SEPSIS EDUCATION UTILIZING ‘SEPSIS ALERT’ CHECKLIST TO SUPPORT THE ADHERENCE OF EARLY MANAGEMENT BUNDLE IN THE EMERGENCY DEPARTMENT

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ABSTRACT

Early recognition and timely management of sepsis is a priority within hospitals due to its direct impact on patients’ outcomes. It is critical for healthcare providers to be educated and aware of the signs and symptoms of sepsis. The emergency department (ED) is the forefront of the hospital where majority of patients with sepsis are assessed and either discharged or admitted into the hospital. Therefore, it is critical for ED nurses to be educated in the early signs of sepsis and follow evidence-based practice guidelines when managing these patients. The project leader implemented a sepsis education intervention aimed at clinical practice guidelines and introduced the ‘Sepsis Alert’ checklist. This checklist provided a visual guide of interventions and treatment needed for patients presenting with sepsis. A preeducation questionnaire was provided, and a post education questionnaire was completed one month after education implementation. The quality improvement nurse provided the project leader with both the mortality rate and Centers for Medicare & Medicaid Services (CMS) early management bundle rate pre and posteducation implementation. Retrospective review of the questionnaire results indicated an increase in nurses’ knowledge of sepsis and comfort in taking care of patients with sepsis. There was also significant improvement in the adherence to CMS early management bundle rate. These findings suggest that sepsis education with utilization of a ‘Sepsis Alert’ checklist may improve the nurses’ knowledge and comfort for taking care of patients with sepsis and increase the adherence to clinical practice guidelines.

*Keywords:* Sepsis, ‘Sepsis Alert’ checklist, education, evidence-based practice guidelines
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SECTION ONE: INTRODUCTION

Sepsis is a time sensitive medical emergency requiring early identification and intervention to improve patient outcomes. Sepsis continues to be a major healthcare challenge for health systems worldwide. In the U.S., over 970,000 sepsis cases are identified and admitted annually, with the number of admissions rising year after year (Paoli, Reynolds, Sinha, Gitlin, & Crouser, 2018). A two-decade study of U.S. hospitalizations recognized an increase in the incidence of sepsis among hospitalized patients by 8.7 percent annually (Paoli et al., 2018). In thirty to fifty percent of patients, sepsis treatment is started in the emergency department (ED) (Quinten, van Meurs, Wolffensperger, ter Maaten, & Ligtenberg, 2018). Detecting sepsis early and initiating immediate interventions for patients entering through the ED directly impacts patients’ outcomes.

There have been occurrences in a 176-bed community hospital where patients with sepsis were not identified early, and time sensitive sepsis management had been delayed. The 2018 performance summary data for this community hospital early management bundle (SEP-1) was 35.8% compared to the national average of 51% (medicare.gov, n.d.). Nurses play a critical role in early sepsis identification and initiation of targeted treatments. The nurse’s ability to recognize a patient’s vital signs and physical condition is critical to early sepsis management. For comprehensive screening, nurses must be familiar with sepsis risk factors, predisposition for infections, and factors that may contribute to organ dysfunction (Drahnak, Hravnak, Ren, Haines, & Tuite, 2016). Not only is developing a sepsis awareness and education program a priority, but investigating the nursing protocol itself, as well as the utilization of the nursing protocol becomes a necessity.
Background

Sepsis is a life-threatening medical emergency, where failure to start clinical interventions can result in acute organ dysfunction with hypotension, leading to a death mortality rate of 50% in high risk populations (Bentley, Henderson, Thakore, Donald, & Wang, 2016). Sepsis occurs with a source of infection and evidence of systemic inflammatory response syndrome (SIRS) to the infection. It is measured by two or more of the SIRS criteria: a temperature greater than 100.4°F or less than 96.8°F, tachycardia (heart rate > 90 beats/minute), and tachypnea (respiratory rate greater than 20 breaths/minute; Perman et al., 2012). Lab findings of sepsis include white blood cell count greater than 12 thousand/mm3 or less than 4 thousand/mm3, or greater than 10% immature cells, concluding the fourth SIRS criteria (Perman et al., 2012). The SIRS response coupled with presentation of end organ dysfunction due to microvascular compromise and hypoperfusion, represents severe sepsis (Perman et al., 2012).

Sepsis is the leading cause of death, morbidity, and expense; resulting in one-third to one-half of deaths of hospitalized patients (Howell, & Davis, 2017). According to the most recent Center for Disease Control (CDC) report, each year 1.7 million adults in the U.S. develop sepsis and an estimated 270,000 die of sepsis annually (CDC, 2016). The incidence of sepsis is rising due to the aging population with multiple comorbidities, increased use of immunosuppressive therapy, and high-risk treatment interventions (Keeley, Hine, & Nsutebu, 2017). The management of sepsis is a clinical challenge, demanding early identification and management of the infection. Previously, invasive management and aggressive resuscitation of a septic patient occurred in the intensive care unit; however, upon further research, sepsis has been identified as a time-sensitive critical disease, requiring early management of care (Perman, Goyal, & Gaieski, 2012). Two-thirds of patients with sepsis enter the hospital through the emergency department;
therefore, early identification and management of patients with sepsis is critical (Perman et al., 2012).

The cost of sepsis management in U.S. hospitals ranks highest among admissions for all diseases (Paoli et al., 2018). In 2013, sepsis accounted for more than $24 billion in hospital expenses, which is currently more than twice the cost of other disease conditions, and it continues to increase at three times the rate of other admissions (Paoli et al., 2018). As for mortality and length of stay, average daily costs were viewed in 2013 to increase significantly with increasing sepsis severity: $1,830 for sepsis, $2,193 for severe sepsis, and $3,087 for septic shock (Paoli et al., 2018). The timing of sepsis identification and diagnosis is essential in relation to outcomes, given the acute and critical impact of the condition. Poor sepsis outcomes are viewed when diagnosis and management are delayed, and when sepsis develops or is not identified until post hospital admission (Paoli et al., 2018).

**Surviving sepsis campaign.** The Surviving Sepsis Campaign (SSC) was started in 2002 with the goal to reduce mortality from sepsis by 25% using a 7-point agenda: building awareness of sepsis, improving diagnosis, increasing the use of appropriate treatment, educating healthcare professionals, improving post-ICU care, developing guidelines of care, and implementing a performance improvement program (SSC, 2019). Since 2002, phase IV, reinvigoration of the campaign, has been implemented with changes of the sepsis bundle from 3 hours and 6 hours to 1 hour to advocate more rapid interventions for adult sepsis and septic shock patients (SSC, 2019). Based on the 2016 SSC guidelines, a revised one-hour bundle with five key elements was developed: (1) measure lactate level, remeasure if greater than >2mmol/L; (2) obtain blood cultures prior to antibiotic administration; (3) administer broad-spectrum antibiotics; (4) begin rapid administration of 30mL/kg crystalloid for hypotension or lactate ≥4mmol/L; (5) use
vasopressors if hypotension during or after fluid resuscitation to maintain MAP ≥65mm Hg (Levy, Evans, & Rhodes, 2018).

The Hour-1 bundle supports clinicians to act swiftly to obtain blood cultures, administer broad spectrum antibiotics, initiate appropriate resuscitation measure lactate, and being vasopressors if clinically indicated (SSC, 2018). The June 2018 update was recognized as the hour-1 bundle with the objective being that resuscitation and management begins immediately. There is substantial international evidence that demonstrates implementing the SSC sepsis bundles is associated with improved outcomes (Schorr, 2018). In a single-center U.S. study, investigators described a severe sepsis and septic shock mortality reduction to less than 10% with improved bundle adherence (Schorr, 2018). Similar results were observed internationally; results of the sepsis bundle implementation over 7.5 years found that participating in the quality improvement programs was linked with decreased mortality and reduced hospital costs (Schorr, 2018).

In 2015, CMS mandated hospital reporting of the early management of sepsis and septic shock core measures (SEP-1), which closely follows the 3- and 6-hour SCC bundles (Schorr, 2018). SEP-1, CMS early management bundle is targeted for adults 18 years and older with diagnosis of severe sepsis or septic shock. This bundle is consistent with the SSC guidelines in assessing lactate, obtaining blood cultures, administrating broad spectrum antibiotics, fluid resuscitation, vasopressor administration for hypotensive septic shock, reassessment of volume status and tissues perfusion, and repeat lactate measurement (CMS, 2016). These elements should all be performed in the early management of severe sepsis and septic shock. The evidence for all components of this measure is directly related to decreases in organ failure, hospital mortality, length of stay, and costs of care (CMS 2016). For this project, CMS early management
bundle (SEP-1) rate was provided by the quality improvement nurse for pre and posteducation intervention.

**Sepsis protocol & education.** A protocol for resuscitation of patients with severe sepsis and septic shock has become a widely recommended standard. There is evidence indicating the importance of sepsis awareness, early recognition and treatment management directly impacting patient’s outcome, length of hospital-stay, and cost of care. The implementation of sepsis bundles is the cornerstone of sepsis performance improvement programs, which are linked with significant increase in compliance with sepsis bundles and a decrease in mortality rates (Kim & Park, 2019). This highlights the need for hospital staff to be education about the early signs and symptoms of sepsis and the clinical guidelines for managing patients with sepsis. Included are the studies supporting sepsis education and utilization of protocols. Hospitals and health systems should utilize programs to improve sepsis management including sepsis screening (best practical statement; Howell & Davis, 2017). Since infection causes sepsis, treating the infection may be the most critical factor of sepsis therapy. Mortality increases when there is a delay of antimicrobials (Howell & Davis, 2017).

Nurses play a pivotal role in improving outcomes for patients with sepsis or septic shock, as they can recognize signs and symptoms, implement treatment, assist with removing barriers to care, and promote education (Schorr, 2018). Therefore, increased compliance to the sepsis hour-1 bundle is imperative to providing optimal patient care. Promoting education for a sepsis education program is critical, which includes guidance for sepsis screening, a process to communicate findings, and knowledge of the hour-1 bundle components to keep nurses up to date with current evidence-based practice guidelines (Schorr, 2018).
Guidelines providing best practical statements for hospitals and health systems to create formal sepsis performance improvement includes resource tools such as order sets, checklists, posters, reminder cards, and electronic medical records to assist the health care team in early recognition and appropriate treatment management of sepsis (Howell & Davis, 2017). For this project, the nurse-initiated sepsis protocols included pre-set orders that the ED nurse can order in the patient’s electronic medical record (EMR). This allows time-sensitive orders to be initiated and collected while waiting to be seen. The sepsis protocol includes chest x-ray, two sets of blood cultures, complete blood count with differential, comprehensive metabolic panel, lactic acid, and a urinalysis. The benefits of sepsis education and awareness in the ED include the knowledge provided in recognizing patients with sepsis early and initiating sepsis management in a timely manner. Sepsis education provides the nurses with the knowledge, resources, and checklist to assist the management of patients with sepsis.

