







Nurse-managed protocols for early identification of sepsis: a scoping review

Protocolos gerenciados por enfermeiros para identificação precoce da sepse: revisão de escopo

Protocolos administrados por enfermeros para la identificación temprana de la sepsis: revisión del alcance

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ABSTRACT

Objective: to map the care protocols used by nurses for the early identification of sepsis in the hospital environment. **Method:** this is a scope review anchored in the recommendations of the Joanna Briggs Institute, developed in seven databases. The search and selection took place on July 17, 2021, using the descriptors: sepsis, nursing protocols, nursing assessment and nursing care. **Results:** the sample consisted of six studies, highlighting the protocols implemented by quality improvement projects and the use of electronic warning systems for clinical deterioration. **Conclusion:** care protocols boost professionals' adherence to official recommendations for the management of sepsis in the hospital environment and the development of evidence-based nursing care, contributing to improve quality indicators and reduce mortality among patients with sepsis. **Descriptors:** Nursing Assessment; Nursing Care; Sepsis; Evidence-Based Nursing; Total Quality Management.

RESUMO

Objetivo: mapear os protocolos assistenciais utilizados por enfermeiros para identificação precoce da sepse no ambiente hospitalar. **Método:** trata-se de uma revisão de escopo ancorada nas recomendações do Joanna Briggs Institute, desenvolvida em sete bases de dados. A busca e seleção ocorreu em 17 de julho de 2021, utilizando os descritores: sepse, protocolos de enfermagem, avaliação de enfermagem e cuidados de enfermagem. **Resultados:** a amostra foi composta de seis estudos, destacaram-se os protocolos implementados por projetos de melhoria de qualidade e utilização sistemas eletrônicos de alerta para deterioração clínica. **Conclusão:** protocolos assistenciais impulsionam a aderência dos profissionais às recomendações oficiais para o manejo da sepse no ambiente hospitalar e o desenvolvimento de cuidados de enfermagem baseados em evidências, contribuindo para melhorar os indicadores de qualidade e reduzir a mortalidade entre pacientes com sepse. **Descritores:** Avaliação em Enfermagem; Cuidados de Enfermagem; Sepse; Enfermagem Baseada em Evidências; Gestão da Qualidade Total.

RESUMEN

Objetivo: mapear los protocolos de atención utilizados por las enfermeras para identificar de forma temprana la sepsis en el ambiente hospitalario. **Método:** se trata de una revisión de alcance anclada en las recomendaciones del Instituto Joanna Briggs, desarrollada en siete bases de datos. La búsqueda y selección se realizó el 17 de julio de 2021, utilizando los descriptores: sepsis, protocolos de enfermería, evaluación de enfermería y cuidados de enfermería. **Resultados:** la muestra estuvo compuesta por seis estudios, se destacaron los protocolos implementados por los proyectos de mejora de la calidad y utilización de sistemas electrónicos de alerta con respecto al deterioro clínico. **Conclusión:** los protocolos asistenciales impulsan la adherencia de los profesionales a las recomendaciones oficiales para el manejo de la sepsis en el ámbito hospitalario y el desarrollo de cuidados de enfermería basados en evidencias, contribuyendo a mejorar los indicadores de calidad y reducir la mortalidad entre los pacientes con sepsis. **Descriptor:** Evaluación en Enfermería; Atención de Enfermería; Sepsis; Enfermería Basada en la Evidencia; Gestión de la Calidad Total.

INTRODUCTION

Sepsis is considered a global health problem and is defined as a life-threatening organ dysfunction secondary to unregulated host response to an infection. An analysis based on data from the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) estimated the global, national and regional incidence of sepsis and its mortality in 195 countries, showing 48.9 million new cases of sepsis in the world and 11.0 million deaths, representing 19.7% of all global deaths. Mortality was twice as high as in previous study, which reported 5.3 million deaths. This considerable increase is attributed to the inclusion of data from countries with a low sociodemographic index (SDI), which were not contemplated in the first study. In Brazil, a multicenter study coordinated by the Latin American Sepsis Institute (*Instituto Latino-Americano de Sepse*, ILAS), entitled Sepsis Prevalence Assessment Database (SPREAD), described a mortality rate of 55.6%¹⁻⁴.

