Original Research Article

Significance of Nurses' Role in the Early Recognition and Management of Sepsis: A Systematic Review of Existing Reviews

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Abstract

Despite notable improvements in the understanding of the pathophysiology of sepsis, innovations in hemodynamic monitoring and methods of resuscitation, the cases of sepsis and septic shock still has a higher healthcare and economic burden and mortality. Yet, the significance of the nurses' role is not explored and utilized enough in the fight against sepsis and septic shock. To give emphasis to the nurses' role, this paper is a systematic review of existing reviews on sepsis following a research question: In patients with a suspected or confirmed sepsis, does specialized sepsis nursing assessment and intervention tool to standard nursing assessment tool improves management, outcome, and length of stay starting from the time of admission? This research question was formulated using the participant, intervention, (comparison), outcomes, and time frame (PICOT) formula. That is: (P) *In patient with existing or confirmed sepsis,* (I) *does specialized nursing assessment and intervention tool* (C) *to standard nursing assessment tool only* (O) *improves management, outcome, and length of stay* (T) *starting from time of admission?* Literature reviews and studies cited in this paper that explored sepsis recognizing the significance of the nurses' role were published in either international or national journals and online databases including CINAHL Cochrane, Proquest, Medline, PubMed, and Google Scholars. The archives were searched using the following eligibility criteria: Nurses and Sepsis/Septic shock; Nurse Led Pathways and Sepsis/Septic Shock. Eligibility criteria of participants included suspected or confirmed blood infection. Out of 30 articles found, only 6 were included in the review based on the eligibility criteria set out. This paper found that nurse- led sepsis pathways played an important role in improving the management and outcome of sepsis. It also found a significant reduction of length of stay starting from the time of admission for those who are suspected or confirmed presence of blood infection. In its recommendation, the paper suggested the creation and implementation of a nurse-led pathway for use within the hospital initially and then throughout the catchment areas eventually.
Keywords: Sepsis, nursing care Early identification and management, Nursing management of sepsis.

INTRODUCTION

With the rapid growth seen in medical science, technology, and know how relating to sepsis, 'multiple approaches and guidelines have been proposed to mitigate the burden of sepsis on healthcare outcomes either clinically or financially the impact of sepsis syndrome on healthcare outcomes is still significant' (Althunayyan *et al*, 2021). Sepsis is a life-threatening organ dysfunction that is caused by a dysregulated host response to infection (Singer *et al*, 2016). It is an extreme immune response to an infection with a significant impact on healthcare outcomes estimating an incidence of 49 million per year globally (Althunayyan, 2021). Altogether, sepsis, severe sepsis, and septic shock represent progression of a single illness associated with high morbidity and mortality (Dantes and Epstein, 2018). Sepsis/septic shock is a major cause of avoidable morbidity and mortality (Plowright, 2016).

In the United States, approximately 1.7 million adults develop sepsis annually (CDC, 2019). It is estimated that sepsis involves 31.5 million cases each year worldwide of which, 19.4 million are characterized by severe sepsis, accounting for 5.3 million deaths annually (Fleishmann, Scherag, *et al.,* 2016). Furthermore, one in three patients who dies in hospitals were diagnosed with sepsis (CDC, 2019). Patients who do survive sepsis are at high risk of developing chronic conditions that result in poor quality of life (Bateson and Patton, 2015). In previous systematic reviews, mostly studies performed in the United States, revealed that an essential analysis of the economic burden of sepsis concerned an evaluation between survivors and non-survivors because of a major difference in the mean total hospital costs per day – US$351 vs. US$948, respectively (Arefian, *et al*., 2017).

One of the most significant current discussions is that the Global incidence of this clinical syndrome has been placed at 30 million patients each year with up to 6 million deaths. In the United Kingdom, this translates to 200,000 cases 70% of which arise in the community and an estimated 52,000 deaths (Daniels and Nutbeam, 2019). Despite the significant morbidity, mortality and economic costs associated with sepsis, 10,000 deaths are thought to be preventable, and the care improved in 2 out of 3 patients (NHS, 2015). In Saudi Arabia, despite notable improvements in the understanding of the pathophysiology of sepsis, innovations in hemodynamic monitoring and methods of resuscitation, including pharmacological and surgical interventions, sepsis still remains one of the major causes of morbidity and mortality in critically ill patients.