**Sepsis alert.** This project included a sepsis education intervention for the ED staff and a ‘Sepsis Alert’ checklist. The purpose for the new ‘Sepsis Alert’ process and checklist was to provide timely and complete care to the patient with suspicion of severe sepsis and septic shock. Delay in care results in greater mortality, longer length of hospital-stay, and inability to return to the patients’ preferred setting. This process included a paper ‘Sepsis Alert’ checklist (Appendix E) to visually guide the nurses’ care for the patient suspected of sepsis. This two-page checklist included the SIRS criteria; indicators of infection; criteria for sepsis, severe sepsis, and septic shock; suggested first antibiotics for sepsis; and an area to list the sepsis team involved. To initiate this ‘Sepsis Alert,’ the nurse would communicate with the physician to see if an alert is necessary for the patient, if agreed, the ED secretary would call the operator to inform them that a ‘Sepsis Alert’ was called on a specific patient. The operator would then send hospital pages to
the ED charge nurse, patient care supervisor, respiratory therapist, pharmacy, laboratory, imaging resources, and quality/safety resources. These pages expedited the care for the patient, allowing the necessary team members to prioritize patient care and prepare for hospital admission.

**Problem Statement**

A gap in sepsis awareness, education, and management was identified among the ED staff (nurses, techs, and physicians) of the community hospital where the study occurred. A sepsis awareness program implementation became a priority in order to improve their CMS bundle rate, mortality rate, and decrease variances. The percentage of patients who received appropriate care for severe sepsis and septic shock was 26%, with the national average being 51% during the period of 4/1/2017 to 3/31/2018 (medicare.gov, n.d.). The issue is minimal sepsis awareness for ED nurses to apply clinical practice guidelines when treating patients with sepsis in the ED. Various studies indicate that there is a pressing need to improve sepsis care not only to meet CMS measures but to also provide evidence-based patient care. This process begins with educating ED nurses in recognizing patients with sepsis, increasing awareness in severe sepsis and septic shock patients, and empowering them to utilize nursing protocols early.

**Purpose of the Project**

The purpose of this project was to implement and evaluate a sepsis educational intervention program using evidence-based practice guidelines to support ED nurses by providing quality education, resources, a ‘Sepsis Alert’ checklist, and protocols to properly care for patients with sepsis. This project was important to the 176-bed community hospital where the project took place as evidenced by the gap in nurses failing to recognize clinical manifestations of sepsis and its timeliness of care. The aim of this project was to increase nurse’s self-reported
knowledge of sepsis, their comfort in taking care of patients with sepsis, and the utilization of the nurse-initiated sepsis protocol.

Clinical Question

Can providing sepsis education to the ED nurses increase nurses’ knowledge and comfort in caring for patients with sepsis and increase adherence to CMS early management bundle?

SECTION TWO: LITERATURE REVIEW

A review of literature was performed using a search strategy. Then a critical appraisal was completed to review the studies strengths and limitations. Lastly, a synthesis was completed to conclude the findings within the context of the clinical question.

Search Strategy

Databases used for the systematic search for literature include: CINAHL, Cochrane Library, JAMA, EBSCO, ProQuest Nursing & Allied Health Database, and Medline. The keywords used were sepsis, ED management of sepsis, the nurse’s role in sepsis, and sepsis education. Parameters of the literature search included articles in the English language, articles within the last 5 years, full text, and peer reviewed articles. The word, “OR” was used to broaden the scope of articles, and the word “AND” was used to narrow the scope of articles. The literature review consisted of professional and medical peer reviewed journals, evidence-based guidelines, and clinical resources. Both the Emergency Nurses Association (ENA) and American College of Emergency Physicians database were used to access evidence-based guidelines and additional literature support for sepsis education in the ED.

An estimated 70 articles were reviewed. Using the Melnyk levels of evidence, inclusion criteria included original research and a minimum level of evidence VI studies examining sepsis education, performance improvement programs, early detection and management of sepsis, and
utilization of sepsis protocols. In addition, studies of prevalence and incidence from prior to 2014 were excluded to include only most recent statistics. Once inclusion criteria was applied, there were 40 studies remaining. Of the 40 studies available, 12 studies remained for review. The remaining studies were excluded if they did not pertain to sepsis education and use of clinical guidelines in the ED.

**Critical Appraisal**

Each study was critically appraised and the evidence graded using the Melnyk levels of evidence. The table of evidence used as a matrix is included in the literature review and is provided (Appendix A). Twelve studies were critically appraised and synthesized. There were two case-control studies (LeConte et al., 2017; McDonald et al., 2018), three systematic reviews (Baker, 2016; Damiani et al., 2015; National Guideline Centre, 2016), and seven qualitative studies (Armen et al., 2016; Bentley, Henderson, Thakore, Donald, & Wang, 2016; Bruce, Maiden, Fedullo, & Kim, 2015; Ferguson, Coates, Osborn, Blackmore & Williams, 2019; Mitzkewich, 2018; Romero, Fry, & Roche, 2017; Tedesco et al., 2017). The studies reviewed were peer-reviewed articles with a sample size that was appropriate for the research purpose. The assessment of bias was evaluated in each study by confounding factors: illness severity, age, and race; since they have the greatest impact on the outcome of patients with sepsis. Studies indicate that acute infections, worsening preexisting chronic disease, or new chronic diseases lead to poor long-term results in acute illness survivors (Mayr, Yende, & Angus, 2014). People of older age, male gender, black race, and preexisting chronic health conditions are inclined to develop severe sepsis; therefore, prevention methods should be essential for these vulnerable populations (Mayr et al., 2014).
Findings and discussion in the studies reviewed presented clearly where the reader was able to understand the results and implications to practice. Multiple studies that are critically appraised and synthesized are used in systematic review, which greatly reduces bias. These reviews were used to support the impact of sepsis education and quality improvement programs. The systematic review performed by the National Institute for Health and Care Excellence (NICE) indicated training and education on sepsis impacted knowledge, changed behavior, and improved processes of care. A systematic review of observational studies performed by Damiani et al. (2015) highlighted the benefits of performance improvement programs. This review discussed the different observational studies performed to see which quality improvement approach would provide the greatest adherence to the sepsis bundle. The strengths of this study included data extraction methods where unadjusted binary data were collected to calculate odds ratio for compliance and random effects model were used for data synthesis, limiting bias and personal perspective.

Limitations of the reviewed studies include the inability to generalize (Romero, Fry, & Roche, 2017; Tedesco et al., 2017), deficiency in documentation (Armen et al., 2016), generalizing patients with sepsis to include patients with severe sepsis and septic shock (McDonald et al., 2018), small sample sizes (Baker, 2016), changes in the SSC bundles during program implementation (Damiani et al., 2015; LeConte et al., 2017; Tedesco et al., 2017), sepsis training impact not evaluated (Bruce, Maiden, Fedullo, & Kim, 2015), and inability to measure specific contribution (Ferguson, Coates, Osborn, Blackmore, & Williams, 2019). Although these reviewed studies had limitations, there was purposeful significant data supporting sepsis education in the ED.

Synthesis
The evidences evaluated indicated sepsis mortality may be improved by early identification and appropriate treatment based on evidence-based guidelines (Armen et al., 2016). EGDT was created for early detection of sepsis and timely optimization of hemodynamic parameters by continuous monitoring of central venous oxygen saturation, central venous pressure, mean arterial pressure, and urine output (Kim & Park, 2019). However, there are inconsistencies throughout the literature, questioning if EGDT is beneficial to the patient outcome versus conventional treatment of patients with sepsis. Three international multicenter trials did not show any significant survival benefit compared to usual patient care (Kim & Park, 2019). Additionally, a meta-analysis of individual participants in three randomized controlled trials highlighted that EGDT did not lead to better outcomes, but increased hospitalization costs (Kim & Park, 2019). These finding may be due to the changes in the sepsis guidelines from 2012 to 2016. The most significant guideline update removes specific EGDT end points and emphasizes frequent reevaluation of patient specific hemodynamic therapy (Howell & Davis, 2017). This is due to the persistence of a positive daily fluid balance over a period of time impacting higher mortality rates in patients with sepsis (Kim & Park, 2019).

**Impact of sepsis education.** A systematic review was performed to examine both quantitative and qualitative evidence of education for sepsis recognition and management (National Guideline Centre, 2016). The review included studies observing different populations of health professionals and settings. Clinical evidence from this review indicated that education and training for sepsis recognition and management suggest: knowledge of sepsis and sepsis management to increase following education and training, important process of care and patient outcomes may improve by education and training, and mixed evidence for impact of education and training on adherence to protocols (National Guideline Centre, 2016). Recommendations on
training and education from the NICE 2016 guidelines include: (a) ensure all healthcare staff involved in assessing patients’ clinical conditions are provided regular appropriate training in identifying people suspected of sepsis, and (b) Ensure all healthcare professionals involved in triage or early management are given regular appropriate training in identifying, assessing, and managing sepsis (National Guideline Centre, 2016). Additionally, another study using a pre and postintervention survey method indicated that sepsis educational sessions provided nurses the knowledge to identify and preempt early interventions and prompt doctors in decision making (Bentley, Henderson, Thakore, Donald, & Wang, 2016). Education alone was able to improve compliance with resuscitation and management bundles and reduce mortality (Damiani et al., 2015).