This study was financed in part by the *Fundação de Amparo à Pesquisa do Estado do Rio de Janeiro – Brazil* (FAPERJ), Rio de Janeiro Stricto Sensu Post-Graduation Programs Support, Call 12/2019, Process n°E-26/010.001313/2019 and Scientific Initiation Call, Process #E-26/200.768/2020.

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Editor in chief: Cristiane Helena Gallasch; Associate Editor: Magda Guimarães de Araujo Faria

Sepsis management is guided by an evidence-based set or package of practices that, when implemented at the right time, can contribute to favorable clinical outcomes. Based on the recommendations set forth in the “Surviving Sepsis Campaign: *International Guidelines for Management of Sepsis and Septic Shock*: 2016”, revised in 2018, the main change in the package referred to agility in the implementation of interventions. That said, the recommendations of the three-hour and six-hour packages, a set time for treatment initiation, are highlighted, which were combined into a single package to be implemented, ideally, within one hour. This new one-hour package includes volume resuscitation, lactate and blood culture collection, antibiotic therapy initiation and, in cases of volume-refractory hypotension, vasopressor therapy initiation and, after 6 hours, its reassessment^{5,6}.

The interventions proposed by the package are anchored in three fundamental points and of simultaneous onset that refer to the early recognition and stratification of severity, prevention and support of organs in dysfunction, treatment of the cause and control of the infectious focus. The effectiveness of sepsis rapid response systems, which prioritize the identification of patients at risk and with deterioration in their general condition, is directly related to time, as each hour of delay in initiating treatment represents a 4% increase in the risk of death^{7,8}.

Aligned with the multiprofessional team and updated on clinical recommendations, nurses play an important role in early recognition of sepsis, in the recommended actions during the first hours and in the monitoring and maintenance of specialized care for critically-ill patients. An intervention study evidenced that implementing care protocols managed by nurses can contribute to reducing progression of the disease and exert a positive impact on the survival of these patients, with the post-intervention group having a chance of increased survival in 30 days (OR: 2.7, 95% CI: 1.6 - 4.6). In addition to that, there was a lower probability of developing severe organ failure (OR: 0.7, 95% CI: 0.4 - 0.9) and a reduction in the mean hospitalization time of 3.7 days (95% CI: 1.5 - 5.9)⁹⁻¹¹.

Considering the constant updates proposed by the Surviving Sepsis Campaign initiative, it is important that clinical judgment and decision-making by nurses are guided by health care based on scientific evidence. In this sense, the implementation of care protocols is an efficient strategy to boost quality and safety in the process of caring for patients with a medical diagnosis of sepsis.

A preliminary search carried out on June 25th, 2021, was conducted with a view to identifying the existence of other available reviews that included the objective of this study. The survey involved the Cochrane database of systematic reviews, the Joanna Briggs Institute Evidence Synthesis and the Open Science Framework (OSF) repository, not finding data that would prevent this research from being conducted.

The objective of this study was to map the care protocols used by nurses for the early identification of sepsis in the hospital environment.

METHOD

This is a scoping review based on the Joanna Briggs Institute method and the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) instrument. This method is characterized by recognizing and mapping the main evidence about a knowledge area, in this case, the protocols managed by nurses in sepsis recognition, exploring research gaps. The study went through the stages of identifying the research question, searching for relevant studies, selection of the articles; extraction of data from the articles, and grouping of the results. The study protocol was previously prepared and made available in the Open Science Framework (OSF) repository at <https://osf.io/j7az2/>^{12,13}.

The research question was elaborated according to the PCC strategy, where P (Population): patients over 18 years of age with sepsis, C (Concept): Care protocols managed by nurses, and C (Context): Hospital environment. Thus, the following review question emerged: Which care protocols managed by nurses have been used for the care of adult patients with sepsis in the hospital environment?

The structured data collection procedure was carried out on July 17th, 2021, and an advanced search for primary studies took place through the Coordination for the Improvement of Higher Education Personnel (*Coordenação de Aperfeiçoamento de Pessoal de Nível Superior*, CAPES) portal, in the following databases: Scientific Electronic Library Online (SCIELO), *Literatura Latino-Americana em Ciências de Saúde* (LILACS) and *Banco de Dados em Enfermagem* (BDENF) via *Biblioteca Virtual em Saúde* (BVS), Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medical Literature Analysis and Retrieval System Online (Medline) via PubMed, Excerpta Medica dataBASE (EMBASE), Scopus, and Web of Science.