In recent years, there has been sepsis cases not diagnosed until after admission, and those with increasing severity had a higher economic burden and mortality on a case-by-case basis. Methods to improve early identification of sepsis may provide opportunities for reducing the severity and economic burden of sepsis (Paoli *et al.*, 2018). Early recognition and appropriate management of a patient with sepsis saves lives (Bleakley and Cole, 2020). The following were identified as gaps in the identification of sepsis: delay in recognizing sepsis in 36% of affected patients; delay in recognizing severe sepsis in 52% of affected patients; and delay in recognizing septic shock in 33% of affected patients (Plowright, 2016). And the following were identifying as reasons for those delays in sepsis identification: incorrect calculation of early warning scores; missed by reviewing clinicians; lack of senior review; and clinician's lack of sepsis consideration during patient's review (Plowright, 2016).

To understand the impact of the nurses' role in the recognition of sepsis, this paper aims to review literature of works done on sepsis locally and globally and explore how frontline nurses can impact in mitigating the burden of sepsis on healthcare outcomes clinically or financially. This paper aims to make recommendations based on the conclusion arrived at through this systematic review.

METHODS AND RESULTS

This paper is a systematic review to investigate the effectiveness of a specialized nurse-led protocol in improving management, outcomes, and length of hospital stay of patients with suspected or confirmed blood stream infection. Systematic searches of published literature were undertaken. Literature reviews and studies cited in this paper that explored sepsis recognizing the significance of the nurses' role were published in either international or national journals and online databases including CINAHL Cochrane, Proquest, Medline, PubMed, and Google Scholars. The archives were searched using the following eligibility criteria: Nurses and Sepsis/Septic shock; Nurse Led Pathways and Sepsis/Septic Shock. Eligibility criteria of participants included suspected or confirmed blood infection. 30 case studies on sepsis and septic shock were identified for analysis. Out of the 30 articles found, only 6 were included in the review based on the eligibility criteria set out for this paper (See Figure 1).

The articles included in the review were appraised critically for quality and strength (see Table 1 below) utilizing the John Hopkins Nursing Evidence-Based practice tool – that has five levels of evidence (Level I to Level V). It also rated the quality of articles as follows: A – high quality; B – good quality; and C – low quality (See Appendix 1 for further details of the Tool).