There is substantial evidence supporting the impact of sepsis educational programs (Armen et al., 2016). An educational project was implemented focusing on early recognition and assessment of sepsis, rapid antibiotic administration, and initial fluid resuscitation (Armen et al., 2016). This study included a research team who designed a severe sepsis and septic shock bundle sets for the ED and inpatient units. There was also a system-wide comprehensive approach to educating all clinicians on sepsis, which included e-learning modules, sepsis reference pocket guides, sepsis bundle posters, antibiotic algorithm with infusion rates, and sepsis reference lists completed and published on the infection control website for access. After the intervention period, patients with sepsis had 30% lower odds of dying and a decrease of 1.07 few days in the intensive care unit. Part of this system initiative included a baseline survey to assess clinical staff knowledge on sepsis. The development of an in-hospital sepsis program that incorporated education of health care staff and process changes was shown to improve guideline adherence and survival rates in patients admitted to the intensive care unit (Armen et al., 2016).
The impact of performance improvement programs. Though EGDT may be an inconsistent concept, the emphasis on early recognition and early treatment remains consistent throughout the literature. Increased awareness of sepsis and significance of the importance of early treatment have helped increase survival rates (Vincent, Pereira, Gleeson, & Backer, 2014). Additionally, performance improvement programs have been related to significant increase in compliance with the sepsis bundles and reduction in mortality (Kim & Park, 2019). In order to facilitate early identification of patients with sepsis, quality sepsis awareness programs following evidence-based guidelines are essential. In-hospital patients are usually admitted through the ED; therefore, it is imperative for the triage nurse to use sepsis screening on all patients who enter the ED. Sepsis education and team collaboration is an integral part of identifying and treating patients with sepsis.

A systematic review and meta-analysis of observational studies performed by Damiani et al. (2015) indicated that education itself was able to improve compliance with the complete resuscitation and management bundles associated with reeducation in mortality for patients with sepsis. Merely implementing process change programs were only able to improve compliance with the resuscitation bundle, but still displayed significant and consistent reduction in mortality (Damiani et al., 2015). Ultimately, the greatest increase in adherence to 6-hour and 24-hour bundles was displayed by implementing both an educational program and process change, which were also linked with the greatest survival benefit (Damiani et al., 2015). Furthermore, in 2017 the World Health Assembly and World Health Organization adopted a resolution that supported governments and healthcare workers to implement appropriate methods to address sepsis (Kim & Park, 2019). Sepsis should be viewed as a medical emergency and increasing the level of awareness of sepsis is imperative to optimal patient outcome. The implementation of sepsis
bundles is the foundation of sepsis performance improvement programs, which are associated with significant increase in compliance with the sepsis bundles and a reduction in mortality rate (Kim & Park, 2019).

**The impact of nurse directed sepsis care.** Through the bundled approach and nurse-based sepsis care, sepsis mortality can be reduced; however, the challenge may be the inconsistency of bundle adherence. A multi-phase quality improvement initiative was performed in a multidisciplinary healthcare network hospital in Seattle. This project implemented a sepsis program emphasizing nurse-led identification and treatment of early sepsis before the development of septic shock, which included traditional bundle adherence and reduced in-hospital sepsis related mortality rate (Ferguson, Coates, Osborn, Blackmore, & Williams, 2019). Over the seven-year pre-to-post intervention evaluation period, the ED sepsis bundle adherence increased from 40.5% to 73.7%. Rapid response team calls decreased from 2.2% to 0.85% and the in-hospital sepsis related mortality rate decreased from 12.5% to 8.4%. Ferguson et al. (2019) concluded that the resources that led to the successful implementation of this quality improvement initiative included the support for nursing empowerment by executives and physicians supporting change movement, the institution’s dedication of resources, data analysts, and a nurse sepsis coordinator.

SSC recommendations include hospital systems benefiting from programs identifying sepsis. The SSC improvement project purpose is for earlier recognition of sepsis through the use of screening tools and sepsis care bundles. The first step in raising awareness of sepsis is to educate the staff, including triage personnel, ED nurses, and staff nurses. This process is vital to sepsis awareness and the survival rate of patients with sepsis. Additionally, it is recommended to incorporate an education program related to sepsis, signs and symptoms, protocols, and treatment
into the new hire orientation for ED nurses, as well as yearly competencies to include recognition of severe sepsis, protocols, and treatment (Walters, 2018). It is innate within nurses to educate other staff members, patients, and family regarding sepsis and risks of progression. Raising the awareness of sepsis is helpful to working toward best practices (Walters, 2018). Through the work of the ED staff, many lives of patients with sepsis can be saved through sepsis screening, early intervention, and early treatment (Walters, 2018).

**Impact of sepsis education on mortality.** It is a well-known fact that sepsis is the leading cause of death in the U.S.; however, healthcare providers continue to struggle with timely recognition, diagnosis, and treatment of patients. Both the CMS and the National Quality forum have recognized this diagnosis as a priority, yet many patients with sepsis are identified late, resulting in morbidity and death (Tedesco, Whiteman, Heuston, Swanson-Biearman, & Stephens, 2017). A quality improvement project was performed in a 38 bed ED with annual patient volumes of more than 40,000 visits. The methods included sepsis education on the symptoms and treatment, and institution of a screening and management algorithm tool containing early identification triggers and the interventions to perform according to the SSC guidelines (Tedesco et al., 2017). During the first four months after implementation of the project, more than 240 patients were screened, assessed, and treated following the algorithm. The project outcomes included an increase in staff knowledge of sepsis, a decrease in length of stay by 3 hours, and a significant decrease in mortality in comparison to the previous year’s coded data.

**Conceptual Framework**

The Iowa Model of Evidence-Based Practice was used to guide this project. Permission was granted for use of the model (Appendix C). The steps of the model include identifying the
trigger and forming a team; assemble, appraise, and synthesis body of evidence; design and pilot the practice change; integrate and sustain the practice; and disseminate results (Iowa Model Collaborative, 2017).

Identify the trigger & form a team. The Iowa Model of Evidence-Based Practice was used to guide this scholarly project. Points to consider when identifying trigger issues/opportunities include: (a) clinical or patient identified issues, (b) an organization, state, or national initiative, (c) data/new evidence, (d) an accrediting agency requirements/regulation, and (e) philosophy of care (Iowa Model Collaborative, 2017). This project leader was informed that sepsis care was a priority in the community hospital. According to hospital compare, the community hospital’s performance on timely and effective care for sepsis shows 26%, while the national average is 51% (medicare.gov, n.d.). After discussing the data with the quality improvement coordinator and ED administrators, developing an intervention to increase awareness of sepsis in the ED and improve early management bundle (SEP-1) was determined to be a priority for the organization. Permission to use the Iowa Model of Evidence-Based Practice is provided in Appendix C.

The clinical question was then created using the PICO tool: Can providing sepsis education to the ED nurses increase nurses’ knowledge and comfort in caring for patients with sepsis and increase adherence to CMS early management bundle? The project leader formed a team consisting of the project leader, project chair, quality improvement coordinator, physician quality director, clinical pharmacist – critical care, senior process improvement department, ED educator, and ED administrators. The project leader worked with her project chair to obtain clinical and research guidance throughout the project’s progression. The physician quality
director and ED educator comprised the collaborating team that oversaw the implementation of the sepsis education project.

**Assemble, appraise, and synthesize the body of evidence.** The literature review was critically appraised and synthesized. The level of evidence matrix is provided in Appendix A. Designing and piloting the practice change consisted of: (a) gaining the resources, constraints, and approval; (b) developing localized protocol, (c) creating an evaluation plan, (d) collecting baseline data, (e) developing an implementation plan, preparing clinicians and materials, (f) promoting adoption, and (g) collecting and reporting postpilot data (Iowa Model Collaborative, 2017). Approval from Liberty University’s Institutional Review Board (IRB) was required, and once received, the sepsis education program was implemented. Recruitment was not necessary, since this project was implemented during ED competencies. Preintervention data, such as last year’s early management bundle rates and mortality rates, were provided by the quality improvement nurse. Furthermore, preeducation data assessing the nurses’ knowledge of sepsis management and protocols and comfort level of taking care of patients with sepsis were evaluated. The project took place at an ED of a 176-bed community hospital, evaluating 34,000 patients annually. The results, once analyzed, were disseminated and adopted into practice in the community hospital.

**Summary**

Sepsis occurs when the body’s response to infection results in life-threatening organ dysfunction (Howell & Davis, 2017). Because infection causes sepsis, managing infection may be the most crucial component of sepsis treatment. Mortality increases even with brief delays of antimicrobials; therefore, prompt treatment of patients with sepsis is imperative. To optimize the risk-benefit, the methods of initial broad-spectrum therapy require precise attention to
antimicrobial stewardship, including collecting early cultures and daily review to decrease or stop antimicrobials (Howell & Davis, 2017). Throughout the literature, prevention and early management of sepsis are noted to be of significant importance. Early application of the optimal treatment and improved compliance with sepsis bundles are prerequisites for improving outcomes in which increased awareness is inevitable. To promote sepsis awareness, one must be educated in what sepsis is, as well as its symptoms, management, and treatments. There needs to be a paradigm shift in how the patient with sepsis is viewed. Nurses play a crucial role in identifying patients with sepsis through the progression of the disease process. Therefore, nurse-led sepsis screening interventions such as utilization of protocols and checklists may improve early recognition of patients with sepsis.

SECTION THREE: METHODOLOGY

Design

This project was an evidence-based educational intervention pilot project guided by the Iowa Model for Evidence-Based Practice. By performing this educational intervention as a pilot study, this project leader had the opportunity to evaluate the ED nurses’ attitudes about and knowledge of sepsis, the utilization of sepsis protocols, and the adherence to CMS early management bundle rate (Iowa Model Collaborative, 2017). The project’s design was quasi-experimental, which involved a pre and posteducation questionnaire to evaluate the impact of the practice change intervention. These questionnaires were used to evaluate the knowledge of sepsis and SIRS criteria, the frequency of utilizing sepsis protocols, and adherence to sepsis guideline management.

Once participants completed the preeducation questionnaires, sepsis education was provided. The education discussed the identification of sepsis, sepsis management adhering to
evidence-based practice guidelines, and utilization of the ‘Sepsis Alert’ checklist. Additionally, the sepsis education discussed the availability of nurse driven sepsis protocols in patients’ EMR and possible sources of infection with the steps to follow for patients with sepsis. After one month of implementing the educational intervention, the ED nurses took a post-education questionnaire to compare knowledge of sepsis. The nurses’ knowledge of sepsis and comfort level in taking care of patient with sepsis, in addition to early management bundle and mortality rates were evaluated to see whether sepsis education was effective.