The sample consisted of the following eligibility criteria: studies that presented care protocols managed by nurses directed to patients with sepsis in the hospital environment, excluding studies in editorial format, letters to the editor, opinion articles, case and experience reports, review articles, articles that did not consider updating the sepsis evaluation protocol in the first and sixth hour(s) and those developed in the Neonatology, Pediatrics and Obstetrics

scopes. The following filters were applied: human species, articles in English, Portuguese or Spanish, available in full through the CAPES portal and with a time frame from 2017 to 2021, as it was the year of publication of the Surviving Sepsis Campaign update.

The Descriptors in Health Sciences (*Descritores em Ciências da Saúde*, DeCS), Medical Subjects Headings (MeSH) and Emtree (Embase Subject Headings) descriptors, as well as their non-controlled terms, were established from the PCC strategy and combined with the OR and AND Boolean operators. Synonyms were not considered for the “sepsis” descriptor, as they were not related to the updated nomenclature adopted in this review. The development of the search strategy, including all descriptors, was adapted for each database, as shown in Figure 1.

Databases	Search strategy
SCIELO	(*sepsis) AND (*protocolos de enfermagem or avaliação de enfermagem or cuidados de enfermagem)
BDENF, LILACS (Via BVS)	("sepsis") AND ("protocolos de enfermagem" OR "Cuidados de Enfermagem" OR " Avaliação de Enfermagem")
CINAHL	MH sepsis AND MH (nursing care or nursing interventions or nursing assessment or nurses or nursing management or nursing protocols)
PUBMED	(sepsis[MeSH Terms]) AND (nursing protocol OR nursing protocols OR nursing care[MeSH Terms])
EMBASE	'sepsis'/exp AND ('nursing protocol'/exp OR 'nursing care'/exp OR 'nursing assessment'/exp OR 'nursing intervention'/exp)
SCOPUS	(TITLE-ABS-KEY (sepsis) AND TITLE-ABS-KEY ('nursing AND protocol' OR 'nursing AND care' OR 'nursing AND assessment' OR 'nursing AND intervention'))
WEB OF SCIENCE	(TS=(sepsis*)) AND TS=(nursing protocol* OR nursing care* OR nursing assessment* OR nursing intervention*)

FIGURE 1: Chart corresponding to the search strategy by database. Rio de Janeiro, RJ, Brazil, 2021.

In order to read and select the titles and abstracts of the studies, the Rayyan Qatar Computing Research Institute tool was used (Rayyan QCRI - <https://rayyan.qcri.org>). Choice to use this review program was because it is free, removes duplicate articles and streamlines the initial screening using a reliable semi-automation process that incorporates a high usability and effectiveness level to the process¹⁴.

In this stage, the studies were selected by pairs, independently, with a third reviewer analyzing cases of disagreement and solving impasses. The articles that met the selection criteria established by the study were selected for full-reading. For the final selection, a thorough and critical reading of the full texts was carried out and the articles that met the eligibility criteria were selected. The articles were evaluated in detail and in full by two reviewers, and any divergence about the decision-making process was discussed among all the authors of this study.

Subsequently, an instrument was created to extract data from the articles selected, whose variables included the following: title; authors; year of publication; country where the study was conducted; objectives; study design; scenario in which the study was carried out; outcomes; description of the care protocol cited in the article and level of evidence.

The following was considered according to the Joanna Briggs Institute (JBI) Levels of evidence: Level 1 - Experimental research designs: 1.a) Systematic review of randomized controlled trials; 1.b) Systematic review of randomized controlled trials and other study designs; 1.c) Randomized controlled trial; 1.d – Pseudo-controlled, randomized trials; Level 2 - Quasi-experimental designs: 2.a) Systematic review of quasi-experimental studies; 2.b) Systematic review of quasi-experiments and other lower evidence study designs; 2.c) Prospectively controlled studies of quasi-experiments; 2.d) Pre- and post-test or retrospective historical controlled group studies; Level 3 - Observational - Analytical designs: 3.a) Systematic review of comparable cohort studies; 3.b) Systematic review of comparable cohorts and other lower evidence study designs; 3.c) Cohort study with Control Group; 3.d) Case-control study; 3.e) Observational studies without a Control Group; Level 4 - Observational - Descriptive studies: 4.a) Systematic review of descriptive studies; 4.b) Cross-sectional study; 4.c) Case series; 4.d) Case study; Level 5 – Experts' Opinion – Laboratory bench research studies: 5.a) Systematic review of experts' opinion; 5.b) Experts' consensus; 5.c) Laboratory bench research study/Experts' opinion¹⁵.