Table 1: Synthesis of Articles included here in this table

Title	Author/s	Design/Sample	Interventions	Level of Evidence
Gaps and Improvement in management of Sepsis	Plowright, (2016)	Quasi-experimental study (n= 3,363 patients from 549 hospitals)	Descriptive, cross-sectional, quantitative and qualitative study	Level I-A
The Role of the Nurse in Caring for the Critical Patients with Sepsis	Branco *et al* (2020)	Integrative Literature Review (9 Articles)	Analyzed the care delivered to patients in critical care units	Level II-A
Study on Clinical Nursing Pathway to Promote the Effective Implementation of Sepsis Bundle in Septic Shock	Chua-Xia *et al*., (2021)	Randomized Control study (n=113 pts in control group) (n=113 pts in Treatment group)	Analyzed and compared statistical data between the control group and treatment group at 1 hr, 3 hr, and 6 hr time nodes from admission to ICU.	Level I-A
Promoting Early Identification of Sepsis in Hospitalized Patients with Nurse-led Protocols	Kleinpell, (2017)	Integrative Literature Review (14 Articles)	Analyzed the care delivered to patients with Sepsis using nurse-led pathways	Level II-B
Early Identification of Sepsis in Hospitalized Inpatients by Ward Increases 30-Day Survival	Torsvik, *et al* (2016)	Quasi-experimental prospectively controlled study. (n=479 pts in Pre-intervention group) (n=409 pts in Post-intervention group)	Evaluated the use of clinical tool for triage of SIRS and Organ Failure that could improve clinical observations in an Emergency Department of a Community Hospital	Level I-A
Early Identification of Sepsis: A Nurse-Driven Protocol to Reduce Morbidity, Mortality and Hospital Costs	Biju, (2021)	Integrative Literature Review (10 Articles)/ Quasi-Experimental study	Quantitative project evaluation design with pre- and post-implementation data were collected, measured and compared	Level I-A
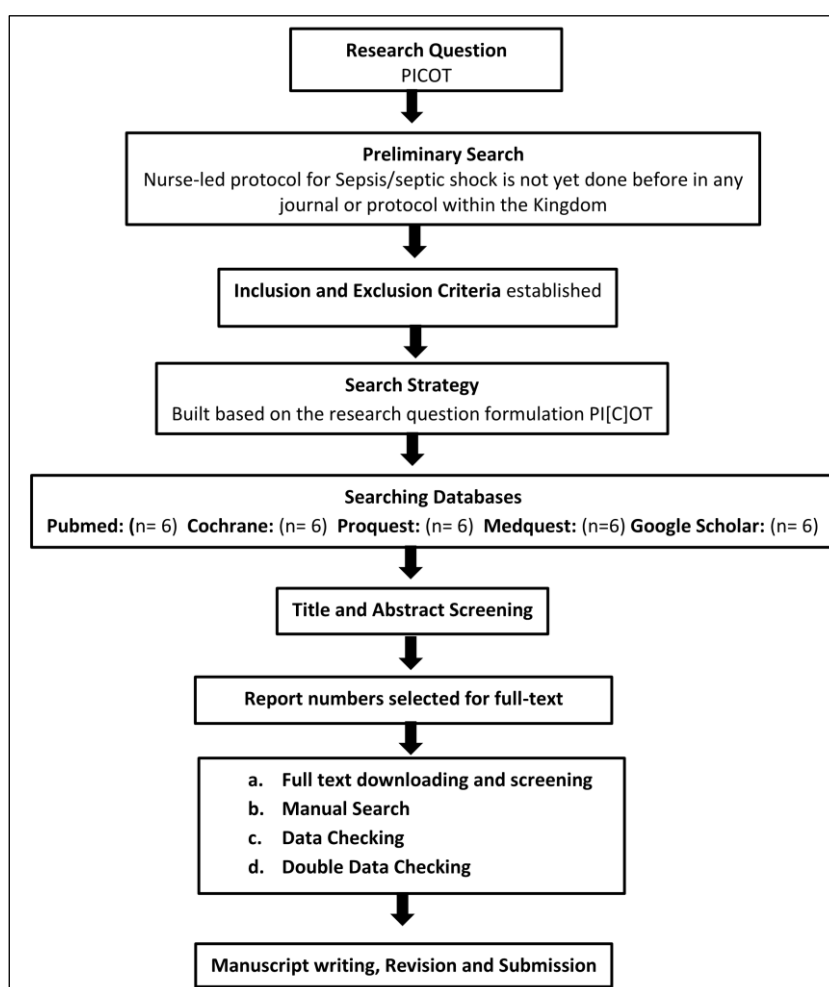
Figure 1: Flow Diagram of the Project
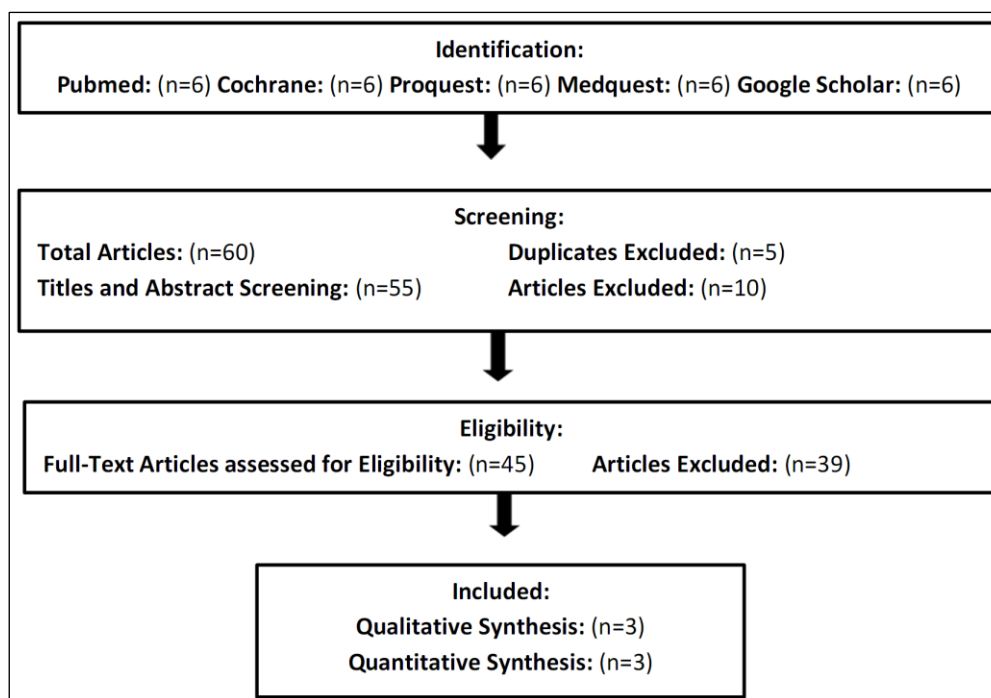
Figure 2: PRISMA Flow Diagram of Studies Screening and Selection

The main results of the 6 articles included in the review for this paper are shown in Table 2 below.