**Measurable Outcomes**

1. After completion of the sepsis educational intervention, ED nurses will demonstrate an increase in knowledge of sepsis as measured by self-reported knowledge.
2. After completion of the sepsis educational intervention, ED nurses will demonstrate a self-reported level of comfort taking care of patients with sepsis.
3. After completion of sepsis education intervention, ED nurses will demonstrate an increase in self-reported frequency for utilization of the nurse-initiated sepsis protocol.
4. After completion of the sepsis education intervention, the mortality rate will be reduced.
5. After completion of the sepsis education intervention, CMS early management bundle rate (SEP-1) will improve.

**Setting**

This project took place in a community hospital in central Virginia. A letter of support was obtained from the nurse educator and ED director (Appendix D). The community hospital is part of a larger health system. This project aligned with the organization’s mission statement and values by recognizing a gap in patient care and utilizing a team approach with key stakeholders to find a solution to provide better patient care. Key stakeholders for this practice project
included the medical director, quality improvement coordinator, quality director, in-patient hospitalist nurse practitioner, pharmacy, ED director, ED managers, ED educator, nurses, physicians, and techs.

**Population**

For the purpose of this project being a practice change in the ED, the type of sampling used was purposive sampling. There were approximately 57 nurses in the ED during that time, and all were required to participate in annual ED competencies. ED techs were also required to attend but were excluded from this study since they do not initiate sepsis protocols nor triage patients.

**Ethical Considerations**

Even though this was a practice change project within an organization, protecting all human rights is a priority. This project leader has completed an ethics training course to ensure the protection of human participants (Appendix B). This project was submitted to Liberty University’s IRB for approval prior to the start of the project (Appendix I).

Ethical considerations considered included the protection of human participants and data confidentiality. The project leader obtained permission from the clinical educator to implement the mandatory educational intervention (Appendix D). The participants of this project are ED nurses and no identifying information was obtained. Participants were asked not to provide names, and if names were accidently placed, those questionnaires were excluded. Once the project was completed, all data were destroyed.

**Data Collection**

The preeducation questionnaire (Appendix F) was printed and provided on site by the project leader face to face prior to education intervention. The staff had 10 minutes to complete
this questionnaire before it was collected by the project leader. One month following education intervention, the post-education questionnaire (Appendix G) was given to the ED nurses by the project leader face to face. Both provision and collection of the post-education questionnaire occurred on site. Extra post questionnaires were given to the charge nurse to hand out during huddle and completed questionnaires were placed in a yellow folder to return to the project leader. Once all data were collected, the project leader analyzed the questionnaire results using SPSS statistics and Microsoft Excel for statistical significance. The week before education implementation, up to date mortality rate and CMS early management bundle rate were requested and provided by the quality improvement coordinator.

Tools

The pre and posteducation questionnaires were developed by the project leader and submitted to the ED educator for content validity prior to utilization. Due to self-development, validity limitation exists; however, the tools still displayed an impact of the education on sepsis knowledge, comfort, and utilization of protocols. Both questionnaires contained five demographic questions regarding the participant’s role in the ED, years of nursing experience, years of ED nursing experience, location of ED primarily worked, and whether the nurse-initiated sepsis protocols. The preeducation questionnaire contained 10 perception statements on knowledge of sepsis, the frequency of utilization of nurse driven protocols, and comfort in taking care of patients with sepsis. These questions were answered using a Likert-type scale with 1 – strongly disagree, 2 – disagree, 3 – neutral, 4 – agree, and 5 – strongly agree. The posteducation questionnaire contained six Likert-type scale questions assessing nurses’ comfort level of taking care of patients, knowledge strength, and nurse-initiation of sepsis protocols. There were five additional multiple-choice questions placed at the end of the post-education questionnaire,
specifically assessing knowledge of sepsis clinical guidelines. These questions were not placed in the preeducation questionnaire since clinical guidelines were not discussed prior to the education intervention.

**Intervention**

The intervention for this project provided formal sepsis education on the SSC (2016) clinical guidelines for managing sepsis, sepsis awareness, early recognition of signs and symptoms, and use of protocols and ‘Sepsis Alert’ checklist. Once the project proposal and defense were completed, IRB application was submitted and a letter of approval was obtained (Appendix I). Immediately following the IRB approval, the sepsis education intervention was implemented to the ED staff. Even though the sepsis education was required for both ED nurses and techs, the number of staff attendance was not recorded. The preeducation questionnaire was filled out and collected prior to the beginning of the educational intervention. The format of the education was a Power Point discussion on epidemiology, evidence-based practice guidelines, sepsis bundle care, initiation and location of nurse driven protocol, and utilization of the new ‘Sepsis Alert’ checklist.

The education intervention lasted 30 minutes with discussion for questions at the end. During the one month of implementing the new “Sepsis Alert” process, an email was sent out weekly encouraging the ED nurses to provide feedback using the sepsis checklist and protocols. The project leader was available from 0700 to 2300 for both day and night shift staff daily to answer any questions regarding the sepsis checklist and protocols. The posteducation questionnaire was provided to the staff by the project leader in person. The questionnaire evaluated the nurses’ knowledge of sepsis, comfort of taking care of patients with sepsis, and self-reported frequency of nurse-initiation of sepsis protocol.
SECTION FOUR: RESULTS

Demographics

Sample size. Both ED nurses and techs attended the sepsis education. The project leader reviewed 31 completed preeducation questionnaires and four were omitted since they were completed by ED techs. A total of 27 ED nurses ($n = 27$) completed the preeducation questionnaire for a response rate of 47%. Of the 27 ED nurses, one was a unit coordinator. A unit coordinator is a nurse who also serves as leader during their shift. Less than five years of ED nursing experience represented the highest portion of respondents (59%), see Table 1. Eleven participants responded having greater than five years of ED nursing experience (41%).

![Years of ED Nursing](image)

Figure 1. Preeducation Years of ED Nursing ($n = 27$)

One month after the education intervention, the project leader administered posteducation questionnaires to 35 nurses face to face and 16 questionnaires were returned. A total of 16 ED nurses ($n = 16$) completed the posteducation questionnaire for a response rate of 28%. Of the 16 ED nurses, three identified themselves as a unit coordinator. Exactly 50% of the ED nurses who
participated in the posteducation questionnaire had more than five years of ED nursing experience, see Table 2. Six participants answered having less than three years of ED nursing experience (37%) and two participants self-reported three to five years of ED nursing experience (13%).

![Years of experience as an ED nurse](image)

**Figure 2.** Posteducation Years of ED nursing \((n = 16)\)

### Measurable Outcomes

**Outcome 1.** After completion of the sepsis educational intervention, ED nurses will demonstrate an increase in knowledge of sepsis as measured by self-reported knowledge. In the post-education questionnaire, 93.8% of the nurses self-reported ‘agree’ and ‘strongly agree’ that their knowledge of sepsis is strong, showing an 8.7% increase from the preeducation questionnaire results. The ED nurses that participated in the posteducation questionnaire showed clinical and statistically significance of sepsis education impacting nurse’ knowledge of sepsis management, \(t (15) = 8.88, p < .001\). As evidenced by the results of both preeducation and posteducation questionnaires (Figure 3 and Figure 4).
Figure 3. Pre-education Questionnaire Results

Figure 4. Posteducation Questionnaire Results
**Outcome 2.** After completion of the sepsis educational intervention, ED nurses will demonstrate a self-reported level of comfort taking care of patients with sepsis. Nurses’ comfort of sepsis patient care: $M = 4.44$, $SD = .512$, $t (15) = 11.22$, $p < .001$, indicating sepsis education clinically and statistically significant to nurses’ comfort in taking care of patients with sepsis.

**Outcome 3.** After completion of sepsis education intervention, ED nurses will demonstrate an increase in self-reported frequency for utilization of the nurse-initiated sepsis protocol. There was a decrease of 14% in agreement in the post-education questionnaire, $t (15) = 4.14$, $p = .001$. The project leader anticipated a minimal decrease since physicians were being educated by their quality director at approximately the same time nurses were educated in sepsis management. Other potential variables impacting nurse initiation of sepsis protocol decline is the smaller sample size of post-education questionnaire participants and/or increase in physician knowledge of sepsis, prompting them to place sepsis bundle orders in a timely manner.

**Outcome 4.** After completion of the sepsis education intervention, the mortality rate will be reduced. After completion of sepsis education intervention, as reported by the quality improvement nurse, the mortality rate remained unchanged at 7.5%.

**Outcome 5.** After completion of the sepsis education intervention, CMS early management bundle rate (SEP-1) will improve. Since the implementation of the ED sepsis education and ‘Sepsis Alert’ initiation, 13 records were reviewed by the quality improvement nurse and 53.8% passed the entire CMS bundle, which is a significant improvement from 31.1%.