RESULTS

A total of 2,573 articles were identified in the databases researched and, after applying filters and removing duplicates, 366 were submitted to title and abstract analysis, excluding 331 articles due to the eligibility criteria and 35 advancing to the full-reading stage, with three of these articles not available through the CAPES Journals portal. 26 articles were also excluded for the following reasons: not presenting protocols; and not considering the updated

package for evaluation in the first hour, according to recommendations defined by Surviving Sepsis 3, totaling a sample of six articles.

The identification of studies via databases is represented by the PRISMA-ScR flowchart in Figure 2.

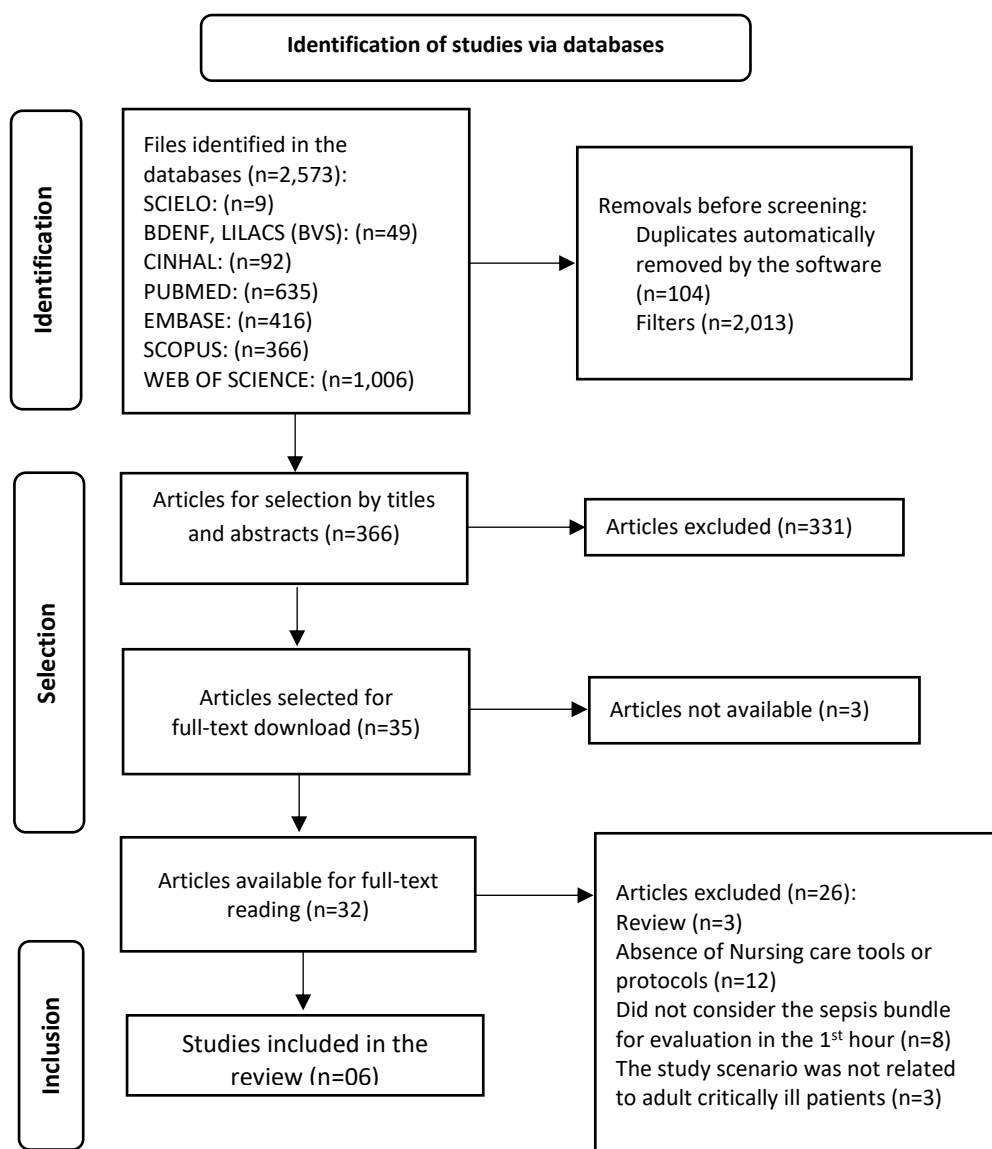


FIGURE 2: - Flowchart of the study selection process adapted from PRISMA-ScR. Rio de Janeiro, RJ, Brazil, 2021.