Table 2: Main Results of Articles included in this review

Title	Author/s	Main Result

Gaps and Improvement in management of Sepsis	Plowright, (2016)	▪ The quality of care received by a third of the patients with sepsis was good during admission and about 6% of patients received less than satisfactory care.
		 ▪ Sepsis is a killer and unless health professionals can recognize it and act accordingly, patients will continue to be harmed or die.
		 ▪ The recommendation for nurses and nursing practice included:
		   o Nurse managers ensure training of all nurses in the recognition of sepsis;
		   o ensuring hospital uses track and trigger/escalation system;
		   o Patients and family provided with written information about sepsis;
		   o Ensure availability of sepsis response kit in all clinical areas; a hospital lead clinician for sepsis and designated sepsis nurse;
		   o use early warning scores and record all physiological vital signs in a primary or secondary settings;
		   o escalate according to the early warning scores; learn to identify signs and symptoms of infection; use the SEPSIS 6;
		   o maintain accurate input and output record; administer prescribed antibiotic as soon as possible;
		   o Escalate to doctor or critical care outreach team ensuring immediate review of the patient; and ensure sepsis is mentioned in discharge summaries for GPs.

The Role of the Nurse in Caring for the Critical Patients with Sepsis	Branco, *et al* (2020)	▪ Reiterated the importance of creating/implementing rapid response protocol to guide the nurses in their approach to patient care of sepsis enabling nurses to implement fast and safe actions and prevent deterioration of patient's clinical condition. ▪ Training of the nursing staff in the identification of sepsis promotes good communication skills especially in articulating/communicating with the medical team and is necessary to avoid failures and delays throughout the sepsis nursing process. ▪ Recommended that healthcare institutions should invest in the implementation, monitoring, and evaluation of training programs, ensuring quality care to reduce morbidity and mortality rate from sepsis.

Title	Author/s	Main Result
		▪ Confirmed that training has a decisive influence on practice and can lead to faster, assertive, and confident interventions in all stages of sepsis, preventing disease progress. ▪ However, the paper emphasized that it is still necessary to continue investigating as the area of sepsis care is in constant update and should be discussed and debated in the scientific community.
Study on Clinical Nursing Pathway to Promote the Effective Implementation of Sepsis Bundle in Septic Shock	Chua-Xia *et al.*, (2021)	▪ The study found that active involvement of clinical nurses is very important to promote efficient diagnosis and treatment. It provided standardized treatment and management, improved communication and coordination among medical professionals, saved medical resources, and improved medical safety and patient satisfaction.
Promoting Early Identification of Sepsis in Hospitalized Patients with Nurse-led Protocols	Kleinpell, (2017)	▪ The "role of nurses in quality improvement of sepsis care is significant". ▪ Nurses' role in the recognition and treatment of sepsis is critical to improving sepsis related outcomes" and "ensuring adequate education for nursing staff is vital in establishing highly functional sepsis screening and sepsis management protocols". ▪ Claimed 'as sepsis remains a leading cause of mortality in critically ill patients worldwide, additional studies are needed to determine the most effective way to achieve sepsis bundle targets including the incorporation of nurse-led screening and treatment protocols'.
Early Identification of Sepsis in Hospitalized Inpatients by Ward Increases 30-Day Survival	Torsvik *et al* (2016)	▪ The study found that the post intervention group had a higher odd of surviving 30 days, lower probability of deteriorating to severe organ failure, with an average 3.7 days shorter length of stay compared to the pre-intervention group. ▪ The post intervention group were observed better by ward nurses compared to the pre-intervention group. ▪ The study concluded that early sepsis recognition by nurses may have reduced the progression of the disease and improve the survival rate of in-patients with sepsis.
Early Identification of Sepsis: A Nurse-Driven Protocol to Reduce Morbidity, Mortality and Hospital Costs	Biju, (2021)	▪ The evaluation of the outcome measures indicated that the number of patients who developed severe sepsis decreased from 12 during pre-implementation to 1 during the post-implementation of the tool. ▪ The number of patients for whom the doctor was notified within 30 minutes after change of patient condition improved from 19 patient during the pre-implementation to 27 during the post-implementation of the tool. ▪ The result demonstrated a significant improvement in using the Severe Sepsis Identification tool to reduce the number of patients developing severe sepsis albeit the result of using the tool for physician notification time was insignificant.