**Additional findings.** The results of the five additional questions on clinical guidelines are displayed in Table 1.

<p>| Sepsis Management Questions Based on Evidence-based Practice Guidelines |</p>
<table>
<thead>
<tr>
<th>Question</th>
<th>Frequency</th>
<th>Percent</th>
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<tbody>
<tr>
<td>Obtaining labs with lactic acid, blood cultures x 2, and urinalysis is important for sepsis management?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>True</td>
<td>16</td>
<td>100</td>
</tr>
</tbody>
</table>

| The initial broad spectrum antibiotic should be administered within what hour? |
|-----------------------------------------------------------------------------|-----------|
| 1 hour                                                                      | 14        | 87.5    |
| 3 hours                                                                     | 2         | 12.5    |

| Accurate weight is important?                                               |           |         |
| True                                                                        | 16        | 100     |

| What is the fluid bolus requirement for sepsis-induced hypotension?         |           |         |
| 20mL/Kg                                                                     | 3         | 18.8    |
| 30mL/Kg                                                                     | 13        | 81.3    |

| For patients with septic shock requiring vasopressors, target a MAP of 65mmHg? |           |         |
| True                                                                        | 16        | 100     |

Nurses’ Response (n = 16)

After running the descriptive statistics in SPSS, 100% of the participants answered correctly that obtaining labs including lactic acid, blood cultures x 2, and urinalysis is critical to the management of patients with sepsis. 87% of nurses answered correctly that broad-spectrum antibiotics should be administered within one hour of sepsis recognition; $M = 1.13$ and $SD = .342$, with a range of 1.81% of the nurses’ response was correct for the fluid bolus (30mL/kg) required for sepsis-induced hypotension; $M = 1.81$ and $SD = .403$, with a range of 1. Lastly, 100% of the nurses answered correctly for keeping a patient with sepsis MAPs above 65mmHg (SSC, 2018).
SECTION FIVE: DISCUSSION

The purpose of this project was to implement and evaluate a sepsis educational intervention with the aim of improving nurses’ self-reported knowledge of sepsis and comfort level for caring for patients with sepsis, increase utilization of the sepsis protocol, and reduce mortality in the ED, which included implementing a ‘Sepsis Alert’ process using a checklist to better care for patients suspected of sepsis. The results of this project show no significant change in nurses initiating sepsis protocols; however, key findings include the increase in nurses’ knowledge of sepsis and comfort level of caring for patients with sepsis. Additionally, CMS early management bundle (SEP-1) rate improved post-education intervention, which may have been related to the education and implementation of the new ‘Sepsis Alert’ process in the ED. The literature review emphasizes the importance of early recognition and early treatment in patients with sepsis, increasing the likelihood of survival for patients with sepsis (Kim & Park, 2019). Increased awareness of sepsis and significant importance of early treatment has helped increase survival rates (Vincent et al., 2014). Furthermore, performance improvement programs have been associated with increasing compliance with sepsis bundles and reduction in mortality (Kim & Park, 2019). The results of the project include an increase in adherence to the CMS early management bundle (SEP-1) from 31.1% to 53.8%. The findings support and further highlight that educating staff in early recognition and management of patients with sepsis and utilizing a sepsis checklist or guideline can impact bundle care for these patients.

Strengths

This project had consistent support from key stakeholders including ED management, ED educator, quality improvement nurse, and hospital administrators. Strengths of this project include cost-effectiveness and multiple data availability methods. Since the cost of this project...
was minimal, outside financial assistance was not necessary. Multiple data availability included results from pre and posteducation questionnaires and data report provided by the quality improvement nurse; therefore, multiple sources of data were available to reduce bias in this project. Education in best practice and clinical guidelines is essential for nurses to provide standard patient care. This ensures that all patients receive quality care supported by evidence-based practice. The sepsis education and utilization of a ‘Sepsis Alert’ checklist was fairly simple to implement in the ED, which will help implement education in the in-hospital units.

Limitations

Limitations of this project are as follows: short time frame between the education and data collection, and small sample size of participating nurses. The one-month time frame between implementation of sepsis education and chart review by the quality improvement nurse was not sufficient amount of time to observe a significant change in clinical practice. Though there was a significant increase in adherence to CMS bundle rates, data for mortality was unavailable due to the turnaround time of completed charts in billing and coding. The short time frame also may have impacted the post-education questionnaire results, for both behavioral change and knowledge increase. A larger sample or a sample equal to the sample of the preeducation questionnaire participants may have produced valid results.

Implications for Practice

Sepsis continues to be a worldwide healthcare challenge, requiring an interdisciplinary approach for caring for these patients. This project showed sepsis education to be of significant importance to the organization due to being a system initiative, recognizing the gaps and inconsistencies in caring for patients with sepsis. The ED was the main area where the pilot study was introduced due to “first contact” with patients with sepsis. Initiating this quality
improvement education program in the ED supported expanding the education within all the in-hospital units. Managing patients with sepsis does not always initiate in the ED; sepsis can develop anytime and anywhere regardless of where the patient is. Therefore, it is important for all nurses to be educated in evidence-based practice guidelines in managing patients with sepsis. Because of the success of the ED sepsis education intervention, the education director of the hospital informed leadership administration that sepsis education will be provided to inpatient units during mandatory hospital competency days.

Using a checklist or protocol can impact the care for patients with sepsis. These methods can ensure standardization of care for patients with sepsis. It is recommended to incorporate an educational program for recognizing sepsis, signs and symptoms, protocols, and treatment management into the new hire orientation for ED nurses, as well as annual competencies to include early recognition of severe sepsis, utilization of protocols, and treatment (Walters, 2018).

**Sustainability**

The sustainability of this sepsis education program is dependent upon the ED leadership team. This education should be provided twice a year during competencies to ensure that new nurse graduates will be educated and prepared to take care of patients with sepsis in the ED. This will also ensure the use of the ‘Sepsis Alert’ checklist to better aid the nurses in the expected tasks needed to manage these patients. Since this is a high priority within the healthcare system of the hospital where the study took place, sepsis management will continue to be evaluated and changes will be made accordingly. Lessons learned during the pilot study included restructuring the ‘Sepsis Alert’ checklist to avoid confusion for fluid resuscitation in patients with severe sepsis. Questions received included if the one-liter fluid bolus was part of the sepsis weight-based fluids or in addition to, and how one would evaluate how much fluids a patient received.
This prompted the sepsis team to communicate with the EMR staff to allow nurses to scan the intravenous crystalloids individually and chart how much fluid the patient was actually receiving. Traditionally, the nurse would have to put the sepsis fluid requirement in the input area of the patient’s chart; however, there was no true way to accurately document if the patient received this weight-based sepsis bolus.

Additionally, there continues to be communication between the EMS agencies and the ED regarding potentially calling a ‘Sepsis Alert’ in the field. This will allow the necessary resources to be available when the patient arrives. However, in order to achieve this, there needs to be extensive education among all EMS agencies regarding proper identification of patients suspected of sepsis. The primary goal is educating the in-hospital units in how to utilize the ‘Sepsis Alert’ checklist and early communication with the hospitalist overseeing the patient. Since this project was fairly easy to implement, it is feasible to replicate within the hospital units.

**Dissemination Plan**

Dissemination of this project’s findings of nursing knowledge and comfort in taking care of patients with sepsis is essential to increase awareness and knowledge of evidence-based practice guidelines in managing patients with sepsis. The findings of this project not only showed an increase of CMS early management bundle rate but also resulted in an increase in the nurses’ knowledge of managing patients with sepsis. The dissemination objective includes educating the ED regarding the benefits of implementing a sepsis education program utilizing a ‘Sepsis Alert’ checklist to increase the use of evidence-based practice guidelines for managing patients with sepsis, severe sepsis, and septic shock. This will include displaying the findings through a poster and podium presentation on research day in the hospital. The expected audiences include healthcare staff members, physicians, nurses, and unit techs. The quality
improvement project will be submitted to Liberty University’s Scholarly Crossings and will be available for search and download. Lastly, a manuscript will be submitted to a professional journal for review and potentially be published within their journal publication.

Conclusion

This project supports the use of sepsis education to increase the nurses’ perceived knowledge of sepsis management and comfort level caring for patients with sepsis and improve the adherence of CMS early management bundle rate. It is crucial to the practice of nursing that nurses stay up to date in practice guidelines and standard of care. This includes the timely recognition and management of patients with sepsis. Raising the awareness of sepsis will help work towards best practices. Sepsis is viewed as a medical emergency; therefore, increasing the level of awareness of patient care providers is essential to appropriate patient management. It is well known that implementing sepsis bundles in sepsis improvement programs are foundational to the outcomes of patients with sepsis. The outcomes of this project reinforce the importance of providing quality education using evidence-based practice guidelines to ensure standard treatment for patients with sepsis. Although the project leader did not identify an increase in the nurse initiation of sepsis protocols, clinical significance of knowledge and comfort increased as evidenced by the pre and posteducation questionnaire results.
References


https://www.medicare.gov/hospitalcompare/compare.html#cmprTab=2&cmprID=490009%2C490077%2C490018&cmprDist=5.8%2C9.1%2C29.4&dist=100&loc=22901&lat=38.0824703&lng=-78.5547283


qSOFA screening for non-ICU patients to improve sepsis recognition and time to treatment. *Journal of Nursing Care Quality, 00*(00), 1-7. doi:
10.1097/NCQ000000000000379