Among the articles selected, five were published in North American journals and one in Brazil. The year 2020 had the highest number of publications, corresponding to three articles, and 2021, 2019 and 2018 had one publication each. The synthesis of the articles included in the sample is presented in Figure 3.

Article	Title	Methodological Characteristics	Protocol	Outcome	JB I LE*15
A1 ¹⁶	<i>Implementation of the Surviving Sepsis Campaign one-hour bundle in a short stay unit: A quality improvement project.</i>	Quasi-experimental study Quality improvement project USA Emergency Service	1 st hour package - Surviving Sepsis 2018.	Increased adherence to the protocol by the Nursing team, optimization of blood culture and lactate collection time and administration of the first dose of antibiotic in the 1st hour.	2.d
A2 ¹⁷	<i>Implementation of a MEWS-Sepsis screening tool: Transformational outcomes of a nurse-led evidence-based practice project.</i>	Quasi-experimental study Quality improvement project USA Simulation Laboratory	MEWS-sepsis screening protocol	MEWS-Sepsis contributed to the early identification of sepsis by means of the first signs of severity, accelerating the implementation of interventions with a positive impact on reducing mortality.	2.d
A3 ¹⁸	<i>Improving Sepsis Bundle Implementation Times: A Nursing Process Improvement Approach.</i>	Quasi-experimental study Quality improvement project USA Emergency Service	<i>ER Nurse Sepsis Identification Tool (ERNSIT)</i>	Reduction in the mean time to implement the sepsis package by 458 min and in the time to administer the 1 st antibiotic dose by 101 min. Mortality was reduced by 5.9%.	2.d
A4 ¹⁹	<i>Implementation of a Vital Sign Alert System to Improve Outcomes</i>	Quasi-experimental study Quality improvement project USA Intensive Care	Electronic vital sign alert system	Training of the nurses working in the service with a 23% reduction in the mortality rate of patients with sepsis transferred to the ICU within 24 hours of admission.	2.d
A5 ²⁰	<i>Interdisciplinary Code Sepsis Team to Improve Sepsis-Bundle Compliance: A Quality Improvement Project.</i>	Quasi-experimental study Quality improvement project USA Emergency Service	Surviving Sepsis Package	The pre- and post-intervention analysis shows an improvement in time for each package element, except administration of antibiotics and collection of blood cultures. The mortality rate reduced from 12.45% to 4.55%.	2.d
A6 ²¹	<i>Validation of a care protocol for the septic patient in the Intensive Care Unit.</i>	Content methodological validation study Brazil Intensive Care	Nursing care for septic patients	The protocol showed agreement above 84%. Proving to be a contribution to guide Nursing professionals to effectively assist critical patients with sepsis.	5c

FIGURE 3: Synthesis of the studies included in the integrative review. Rio de Janeiro, RJ, Brazil, 2022.

*LE – Joanna Briggs Institute Level of Evidence

The articles that presented the highest level of evidence were studies with a quasi-experimental design, with before- and after-intervention analysis aimed at early identification of sepsis in critically ill patients, being classified as 2.d by the Joanna Briggs Institute (JBI) Levels of evidence and representing 83.3% of publications. The following stand out among the main outcomes found in the studies based on implementation of the protocols: increased adherence by the Nursing team to the minimum recommended time for collecting laboratory tests and blood cultures from the package and optimization in the administration of antimicrobials, both meeting the recommendations on interventions during the first hour, in addition to reducing the hospitalization times in Intensive Care Units (ICUs) and mortality.

The protocols evidence strategic moments of Nursing care for the early identification of sepsis and include the following: monitoring of oxyhemodynamic parameters; evaluation of clinical signs of severity; recognition of Systemic Inflammatory Response Syndrome (SIRS) criteria; monitoring and evaluation of laboratory tests; update against the international guidelines of Surviving Sepsis; monitoring of result indicators of protocol implementation (mortality rate, hospitalization time, time to implement the sepsis package), continuing education of the multiprofessional team, effective communication with the team and practicing clinical reasoning for evidence-based Nursing practice.

