 9%-42.0%] in Q4 2017), but these trends preceded SEP-1 and have not changed with SEP-1 Implementation. Unadjusted short-term mortality rates were similar in the pre-SEP-1 period (Q4 2013 to Q3 2015) versus the post-SEP-1 period (Q1 2016 to Q4 2017) (20 .3% [95% CI, 20.0%-20.6%] vs 20.4% [95% CI, 20.1%-20.7%]), and SEP-1 implementation was not associated to changes in level (OR, 0.94; 95% CI, 0.68-1.29) or trend (OR, 1.00; 95% CI, 0.97-1.04) for short-term mortality rates risk-adjusted term.
9	Patients with suspected sepsis, based on the SIRS (systemic inflammatory response syndrome) criterion, are widely identified in the emergency department and account for 30% of patients admitted to the ICU. Accurate screening, rapid recognition, early resuscitation, prompt initiation of antibiotics, and eradication of the source of infection are key components in quality sepsis care.
10	They describe the motivation for creating and using the algorithm, the role of nurses in the development and implementation of this technology and its effects on the nursing work process. Technological innovations need to contribute to the improvement of professional health practices. Thus, nurses must recognize their role in all stages of this process, in order to ensure safe, effective, patient-centered care. In the case presented, the participation of nurses in the process of technological incorporation enhances rapid decision-making in the early identification of sepsis.

Source: Prepared by the authors, 2022.

Article 1 studied the implementation of a protocol for the identification of sepsis in a children's hospital and obtained a positive result, because after joining the package, the number of deaths due to sepsis reduced from 10 to 3 and the identification of the signs of sepsis occurred in a different way. faster and more agile by the team of professionals. [11]

Article 2 showed that there was no difference in the percentage of death from sepsis with the use of the simple management pack or guidelines. [12]

The evidence from article 3 shows that the management of sepsis in the unit surveyed evolved from the implementation of a discharge summary and the training of professionals to correctly fill out this document. Subsequent audits showed progress in identifying the diagnosis of sepsis in patient discharge summaries. [13]

Article 4 points out the importance of knowledge of the sepsis management protocol by the medical and nursing teams, the latter mainly because they are in direct contact and for the entire length of the patient's stay and must be able to recognize the signs and symptoms of sepsis. [14]

In article 5, the effectiveness of the SFT program for the improvement of the patient is observed, since the group participating in this program received adequate management for the treatment of sepsis, that is, they were better managed by the multidisciplinary team. [15]

Study 6 corroborates the findings of studies 1 and 3, as it points to positive results with the implementation of a protocol for managing sepsis, increasing the patient's chances of receiving effective measures within 1 hour by 8 times. [6]

The findings of article 7 agree with article 5, since they demonstrate how inspections and audits collaborate with the improvement of clinical practice and serve as a warning alert for professionals who deal with the diagnosis of sepsis, so that they pay attention to the management of care. [16]

Article 8, in turn, provides results that, similar to article 2, show that there was no significant change in death

indicators, changes in lactate levels and use of broad-spectrum antibiotics with the implementation of the protocol for managing sepsis. [17]

Article 9 addresses the qSOFA score, which is a novelty in the field and serves as a screening for patients at risk of developing sepsis. The great utility of qSOFA does not use any laboratory variables, making it very easy to use at the bedside. If at least 2 of the 3 variables are found, it is recommended to investigate organ dysfunction by SOFA, reassess therapy, increase monitoring, and consider referring the patient to an Intensive Care Specialist. Therefore, in a patient without suspected infection, a positive qSOFA should raise the possibility of infection. The criteria used are: Systolic blood pressure less than 100 mmHg; Respiratory rate greater than 22/min; Mental status change (GCS <15). Each variable counts one point in the score, therefore, it ranges from 0 to 3. A score equal to or greater than 2 indicates a higher risk of death or prolonged ICU stay. [18]

Finally, article 10 shows that the nurses' participation started in the system development phase, or pre-implementation, from the sharing of scientific, theoretical and practical knowledge related to the health area, with technology professionals. This sharing guides the team of developers not only in the creation, but also in the improvement of the proposed computational solutions, as they bring the user experience, promoting the meeting of the needs of health professionals, with the possibilities of the technologies, in order to facilitate the adoption of the tool in professional nursing practice.[19]

Furthermore, the study points out that the use of a computational decision support tool in nurses' clinical practice enhances their role in the early identification of sepsis, providing visibility and professional satisfaction. [19]

Studies show hospital lethality rates due to sepsis are higher than 40%. The lack of a biological marker and the heterogeneity of what constitutes a suspicion of infection bring limitations in studies on sepsis. The definitions of sepsis and septic shock have been revised, considering recent advances in understanding the pathophysiology, management, and epidemiology of sepsis. [18]

Another relevant point common to the publications of this review is the documentation of the care provided and the clinical evolution of patients hospitalized in any health service, which is an obligation and necessity for the continuity of care, but it is a challenge: at first, doctors and nurses are trained to act proactively and resolve critical clinical situations before recording their performance in the information system. Thus, we understand the need to improve the process of collecting and recording patient data in hospital information systems, whether computerized or not. [19]

Studies indicate a high prevalence of nosocomial sepsis, found in 50.2% of patients. The problem related to nosocomial infections is much more serious in ICUs, due to the exposure to risks due to their clinical condition and the use of invasive procedures, and therefore they are five to ten times more likely to contract an infection.[20]

As a cause of ICU admission, there was a prevalence of respiratory complications (19.5%), which shows that the pulmonary site has increasingly been implicated in the source of the infectious process and that the use of mechanical ventilation is indispensable.[20]

The use of mechanical ventilation in septic patients can have an impact on improving their prognosis, however, if this is not performed adequately and safely, it can cause serious injuries to patients.[20]

Therefore, the evidence of the articles, for the most part, confirms that the management of sepsis is necessary to improve the management of patients, rapid identification of signs and symptoms and contribute to increasing the effectiveness of the multidisciplinary team.