### Appendix A: Literature Review Matrix

<table>
<thead>
<tr>
<th>Article Title, Author, etc. (Current APA Format)</th>
<th>Study Purpose</th>
<th>Sample (Characteristics of the Sample: Demographic s, etc.)</th>
<th>Methods</th>
<th>Study Results</th>
<th>Level of Evidence (Use Melnyk Framework)</th>
<th>Study Limitations</th>
<th>Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armen, S. B., Freer, C. V., Showalter, J. W., Crook, T., Whitener, C. J., West, Ch., … Hollenbeak, C. S. (2016). Improving outcomes in patients with sepsis. <em>American Journal of Medical Quality, 31</em>(1), 56-63. doi: 10.1177/1062860614551042</td>
<td>An intervention developed to focus on earlier identification of sepsis, early antimicrobial administration, and an educational program that was disseminated throughout all the units.</td>
<td>1331 patients with sepsis during intervention period. 1401 patients with sepsis during control period.</td>
<td>The research team used EGDT in developing and implementin g a sepsis initiative. This included a baseline survey, development of sepsis treatment bundle of EBP, a compulsary education program around sepsis care, and (d)</td>
<td>Overall mortality rate was 23.5% among patients before the intervention period and 18.9% among patients during the intervention period.</td>
<td>Level VI: multidisciplinary sepsis quality improvement program</td>
<td>There were identified sepsis patients both retrospectively and prospectively based on documented primary and secondary diagnosis codes. Deficiencies in documentation were recognized early and the educational program was specifically designed to improve documentation.</td>
<td>Yes, there was a 37% improvement in the sepsis mortality. Additionally, but not statistically significant, hospital costs were reduced by $1949 on average per patient with sepsis.</td>
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<td>Article Title, Author, etc. (Current APA Format)</td>
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<tr>
<td>Baker, S. D. (2016). Improving sepsis recognition and utilization of early goal-directed therapy in the prehospital environment: A review of the literature. <em>Journal of Emergency Nursing</em>, 42(5), 387-394. <a href="https://doi.org/10">https://doi.org/10</a>.</td>
<td>A literature review of sepsis management in the prehospital setting.</td>
<td>Evidence-based literature review related to sepsis and prehospital care provider involvement in the identification of sepsis using MEDLINE, CINHAL, and Cochrane databases.</td>
<td>monthly result reporting sepsis outcomes on the hospital electronic quality dashboard.</td>
<td>Six articles were reviewed. Though identification and treatment of sepsis and septic shock has become common practice within hospital environment; literature indicates that little is known about emergency medical service (EMS) knowledge and understanding of sepsis in the</td>
<td>Level V: systematic review of descripti ve &amp; qualitati ve studies</td>
<td>All patients with sepsis were included; therefore, patients with severe sepsis and septic shock were not stratified.</td>
<td>Yes, this review highlights the need for sepsis education not just in the hospital setting but also prehospital. The early identification and timeliness of care for patients with sepsis starts with the first</td>
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<td>1016/j.jen.2016.02.015</td>
<td>John’s Hopkins Nursing Evidence-Based Practice Model.</td>
<td>prehospital environment.</td>
<td>prehospital patients.</td>
<td>Yes, the sepsis 6 is an internationally accepted management bundle, that when initiated within one hour of sepsis, can reduce morbidity and mortality. This study sought out data within their hospital to see if sepsis 6 bundle was utilized within</td>
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<tr>
<td>Bentley, J., Henderson, S., Thakore, S., Donald, M., &amp; Wang. (2016). Seeking sepsis in the emergency department – identifying barriers to delivery of the sepsis 6. The British Journal of Medicine, 5(1), 1-6. doi: 10.1136/bmjquality.u206760.w3983</td>
<td>The sepsis 6 has facilitated EDs to commence timely treatment and facilitate early patient transfer to inpatient departments. However, there may still be barriers, which delays achieving these goals. Identify human factors that may</td>
<td>Total of 140 patients were recruited to the follow-up survey through the same methods as initial survey.</td>
<td>Post intervention significant increase in overall compliance with more patients compliant with the Sepsis 6 bundle. A 45.7% improvement in compliance. Imperative to emphasize the need for quick initial assessment by clinical staff identifying deranged physiology and presence of infection and SIRS criteria.</td>
<td>Level VI: qualitative study</td>
<td>Initial survey indicated room for improvement with the sepsis 6 compliance and sepsis management in the ED. They rely on junior staff to perform the majority of initial medical assessments; however, junior staff rotate every</td>
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<tr>
<td>Bruce, H. R., Maiden, J., Fedullo, P. F., &amp; Kim, S. C.</td>
<td>influence achieving the one hour Sepsis 6 bundle.</td>
<td>195 patients admitted through either of 2 academic</td>
<td>Retrospective chart review, pre and post</td>
<td>Serum lactate measurement and mean time to first antibiotic</td>
<td>Level VI: single</td>
<td>four months, therefore there is a lack of consistency. Without prompt senior involvement uncertainty in management decisions can cause delay in Sepsis 6 actions.</td>
<td>yes, in this study a nurse driven ED sepsis protocol</td>
</tr>
<tr>
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<tr>
<td>(2015). Impact of nurse-initiated ED sepsis protocol on compliance with sepsis bundles, time to initial antibiotic administration, and in-hospital mortality. <em>Journal of Emergency Nursing</em>, 41(2), 130-137. <a href="https://doi.org/10.1016/j.jen.2014.12.007">https://doi.org/10.1016/j.jen.2014.12.007</a></td>
<td>protocol on time to initial antibiotic administration, ascertain compliance with 3-hour SSC targets, and identify predictors of in-hospital sepsis mortality.</td>
<td>tertiary medical center EDs. Mean patient was 62 years old and mostly male patients.</td>
<td>protocol implementation data examined both compliance with 3-hour SSC bundle targets and patient outcomes.</td>
<td>administration improved significantly after protocol implementation. No differences in the admitted mortality rate between pre and post protocol implementation groups.</td>
<td>qualitative study</td>
<td>predictors should not be evaluated as cause-and effect relationships in this retrospective chart review. A power analysis for sample size was not performed prior to study initiation. The impact of online training modules on the nurses were not evaluated.</td>
<td>significantly reduced the time to initial antibiotic administration and improved compliance with drawing serum lactate collection. Before protocol implementation, ED nurses and physicians participated in mandatory online sepsis protocol education. Training included: information about the protocol, nurses’ role in...</td>
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<tr>
<td>Article Title, Author, etc. (Current APA Format)</td>
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<td>Damiani, E., Donati, A., Serafini, G., Rinaldi, L., Adrario, E., Pelaia, P., … Girardis, M. (2015). Effect of</td>
<td>Systematic review of studies evaluating the impact of performance improvement programs on studies on adult patients with sepsis, severe sepsis or septic shock that evaluated changes in data extraction</td>
<td>Data extractions included studies that were extracted independently by two 50 observational studies were selected. Regardless of the high inconsistency across studies, performance improvement programs were</td>
<td>Level V: systematic review of descriptive and qualitative</td>
<td>All the included studies were observational investigations and cannot support any causality</td>
<td>Yes, this study indicated that education alone was able to improve compliance with the complete</td>
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<td>Performance improvement programs on compliance with sepsis bundles and mortality: A systematic review and meta-analysis of observational studies. PLOS ONE, 10(5), 1-24. DOI:10.1371/journal.pone.0125827</td>
<td>Compliance to bundle targets and/or mortality, after implementing a performance improvement program. Interventions include educational programs, process changes or both.</td>
<td>Compliance with SSC guideline-based bundles and/or mortality.</td>
<td>Authors. Unadjusted binary data were collected to calculate odds ratios (OR) for compliance to individual/combined bundle targets. Random effects models were used for data synthesis.</td>
<td>Linked with increased compliance with the complete 6 hour bundles (OR = 4.12 [95% confidence interval 2.95-5.76], $I^2 = 87.72%$, $k = 25$, $N = 50,081$) and the complete 24-hour bundle (OR = 2.57 [1.74-3.77], $I^2 = 85.22%$, $k = 11$, $N = 45,846$) and with a reduction in mortality (OR = 0.66 [0.61-0.72], $I^2 = 87.93%$, $k = 48$, $N = 434,447$). This study indicated performance improvement programs are associated with increased adherence</td>
<td>Between the quality improvement programs, increase in bundle compliance and reduction in mortality. Changes in SSC may have occurred over time, independently of the program implemented. Differences in disease severity between the intervention and control groups could have biased the analysis. High inconsistency</td>
<td>Resuscitation and management bundles and was associated with a decrease in mortality. The largest increase in adherence to 6-hour and 24-hour bundles was implementation of both an educational program and process changes, which were also associated with the greatest survival benefit.</td>
<td></td>
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<tr>
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<td>Study Limitations</td>
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<td>Ferguson, A., Coates, D. E., Osborn, S., Blackmore, C. C., &amp; Williams, B. (2019). Early, nurse-directed sepsis care. <em>American Journal of Nursing, 119</em>(1), 52-58. doi: 10.1097/01.NAJ.0000552614.89028.d6</td>
<td>The goal of this quality improvement initiative was to promote early recognition and treatment of sepsis through an executive-led sepsis guiding team.</td>
<td>A multidisciplinary health care network in the pacific northwest.</td>
<td>Early intervention strategy included a nurse-directed ED code sepsis and an inpatient power hour — authorizing nurses to initiate order sets independently for lactate levels, blood cultures, to resuscitation and management of sepsis bundles and reduced mortality in patients with sepsis.</td>
<td>Over seven years pre to post intervention evaluation period, ED sepsis bundle adherence increased from 40.5% to 73.7%. Sepsis-related RRT calls decreased from 2.2% to 0.85%. The in-hospital sepsis-related mortality rate dropped from 12.5% to 8.4% with an absolute reduction of 4.5 deaths per 100 sepsis related discharges.</td>
<td>Level VI: qualitative study</td>
<td>Retrospectively performed, using historical controls. Since implementation multiple program components occurred simultaneously, unable to measure the specific contribution of each. Intervention applied and evaluated at a single urban teaching</td>
<td>Yes, this quality study went above the SSC recommendation and set as a target the identification and treatment within one hour of all patients affected by sepsis, regardless of illness severity.</td>
</tr>
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</table>
| Le Conte, P., Thibergien, S., Obellianne, J. B., Montassier, E., Potel, G., Roy, P. M., & Batard, E. (2017). Recognition and treatment of severe sepsis in the emergency department: Retrospective study in two hospitals. | To assess the compliance with the Severe Sepsis Campaign three-hour bundle and the analysis of the delay of severe sepsis recognition. | Patients older than 18 years old, presenting with severe sepsis were included in this study. Patients that met the criteria: suspected or documented infection and and fluid boluses when they suspect sepsis. | Retrospective study from February 2015 to August 2015 in the EDs of two teaching hospitals in west of France. | 25 patients out of the 130 patients fulfilled each criterion of the three-hour bundle: blood culture, lactate dosage, antibiotics and 30mL/kg fluid bolus loading. The average delay between presentation and severe sepsis diagnosis was 200 +/- 263 minutes from diagnosis to diagnosis. | Level IV: retrospective study | Three limitations: 1. Conducted before SEPSIS-3 publication; therefore, definition of severe sepsis was used. 2. Since it was a retrospective study | Yes. This article indicates that there is poor compliance to the three-hour SSC bundle in the ED and delay between admission and severe sepsis diagnosed needs to be improved. This
<table>
<thead>
<tr>
<th>Article Title, Author, etc. (Current APA Format)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>French teaching hospitals. <em>BMC Emergency Medicine, 17</em>(27), 1-6. DOI 10.1186/s12873-017-0133-6</td>
<td>To develop a triage-based screening algorithm and treatment order-sets in</td>
<td>at least two of the four SIRS criteria. 130 patients were included, 76 men and 54 women.</td>
<td>fluid challenge and first antibiotic dose, 10+/- 27 minutes and 20 +/- 55 minutes, respectively.</td>
<td>The study, all clinical features could not be retrieved.</td>
<td>Level IV: case control study. The increased awareness of sepsis and global recognition is</td>
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<tr>
<td>McDonald, C. M., West, S., Dushenski, D., Lapinsky, S. E., Soong, C., Broek, K. V. D.,</td>
<td>To develop a triage-based screening algorithm and treatment order-sets in</td>
<td>346 pre-intervention patients, 270 post-intervention patients.</td>
<td>Retrospective cohort study conducted during pre-intervention studies.</td>
<td>Significant improvement of process measures including mean time to antibiotics by 60 minutes and</td>
<td></td>
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<td>study shows that there is opportunity where a complete process involving nurses and physicians’ education, electronic sepsis alert, enhanced triage process and diffusion of simple sepsis bundle can be deployed.</td>
</tr>
<tr>
<td>Article Title, Author, etc. (Current APA Format)</td>
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<td>…Morris, A. (2018). Sepsis now a priority: A quality improvement initiative for early sepsis recognition and care. International Journal for Quality in Health Care, 30(10), 802-809. <a href="https://doi-org.ezproxy.liberty.edu/10.1093/intqhc/mzy121">https://doi-org.ezproxy.liberty.edu/10.1093/intqhc/mzy121</a></td>
<td>the ED for patients with sepsis.</td>
<td>Large teaching hospital, 35 bed ED.</td>
<td>from April 1, 2010 to March 31, 2011 and a post-intervention period from September 1, 2014 to April 30, 2015.</td>
<td>proportion of patients receiving fluid resuscitation. No difference in in-hospital mortality between groups. Triage-based sepsis screening tool led to expedited and consistent delivery of care, with significant improvement in initial resuscitation measures.</td>
<td>promotion of SSC guidelines may have introduced bias. Did not include analysis of overall hospital LOS or in-hospital mortality.</td>
<td></td>
<td>Yes, this study showed that process improvement change had a positive impact on the decrease</td>
</tr>
<tr>
<td>Mitzkewich, M. (2018). Sepsis screening in triage to decrease door-to-antibiotic time. Journal of Emergency Medicine</td>
<td>Identifying patients with sepsis at triage may lead to decrease in door-to-antibiotic time.</td>
<td>Community hospital, 25 bed ED</td>
<td>Practice improvement project proposed sepsis screening tool already</td>
<td>One of the most common treatment delays is that patients with sepsis are not identified upon entrance to the ED. Implement a</td>
<td>Level VI: qualitative study</td>
<td></td>
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<tr>
<td>Article Title, Author, etc. (Current APA Format)</td>
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<td><em>Nursing, 21</em>(1), 1-3. <a href="https://doi.org/10.1016/j.jen.2018.08.002">https://doi.org/10.1016/j.jen.2018.08.002</a></td>
<td>To explore the number of patients</td>
<td>Data extracted from the ED database and Twelve-month pre-post</td>
<td>used by ED nurses would be given to triage nurses to quickly identify patients who meet criteria for sepsis.</td>
<td>practice improvement project by having ED triage nurse screen all patients for sepsis when entering the ED. Door-to-antibiotic time improved from baseline 105.3 minutes to 71.9 minutes. The screening tool at triage decreased the door-to-antibiotic time by 33.4 minutes without affecting triage time and enhanced patient throughput of potential patients with sepsis.</td>
<td>Level VI: single</td>
<td>This study was conducted in one Australian</td>
<td>Yes, the findings of this study highlight</td>
</tr>
</tbody>
</table>

