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## The Need for a Sepsis Screening Tool in an Outpatient Facility

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The Need for a Sepsis Screening Tool in an Outpatient Facility

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### Abstract

Sepsis is an exaggerated inflammatory response generated by the immune system secondary to the presence of septicemia, or pathogens within the bloodstream. An average of 270,000 individuals die from sepsis each year, while a total of 1.7 million cases occur annually. Research has shown that the early identification of sepsis prior to hospital admission is associated with decreased lengths of stay, hospital-associated costs, and overall mortality. To demonstrate this research, 26 healthcare staff members in an outpatient clinic were provided with a pre-survey, qSOFA sepsis screening tool, and a post survey to determine if these materials increased participant confidence when approaching sepsis. The results of the two surveys demonstrated that all of the participants agreed that a screening tool would be beneficial in the outpatient setting and that most of the participants gained confidence with the use of a screening tool.

*Keywords:* sepsis, adult, lactic acid, mortality, length of stay, patient cost, screening tool, confidence, outcomes.

## The Need for Proactive Sepsis Screening in Acutely Ill Patients

### I. INTRODUCTION

#### **Background and Significance**

Sepsis is described as an extreme immune response to the presence of bacteria in the body, bearing an average mortality rate of 270,000 lives each year in the United States of America (USA) (Centers for Disease Control and Prevention, 2018). Another statistic provided by the Centers for Disease Control and Prevention (CDC) (2018) states that of the deaths occurring in the hospital setting, sepsis is responsible for a third of all inpatient deaths. Sepsis is not isolated to one geographical location, but rather can be experienced throughout the globe with a multitude of causative bacterium.

According to Dantes & Epstein (2018), infections of any pathological process, when left untreated or poorly treated, can lead to a septic condition. Additionally, it is estimated that within the USA, 1.7 million adult cases occur annually. People from certain groups that are suffering from one or more comorbidities tend to have a higher risk of sepsis. Soto, Martin, & Gong (2013) state that African Americans usually have a higher instance of comorbidities that increase the likelihood of sepsis. Additionally, people groups with a lower socioeconomic status (SES) are more likely to succumb to severe sepsis than those of a more affluent economic standing. Rush et al. (p. 553, 2017) acknowledges that persons with a lower SES more often lack the resources needed for preventative measures.

A study by O'Brien (2015) cites sepsis as the single most costly reason for inpatient hospitalization. O'Brien (2015) continues to reveal that the USA spent over \$20.3 billion in 2011 on sepsis hospitalizations alone. Another study by Torio & Moore (2016) references septicemia



as the topmost expensive condition treated in the USA in 2013, as well as the number one most expensive condition billed to Medicare.

Paoli, Reynolds, Sinha, Gitlin, & Crouser (2018) found that an average sepsis hospitalization cost over \$18,000 per individual. Additionally, the researchers found that costs ranged anywhere from almost \$40,000 to about \$70,000 for hospitalizations resulting in sepsis that was either unidentified at admission or poorly managed. Different tests and clinical criteria are used to identify sepsis and those at risk for developing sepsis.

Table 1 in Jozwiak, Monnet, & Teboul (2016) depicts one of the current sepsis bundles utilized by various health systems. In the bundle that is shown in Table 1 of their study, lactic acid screening is the first intervention listed followed by obtaining blood cultures and administering crystalloids and antibiotics. The bundle itself can be useful; however, it requires the prompt identification by a nurse or healthcare provider to be effective.

Goodwin (2018) reports that clinical tools are essential to identify sepsis and are “critically important to early intervention efforts.” The article continues to discuss the usefulness of the quick Sequential Organ Failure Assessment (qSOFA), a screening tool used primarily prior to ICU admission to determine sepsis severity and predict patient outcomes.

### **Problem Statement**

The problem I have identified is that sepsis diagnosis and treatment is not often initiated or recognized early enough to provide lifesaving and cost-saving interventions for the patient. The current policy surrounding sepsis diagnosis and bundle initiation usually relies on a single nurse observing the subtle changes that precede septic shock and successfully convincing the provider that action is necessary.

As a nurse it is important to ensure that we practice under our own scope of practice while advocating for our patients to foster improved patient outcomes. It is for this reason that I am aiming to conduct a policy change for how sepsis screening is initiated. My approach includes developing and distributing a new screening tool to help the providers ensure sepsis cases are caught and treated accordingly. Through this method of screening, the nurse will no longer be solely responsible for having the duty to convince the provider that sepsis criteria are present, rather the provider will be responsible for referring to their screening tool to determine if the patient meets the criteria for possible sepsis..