IV. FINAL CONSIDERATIONS

The present study made it possible to analyze the scientific evidence regarding the management of the Sepsis Protocol from an integrative literature review.

Thus, in this review, the evidence indicates that sepsis is a serious pathology, which affects most patients admitted to the ICU. It shows the need for hospital services to standard-ize and institute sepsis management protocols, since there are currently many existing control mechanisms, involving increasingly sophisticated and low-cost technologies.

REFERÊNCIAS

[1] Jurema HC, Cavalcante LL, Buges NM. Prevenção e controle de infecções relacionadas à assistência à saúde em unidades neonatais. R. pesq.: cuid. fundam. Online, 2021 jan/dez; 13: 403-409.

[2] Brasil, Ministério da Saúde. Portaria nº 2616, de 12 de maio de 1998. Brasília, 1998.

[3] Araújo PL *et al.* Prevalência de infecção relacionada à assistência à saúde em pacientes internados em unidade de terapia intensiva. Enfermería Global, 2018; 17(4): 278-315.

[4] Carvalho MK, Carvalho MR. Prevalência de sepse em um centro de terapia intensiva de um hospital de ensino. Rev. Enferm. Foco. 2021; 12(3): 582-7.

[5] Silva MCM, Costa PC, Aguiar BGC, Freitas VL; Pereira GL. Rev. enferm. UFPE on line 2021; 15(2): [1-9].

[6] Borguezam CB *et al*. Managed clinical protocol: impact of implementation on sepsis treatment quality indicators.

Revista Brasileira de Enfermagem [online]. 2021; 74(2): e20200282.

[7] Ganong, LH. Revisões integrativas da pesquisa em enfermagem. Pesquisa em enfermagem e saúde, 1987;10 (1), 1-11.

[8] Souza MTD, Silva MDD, Carvalho, RD. Revisão integrativa: o que é e como fazer. Einstein (São Paulo, 2010;8, 102-106.

[9] Teixeira E, et al. (2013). Integrative literature review step-by-step & convergences with other methods of review/Revisão Integrativa de Literatura passo-a-passo & convergências com outros métodos de revisão. Revista de Enfermagem da UFPI, 2(5), 3-7.

[10] Ursi ES, Gavão CM. (2006). Prevenção de lesões de pele no perioperatório: revisão integrativa da literatura. Revista Latino-Americana de Enfermagem, *14*, 124-131.

[11] Rodrigues-Santos G. et al. Improvement of 1st-hour bundle compliance and sepsis mortality in pediatrics after the implementation of the surviving sepsis campaign guidelines. Jornal de Pediatria, 2021; 97, 459-467.

[12] Yang Q, Wang Z, Guan J. Effect of simple-bundles management vs. guideline-bundles management on elderly patients with septic shock: a retrospective study. Annals of palliative medicine. 2021

[13] Arberry J, Henry Z, Corrah T. A simple measure to improve sepsis documentation and coding. Clinical Medicine, v. 21, n. 3, p. 222, 2021.

[14] Sete, AS, Goveia VR, Vieira A. Implantação do protocolo de sepse em uma instituição hospitalar de grande porte em Belo Horizonte-Minas Gerais Implementation of the sepsis protocol in a large hospital in Belo Horizonte-Minas Gerais. Brazilian Journal of Health Review, 4(4), 14821-14833. 2021.

[15] Booraphun S, et al. Effectiveness of a sepsis programme in a resource-limited setting: a retrospective analysis of data of a prospective observational study (Ubon-sepsis). BMJ open, v. 11, n. 2, p. e041022, 2021.

[16] Husabø G et al. Promoting leadership and quality improvement through external inspections of management of sepsis in Norwegian hospitals: a focus group study. BMJ open, v. 10, n. 11, p. e041997, 2020.

[17] Rhee Chanu et al. Association Between Implementation of the Severe Sepsis and Septic Shock Early Management Bundle Performance Measure and Outcomes in Patients with Suspected Sepsis in US Hospitals. JAMA network open, v. 4, n. 12, p. e2138596-e2138596, 2021.

[18] Branco CA, et al. Sepse–Conduta baseada no Protocolo Clínico utilizado na Unimed Recife. Avanços em Medicina, 2021;51-57.

[19] Gonçalves LS, et al. Implantação de algoritmo de inteligência artificial para detecção da sepse. Revista Brasileira de Enfermagem, 2020;73.

[20] Zonta FNS, et al. Características epidemiológicas e clínicas da sepse em um hospital público do Paraná. Revista de Epi-demiologia e Controle de Infecção, 2018;8 (3), 224-231.