Romero, B., Fry, M., & Roche, M. (2017). The
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>impact of evidence-based sepsis guidelines on emergency department clinical practice: a pre-post medical record audit. <em>Journal of Clinical Nursing, 26</em>(21-22), 3588-3596. <a href="https://doi-org.ezproxy.liberty.edu/10.1111/jocn.13728">https://doi-org.ezproxy.liberty.edu/10.1111/jocn.13728</a></td>
<td>presenting with sepsis before and after guideline implementation – the impact of sepsis guidelines on triage assessment, ED management and time to antibiotics.</td>
<td>paper medical record. Data included patient demographic, clinical information, and patient assessment data.</td>
<td>retrospectively randomized medical record audit of adult patients with sepsis.</td>
<td>time to antibiotics post implementation of the guidelines. The post group (n = 165) received more urgent triage categories (n = 81; 491%), a 758-minute decrease in mean time to second liter of intravenous fluids and an improvement in collection of lactates (n = 112, 679%), also statistically significant.</td>
<td>qualitative study.</td>
<td>mixed metropolitan tertiary ED, the results cannot be representative of other EDs. The collection of data for the retrospective 12-month pre-post medical record audit was based on clinicians’ willingness to complete all required documentation correctly. Patients may have had sepsis, but their diagnosis was not entered as a</td>
<td>the impact the guidelines implemented in the ED can have on clinician decision-making and behavior that support best practice and positive patient outcomes. The sepsis guidelines improved early assessment, recognition and management of patients presenting with sepsis symptoms in a tertiary referral ED.</td>
</tr>
<tr>
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<tr>
<td>Tedesco, E. R., Whiteman, K., Heuston, M., Swanson-Biearman, B., &amp; Stephens, K. (2017). Interprofessional collaboration to improve sepsis care and survival within a tertiary care emergency department. <em>Journal of Emergency Nursing</em>, 43(6), 532-538. <a href="http://dx.doi.org/1">http://dx.doi.org/1</a></td>
<td>Sepsis is the leading cause of death in the U.S.; it continues to be a challenge with timely recognition, diagnosis, and treatment of patients. Both the CMS and the National Quality Forum have identified this disease process as a priority. Currently,</td>
<td>During the first 4 months, more than 240 patients were screened, assessed, and treated according to a management algorithm tool.</td>
<td>Non-experimental qualitative study.</td>
<td>The quality project outcomes resulted in an increase in staff knowledge of sepsis, a decrease in length of stay by 3 hours, and significant decrease in mortality when compared with previous year’s data.</td>
<td>Level VI: single qualitative study.</td>
<td>The design of the project was evidence-based quality improvement and cannot be generalized to other settings. This project was planned and implemented before the 2016 definitions for sepsis and septic shock were published.</td>
<td>Yes, this quality improvement study displays measurable outcomes of sepsis education in the ED. Indicates an increase of the mean score on the pretest from 79% to 85% immediately after sepsis education was provided.</td>
</tr>
<tr>
<td>Article Title, Author, etc. (Current APA Format)</td>
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<td>0.1016/j.jen.2017.04.014</td>
<td>many patients with sepsis are identified late, resulting in consequential morbidity and death.</td>
<td>15 studies</td>
<td>Quantitative data analysis, qualitative data analysis, and thematic synthesis</td>
<td>Although no studies were found to have patient-oriented outcomes; sepsis training and education increased knowledge, changed behavior, and improved processes.</td>
<td>Level V: systematic review</td>
<td>Multiple disparate educational trainings recognized that education and training programs are part of a wider approach.</td>
<td>Yes, this systematic review of sepsis education and training supports the impact in sepsis knowledge and changed behavior.</td>
</tr>
<tr>
<td>National Guideline Centre (UK). (2016). Sepsis: Recognition, assessment and early management. London, UK: National Institute for Health and Care Excellence.</td>
<td>Perform a systematic review to assess education and training of sepsis overlap with the use of protocol for the management of patients with severe sepsis.</td>
<td>15 studies</td>
<td>Quantitative data analysis, qualitative data analysis, and thematic synthesis</td>
<td>Although no studies were found to have patient-oriented outcomes; sepsis training and education increased knowledge, changed behavior, and improved processes.</td>
<td>Level V: systematic review</td>
<td>Multiple disparate educational trainings recognized that education and training programs are part of a wider approach.</td>
<td>Yes, this systematic review of sepsis education and training supports the impact in sepsis knowledge and changed behavior.</td>
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</table>
This is to certify that:

Jean Jun

Has completed the following CITI Program course:

- Biomedical Research - Basic/Refresher
  (Curriculum Group)
- Biomedical & Health Science Researchers
  (Course Learner Group)
- 1 - Basic Course
  (Stage)

Under requirements set by:

Liberty University

Verify at www.citiprogram.org/verify/?wb9ccc23d-9ec6-4cd7-b6e6-057ae9966211-21182639
Appendix C: Permission to Use Iowa Model

Permission to Use The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care

Kimberly Jordan - University of Iowa Hospitals and Clinics <noreply@qualtrics-survey.co

Today, 1:09 AM
Jun, Jean

Action Items

You have permission, as requested today, to review and/or reproduce The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care. Click the link below to open.

The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care

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Please contact UIHCNursingResearchandEBP@uiowa.edu or 319-384-9098 with questions.
Appendix D: Site Letter of Support

May 08, 2019

Attention: IRB
Liberty University
Lynchburg, Virginia

IRB Members:

Ms. Jean Jun, BSN, FNP-C, Liberty University Doctor of Nursing Practice Student has proposed to conduct Doctor of Nursing Practice Project: Implementation of a sepsis education to support the adherence of early management bundle and screening tool in the emergency department.

Sentara Martha Jefferson Hospital is committed to quality patient care by improving health everyday. We are committed to providing the most advanced, comprehensive care for our patients, facilitated by the pursuit of quality improvement. Ms. Jean Jun scholarly project aligns with our commitment of our vision to be the healthcare choice of the communities we serve.

Sentara Martha Jefferson Emergency Department is pleased to support Ms. Jean Jun Scholarly Project Proposal: Implementation of a sepsis education to support the adherence of early management bundle and screening tool in the emergency department.