DISCUSSION

Early recognition is one of the main recommendations for the care of critically-ill patients with sepsis. A cohort study presented very favorable outcomes by showing early recognition of sepsis by nurses, with emphasis on monitoring and recording reliable clinical data, reducing disease progression and increasing survival, with an impact on reducing mortality, hospitalization times and readmission rates^{11,22}.

The care protocols managed by nurses mapped in this review included implementation of the Surviving Sepsis package anchored in quality improvement projects^{16,18,20}, use of tools for the early identification of clinical deterioration in septic patients using severity algorithms¹⁷, electronic alert systems¹⁹ and content validation of a Nursing care protocol in the ICU²¹.

According to the results identified, quality improvement projects guided implementation of the package of actions recommended by Surviving Sepsis^{16,18,20}. Projects developed and designed, based on the detailed study of the changes to be implemented, the understanding of the multiple factors necessary for their operation and the association of practical knowledge with scientific evidence, are more likely to result in sustainable changes and, therefore, achieve better results and higher health care quality^{23,24}.

Implementing quality improvement programs is a strategy recommended by the Surviving Sepsis campaign. The impact of these initiatives in Brazil resulted in a reduction in mortality from 55% to 26% and in hospitalization costs reduced from US\$ 29,300 to US\$ 17,500. Given this context, it is believed that the improvement of septic patients' prognoses can be achieved through Continuing Education and evaluation of care and treatment processes. Diversified education actions that provide nurses and the entire health team with knowledge, skills and attitudes will result in safer care for patients with sepsis²⁵.

A study carried out in Canada reports that Continuing Education actions contributed to maximizing nurses' skills in decision-making regarding the adequate management of protocols for early recognition of sepsis, exerting a satisfactory impact both on the administration of antibiotics in the first hour and on in-hospital mortality. Using active methodologies has been a recommended strategy to improve adherence and effectiveness of educational activities. The use of realistic high-fidelity simulation was tried as a teaching-learning strategy for the care of patients with sepsis in one study, and showed that nurses gained confidence and knowledge around the bundle actions and that, at the same time, improved the results in patient care^{26,27}.

The implementation of protocols is a strategy that combines practice based on the best evidence with systematized actions in the hospital environment. A number of studies have identified nurses' knowledge deficit in recognizing and effectively acting in the care of patients with sepsis, evidencing the need for continuing education actions for these professionals as a way to qualify their work process. It is advocated that the protocols can favor a reduction in care variety, stimulate assertive decision-making, collaborate in the analysis of process and result indicators, and optimize communication between the multiprofessional team and the care management. The articles in this review presented favorable outcomes regarding the implementation of protocols in the context of the care to be provided to patients with sepsis^{10,28-30}.

An article included in this review identified a screening protocol for early identification of sepsis, Modified Early Warning Scoring (MEWS-sepsis), which was initially tested in simulated scenarios and identified clinical deterioration of critically ill-patients with sepsis using severity algorithms¹⁷. A number of studies point to the innovative potential of this type of protocol and emphasize that they are used as organizational and care management support, favoring evaluation and recognition of signs of severity. This assists in directing clinical judgment and decision-making, which involve the adoption of evidence-based Nursing practices for sepsis management^{31,32}.

A protocol involving the use of electronic alert systems for the early identification of vital signs that have an interface with clinical signs of sepsis was identified in the review¹⁹. These are technologies designed to continuously connect, group and analyze the patients' clinical data, in addition to alerting the multiprofessional team when there is

a variation in predetermined signs. It is considered that, in general, they are moderately accurate, favor communication and can contribute to the early recognition of sepsis^{33,34}.

A study that described the development of a cross-platform hybrid mobile app, Nursing Alert®, which aims at assisting nurses in the systematization of their assistance in view of the risk of clinical deterioration of hospitalized patients, highlights that it can be a dynamic and accurate tool to assist nurses in their clinical judgment and in setting priorities for their patients. This makes it possible to define systematized actions, such as patients with sepsis, as it is based on the ILAS protocol, in addition to describing the patients' health status, directing care and suggesting better allocation for this type of patient³⁵.

A systematic review, which evaluated whether automated systems for early detection of sepsis might reduce the treatment package actions' time and improve the clinical results in critically ill patients compared to non-automated record-based systems, questioned the risk of possible technology errors and consequent incorrect detection of sepsis; thus, highlighting the risk of 'alarm fatigue' and continuous equipment maintenance as factors that can compromise patient safety. The existing evidence on the benefits of electronic systems is low and the most robust study of the systematic review type questioned whether such systems can replace periodic and careful monitoring of patients' clinical and laboratory signs by experienced health professionals, and updated on changes in sepsis protocols³⁶.