DISCUSSIONS

The studies in this literature review suggest that the general consensus of sepsis that early recognition and timely treatment largely determine outcome of sepsis and septic shock (Zhang *et al.*, 2017) and early recognition refers to the prompt identification of patients presenting with an acute systemic inflammatory response to infection. Depending on sepsis onset, this may occur in the emergency department (ED), ICU, general ward or even during the pre-hospital phase (Yealy DM *et al.*, 2015). Bleakley & Cole (2020) had explained how a sound understanding of the pathophysiology of sepsis can equip the nurse with the knowledge needed to ensure prompt action and save lives. Nurses are the health professional that has greatest contact with high-risk patients. As such, they are uniquely placed to use clinical guidelines and make a rapid detection of the syndrome and then activate appropriate interventions.

In particular, the integration of early warning scores is a proven template that can 'track and trigger' clinical deterioration and ensure patient safety and timely intervention (Bleakley & Cole, 2020). Skilled nursing care is essential for the early detection, management and escalation of patients with sepsis in acute and critical care (Kleinpell *et al.*, 2013). It is important to note that primary care settings have a different pre-hospital sepsis screening tool and action tool. If the NEWS score is above 3 and/or the patient looks sick then sepsis should be considered. Significantly, the prehospital sepsis screening tool advises practitioners to arrange immediate transfer of the patient to a 'designated destination' and

'communicate likelihood of sepsis at handover' (Daniels and Nutbeam, 2019).

Nurses play a fundamental role in detecting changes in physiological observations that could indicate the onset of sepsis – as 'an awareness of the pathophysiology of sepsis allows nurses to better understand how rapid intervention prevents the onset of septic shock' and 'knowledge and use of clinical guidelines and sepsis screening tools are established methods to help reduced mortality' from sepsis (Bleakley *et al.*, 2020). And the need for nurses to be knowledgeable of sepsis cascades and treatments were emphasized (Jorgensen, 2019). In addition, nurses' familiarity with 'red flag' criteria for sepsis and thorough completion of early warning scores facilitate earlier recognition and time critical intervention (Bleakley *et al.,* (2020).

CONCLUSIONS

As nurses are in a unique position to make that first crucial assessment to detect sepsis (Biju, 2021), the significant role of nurses in the identification of patients with sepsis as they have constant patient interaction should be emphasized (Kleinpell, 2017). To understand the impact on sepsis and septic shock, nurses need to know the signs and keep up to date with the latest evidence-based best practices (Biju, 2019). The integration of sepsis screening as part of routine nursing patient's assessment and patient care rounds as evidenced by number of studies establishing the impact of nurse-led sepsis screening interventions in improving early recognition of patients with sepsis should be given emphasis (Kleinpell, 2017). To that end, this paper recommends that there is a need to create and implement a sepsis screening tool, educate and train the nurses in using the tools, and conduct further study to understand the benefits of the screening tool and the nurses' role in the reduction of avoidable death caused by sepsis and septic shock.

Conflict of interest
None declared.

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Appendix 1:
John Hopkins Nursing Evidence Based Practice Model

Evidence Level	Quality Rating
Level I - Randomized Controlled Trials (RCT) - Experimental Studies - Systematic Reviews (SR) of RCTs with or without meat-analysis	**A -High Quality** Officially sponsored material by government organization, professional, private, or public organization, developed or revised within the last five years, clear aims and objectives, consistent results across multiple settings, definite conclusion**s** with scientific rationales.
Level II - SR with RCT and Quasi-experimental - Quasi-experimental with or without meta-analysis - Quasi-experimental	
Level III - Non-Experimental Studies - SR with RCTs, - Quasi-experimental and Nonexperimental studies with or without meta-analysis - Qualitative studies - SR with or without meta-synthesis	**B- Good Quality** Officially sponsored by government agency or a professional, public or private organization, written or revised in the last five years, consistent results, clear aims and objectives, some reference to scientific evidence, reasonably consistent recommendations, relatively definitive conclusions, credible expertise with materials with logical arguments
Level IV - Clinical practice guidelines - Consensus panels	
Level V - Literature reviews - Case reports - Program or financial evaluation - Opinions of experts	**C- Low Quality** Poorly defined, not sponsored by an official organization or agency, contained insufficient evidence and insufficient results, limited literature search strategies, conclusions inconclusive, not revised in the last five years, inconsistent results, aims and objectives unclear, no recommendations, expertise not discernable.