Sincerely,
Appendix E: Sepsis Checklist

SEPSIS ALERT – EMERGENCY DEPARTMENT
INITIAL SCREEN TO BE COMPLETED AT TRIAGE (IF sepsis screen is positive)

<table>
<thead>
<tr>
<th>Date:</th>
<th>Time:</th>
<th>Weight (kg):</th>
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</table>

**Step 1**
- Does the patient meet **3 OR MORE** of these criteria:
  - □ Respirations > 20/min
  - □ Temp < 36°C (96.8°F) or > 38.3°C (100.9°F)
  - □ Heart Rate > 90
  - □ WBC > 12k OR < 4k OR > 10% bands
  - □ Systolic BP < 90 mmHg
  - □ Mean arterial pressure (MAP) < 65
  - □ Altered mental status (change from baseline)

  □ YES  □ NO

**Step 2**
- Does the patient have **1 OR MORE** indicators of infection:
  - □ Productive cough/PNA
  - □ Dysuria/frequency/urgency/UTI
  - □ Catheter infection ( Foley/dialysis/PICC/central line)
  - □ Skin breakdown/wound/ cellulitis
  - □ Acute abdominal pain
  - □ Bone or joint infection
  - □ S/S meningitis or endocarditis
  - □ Surgical procedure in the last 2 weeks
  - □ Other/site not otherwise specified

  □ YES  □ NO

If YES for step 1 AND 2 then ACTIVATE SEPSIS ALERT

**Time 0**
- □ EPIC orders placed (may use SEPSIS NIPS)
- (CBC with diff, CMP, Lactate with reflex, UA + C&S, BC x2, CXR)
- □ Q15 min vital signs
- □ IV started (2 IVs preferred or central line PRN)
- □ 1 liter NS/LR IV given (rapid infusion/pressure bag)
- □ Labs collected
- □ Lactic Acid Result: ________ (if > 2, redrawn w/in 3 hrs of initial LA)
- □ 2nd Lactic Acid Due: ________
- □ Blood culture #1 (prior to antibiotics)
- □ Blood culture #2 (should be from PICC/central line/port if present)

**STOP**
- Do NOT delay antibiotics if unsuccessful cultures - DOCUMENT WHY!

**Start broad spectrum antibiotics ASAP (preferably w/in 1 hour)**
- (i.e. Ceftriaxone, Zosyn, Meropenem, Cefepime – see back)
- □ Second Antibiotic (if warranted)

**Hour 3**
- □ Give IV sepsis bolus if LA ≥ 4 OR SBP <90 OR MAP <65
- End times: (put in EPIC)
- □ ________ (mL) at ________
- □ ________ (mL) at ________
- □ Weight: _____ (kg) x 30 = ________ mL
- □ *SEPTIC SHOCK CRITERIA MET* (if initial LA ≥ 4 or SBP<90 or MAP<65 s/p fluids)
- □ Start vasopressors if SBP < 90 OR MAP < 65 w/in 1 hour of fluids
- □ Repeat fluid volume assessment documented (MD/APP)
- □ **Draw Repeat Lactic acid** (if initial LA > 2)

**STOP**
- MAKE SURE TO DOCUMENT EVERYTHING IN EPIC

Created 4/2019

PLACE FORM IN SEPSIS FOLDER
### Sepsis Criteria
- Confirmed or Suspected Infection

**AND**
- Any 2 SIRS CRITERIA
  - Temp < 36°C (96.8°F) or > 38.3°C (100.9°F)
  - Heart Rate > 90
  - Respirations > 20/min
  - WBC > 12k OR < 4k OR > 10% bands

### Severe Sepsis Criteria
- Confirmed or Suspected Infection

**AND**
- Any 2 SIRS CRITERIA
  - Temp < 36°C (96.8°F) or > 38.3°C (100.9°F)
  - Heart Rate > 90
  - Respiration > 20/min
  - WBC > 12k OR < 4k OR > 10% bands

**AND**
- Any 1 sign of End Organ Dysfunction
  - Lactate > 2 mmol/L
  - Hypotension: SBP < 90 OR > 40 below baseline OR MAP < 65
  - Creatinine > 2
  - Total Bilirubin > 2.0 mg/dL
  - Platelets < 100,000
  - INR > 1.5 OR aPTT > 60
  - Acute Respiratory Failure requiring BIPAP or intubation

**OR**
- Severe Sepsis Documentation

### Septic Shock Criteria
- Initial Lactate ≥ 4 mmol/L

**OR**
- Severe sepsis AND hypotension persists one hour after sepsis bolus of 30 mL/kg (crystalloid fluid)

**OR**
- Septic Shock Documentation

---

**Suggested First Antibiotics for Sepsis**

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Suspected Site of Infection</th>
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<tbody>
<tr>
<td>Ceftriaxone</td>
<td>Urinary, pneumonia (community acquired), meningitis (2g)</td>
</tr>
<tr>
<td>Zosyn</td>
<td>Pneumonia (hospital acquired/healthcare associated), intra-abdominal, gangrene/severe cellulitis, urinary (catheter-related or with septic shock). Any patient at risk for pseudomonas infection (prior history, multiple or recent hospitalizations/antibiotics).</td>
</tr>
<tr>
<td>Cefepime**</td>
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</tr>
<tr>
<td>Meropenem**</td>
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* Actual orders may differ. This is to serve only as a guide for nursing staff to know what to expect.

** IV push preferred for severe sepsis or septic shock in the ED

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**Sepsis Team** (Please write names inside boxes)

<table>
<thead>
<tr>
<th>Emergency Department</th>
<th>Inpatient</th>
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<tbody>
<tr>
<td>MDs/APPs:</td>
<td>MDs/APPs:</td>
</tr>
<tr>
<td>RNs:</td>
<td>RNs:</td>
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<tr>
<td>Techs:</td>
<td>PCAs:</td>
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<td>PharmD:</td>
<td>PharmD:</td>
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</tbody>
</table>

Created 4/2019

PLACE FORM IN SEPSIS FOLDER
Appendix F: Preeducation Questionnaire

Pre-Education Questionnaire

Demographics Collection Tool:

Please circle one letter for each question.

1. What is your job title?
   a. RN
   b. ED tech
   c. Unit Coordinator
   d. ED secretary

2. How many years have you been a nurse?
   a. 0-1 year
   b. 1-3 years
   c. 3-5 years
   d. > 5 years

3. How many years have you been an Emergency Department (ED) nurse?
   a. 0-1 year
   b. 1-3 years
   c. 3-5 years
   d. > 5 years

4. Where do you primarily work in the ED?
   a. Triage
   b. MEC/Fast track
   c. Focused Care
   d. Acute Care

5. Do you ever initiate the NIP sepsis protocols?
   a. Yes
   b. No
   c. I did not know we had a NIP sepsis protocol.
**Pre-Education Sepsis Questionnaire:**

The following statements examine the perception and belief of sepsis protocols, sepsis management, and sepsis education.

*Please read each statement and mark a box to what extent you agree or disagree with.*

<table>
<thead>
<tr>
<th>Statements</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. It is easy to find the ED sepsis protocols (NIP).</td>
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<tr>
<td>2. It is easy to initiate the ED sepsis protocols (NIP).</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>3. My unit has prepared me adequately to care for patients with sepsis.</td>
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<tr>
<td>4. My knowledge on sepsis is strong.</td>
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<tr>
<td>5. I feel comfortable taking care of patients with sepsis.</td>
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<tr>
<td>6. I use the triage sepsis screening appropriately.</td>
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<td>7. When a patient presents with 3 or more of the SIRS criteria, I utilize the sepsis protocol or notify a physician immediately.</td>
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</tbody>
</table>

*Circle either protocol or physician and mark a box.*

<table>
<thead>
<tr>
<th>Statements</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. I feel we have enough resources to appropriately manage patients with sepsis (ED techs, float nurses, charge nurse support, ancillary staff).</td>
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<td>9. There should be a handoff of care to the inpatient units when caring for patients with sepsis.</td>
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<td>10. I feel like we already do a good job taking care of patients with sepsis and this education is unnecessary.</td>
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Appendix G: Posteducation Questionnaire

Post-Education Questionnaire

Demographics Collection Tool:

*Please circle one letter for each question.*

1. What is your job title?
   a. RN
   b. ED tech
   c. Unit Coordinator
   d. ED secretary

2. How many years have you been a nurse?
   a. 0-1 year
   b. 1-3 years
   c. 3-5 years
   d. > 5 years

3. How many years have you been an Emergency Department (ED) nurse?
   a. 0-1 year
   b. 1-3 years
   c. 3-5 years
   d. > 5 years

4. Where do you primarily work in the ED?
   a. Triage
   b. MEC/Fast track
   c. Focused Care
   d. Acute Care

5. Do you initiate the NIP sepsis protocols?
   a. Yes
   b. No
   c. I did not know we had a NIP sepsis protocol.
**Post-Education Sepsis Questionnaire:**

The following statements examine the perception and belief of sepsis protocols, sepsis management, and sepsis education.

*Please read each statement and mark a box to what extent you agree or disagree with.*

<table>
<thead>
<tr>
<th>Statements</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. My unit has prepared me adequately to care for patients with sepsis.</td>
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<td>2. My knowledge on sepsis is strong.</td>
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<td>3. I feel comfortable taking care of patients with sepsis.</td>
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<tr>
<td>4. I initiate the ED sepsis protocol or have a physician place sepsis orders every time I have a sepsis patient.</td>
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<tr>
<td><em>Circle either protocol or physician and mark a box.</em></td>
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</tr>
<tr>
<td>5. I use the triage sepsis screening appropriately.</td>
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<tr>
<td>6. I have support from my charge nurse and ED techs when I have a Sepsis Alert patient.</td>
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</tbody>
</table>

1. Obtaining labs with lactic acid, blood cultures x2, and urinalysis is critical to the management of patients with sepsis.
   a. True
   b. False

2. The initial broad-spectrum antibiotics should be administered within what hour after sepsis recognition?
   a. 1 hour
   b. 3 hours
   c. 6 hours
   d. Time of antibiotic administration is not important.
3. Accurate weight on patients with sepsis is important.
   a. True
   b. False

4. What is the fluid bolus requirement for sepsis-induced hypotension?
   a. 20mL/kg of IV crystalloid
   b. 30mL/kg of IV crystalloid
   c. 1 Liter of IV crystalloid
   d. 2 Liters of IV crystalloid

5. For patients with septic shock requiring vasopressors, target a mean arterial pressure (MAP) of 65mHg.
   a. True
   b. False
Appendix H: SSC Approval

Letter of approval to use SSC infographic and SSC pocket cards for ED education

Lori Harmon <lharmon@sccm.org> on behalf of Surviving Sepsis <ssc@sccm.org>

Mon 5/20, 10:57 AM

Permission granted.

Lori

Lori A. Harmon, RRT, MBA, CPHQ | Director of Quality | Society of Critical Care Medicine
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www.facebook.com/SCCM1 | www.twitter.com/SCCM | www.youtube.com/SCCM500

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Thank you so much! Thank you very much. Thank you very much for your support.

Report inappropriate text

Jun, Jean

Fri 5/17, 7:42 PM
ssc@sccm.org

To whomever it may concern:

I am requesting permission to use the SSC infographic and SSC pocket cards in a sepsis education awareness program in my community hospital to implement practice change.

Thank you

Respectfully,

Jean Jun