A study on the content validation of a Nursing care protocol in the ICU showed that using protocols for specific demands, such as the care of critically-ill patients with sepsis, establishes effective courses of action and procedures to optimize the work process. The study considered the following axes: screening for sepsis and recognition of the clinical manifestations, package of initial measures for sepsis and supportive treatment²¹.

The screening stage involves identifying at least two indicators of Systemic Inflammatory Response Syndrome (SIRS) and, in case of suspected sepsis, nurses contact the medical team. In the presence of organic dysfunction, the package actions are initiated. Dysfunction in sepsis is recognized through: hypotension - Systolic Blood Pressure (SBP) <90 mmHg or Mean Arterial Pressure (MAP) <65 mmHg or drop in Blood Pressure (BP) >40 mmHg; oliguria (diuresis ≤0.5 mL/Kg/h) or creatinine elevation (>2 mg/dL); Arterial Partial Oxygen Pressure (PaO₂)/Inspired Oxygen Fraction (FiO₂) ratio <300 or need for supplemental oxygen to maintain Peripheral Oxygen Saturation (SpO₂) >90%; platelet count <100,000/mm³ or 50% reduction in the number of platelets from the highest value recorded in the last three days; lactate above the reference value; lowered level of consciousness, agitation, delirium and significant increase in bilirubin (>2 times the reference value)^{6,7}.

In October 2021, some changes to the guidelines of the Sepsis Survival Campaign organized by the Society of Critical Care Medicine (SCCM) and supported by the Latin American Sepsis Institute (ILAS) were published. The new package specifies first hour actions and includes the following: measuring the serum lactate concentrations; obtaining blood cultures before starting antibiotics; initiating broad-spectrum antibiotics immediately after blood culture collection; starting volume resuscitation with 30 mL/kg of crystalloid for hypotension or lactate greater than or equal to 4 mmol/L; initiating vasopressor therapy if the patient has hypotension during or after volume resuscitation to maintain MAP >65 mmHg. If hypotension is not controlled after initial resuscitation, vasopressors should be initiated within the first hour to achieve MAP ≥65 mmHg³⁷.

The diverse evidence gathered from this review points to the importance of adopting projects to improve the quality of the care to be provided to patients with sepsis through the implementation of early identification protocols. This multifaceted strategy encompasses professional training, the creation of teams to support actions and the establishment of indicators to assess the results of the care process.

Study limitations

As a study limitation, it should be noted that, as this is a scoping review, the study did not assess the methodological quality of the articles that comprised the sample. It is worth mentioning the weakness of the publications based on the most up-to-date recommendations of Surviving Sepsis, as well as the inclusion of studies with higher levels of evidence related to protocols for early identification of sepsis.

CONCLUSION

When implemented based on improvement models, the care protocols managed by nurses for the early identification of sepsis in the hospital environment can boost the team's adherence to the development of care practices aligned with the recommendations of Surviving Sepsis. In addition to that, evidence-based health care contributes to improving quality indicators of the care for patients with sepsis.

The main outcomes described in the studies evidenced a positive impact in terms of reducing both mortality in critically ill patients due to sepsis and the ICU hospitalization time, optimizing the time of the Nursing interventions in the full execution of the package of measures recommended by Surviving Sepsis in the first hour.

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Conceptualization, D.M.H., B.S.R.C., J.L.O.S.; methodology, D.M.H., C.S.F., F.G.C.; software, B.S.R.C., J.L.O.S.; validation, D.M.H.; formal analysis, R.F.A.S., C.S.F., F.G.C.; investigation D.M.H., B.S.R.C., J.L.O.S.; resources, B.S.R.C., J.L.O.S.; data curation, D.M.H., B.S.R.C., J.L.O.S.; manuscript writing, D.M.H., B.S.R.C., J.L.O.S.; writing—review and editing, R.F.A.S., C.S.F., F.G.C.; visualization, D.M.H., R.F.A.S., C.S.F., F.G.C.; supervision D.M.H.; project administration, D.M.H.; funding acquisition, D.M.H., C.S.F., F.G.C. All authors have read and agreed to the published version of the manuscript.