### **Needs Assessment**

The site that I have selected for my policy change project is an urgent care clinic in east Tennessee. Prior to devising my policy change, I spoke with the three physicians on duty at the clinic. I asked if we ever conducted sepsis screenings and when they replied “usually not” I asked the reason for omitting the screening. One of the doctors replied that it would not change their decision to admit a patient because they would already recognize that the patient was ill enough to be hospitalized.

While the providers of the clinic are confident in their need to admit a patient that is acutely ill, there are improvements that can be made to the process to better serve their patients. Currently, patient admission tracking is not utilized routinely in the office. Furthermore, suspected sepsis patient tracking is not performed at all. Occasionally the provider that admitted a patient will follow their hospital care; however, this is performed out of curiosity rather than strategically.

Despite the physicians recognizing the need for hospitalization, by screening for sepsis criteria prior to admitting a patient, the patient can receive more efficient and appropriate treatment.

### **Objectives and Aims**

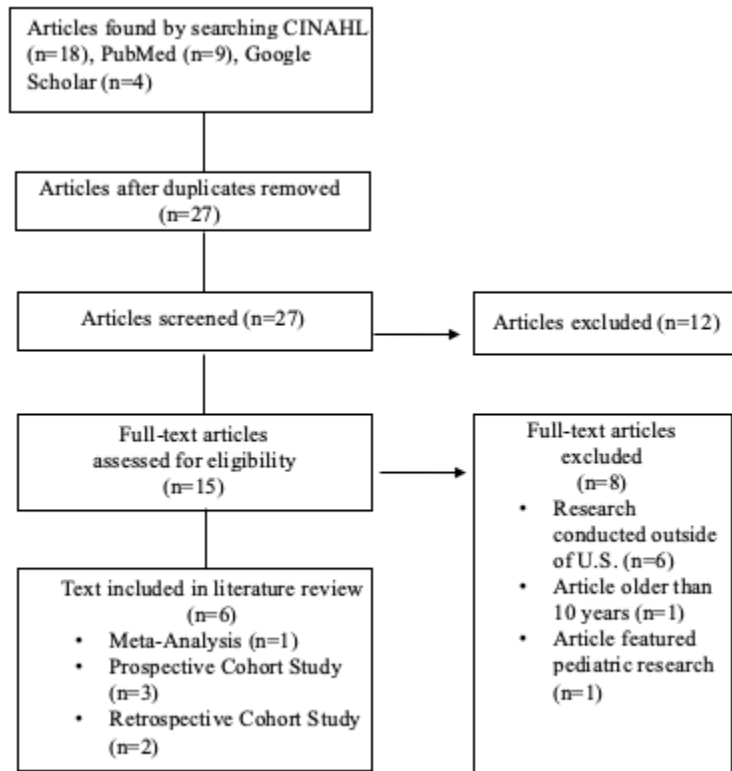
The objective for my project is to successfully implement a policy change at my project site to improve patient outcomes and alleviate excessive and needless costs associated with delayed sepsis identification. By implementing a new screening tool, my project will help provide expedited treatment and potentially prevent extensive hospitalizations. Eventually, after analyzing the healthcare staff responses to the new screening tool, I aim to implement the policy within the healthcare system associated with the clinic.

## **II. EVIDENCE**

### **Literature Review**

After conducting a review of the literature regarding the efficacy of screening for sepsis prior to hospitalization, four themes were identified across the research. The themes included length of stay, mortality prediction, mortality, and cost of treatment. Although a few of the articles expressed the need for further randomization and elimination of bias, each of the articles featured similar data regarding the four themes mentioned. Figure 1 illustrates how the selected articles were chosen for critical appraisal.

Figure 1. Literature Search Diagram



Once the articles were thinned out, a critical appraisal of the remaining articles was performed to gauge the efficacy of the research. Table 1 depicts the critical appraisal and literature synthesis conducted for the selected articles. Each article was examined carefully for bias and pertinent data was compared with the other articles being reviewed. The grading system used for critical appraisal was the ACC/AHA grading system outlined by Melnyk & Fineout-Overholt (2019).

Table 1.

Outcome	Fernando et al. (2018)	Berkman et al. (2009)	Boran et al. (2018)	Shetty et al. (2018)	Shetty et al. (2017)	Morris et al. (2017)
Length of Stay	∅	∅	↓ <sup>c</sup>	↑ <sup>c</sup>	↑ <sup>s</sup>	↓ <sup>c</sup>
Mortality	↓ <sup>c</sup>	↓ <sup>s</sup>	↓ <sup>c</sup>	↓ <sup>s</sup>	↓ <sup>c</sup>	↓ <sup>s</sup>
Mortality Prediction	↑ <sup>s</sup>	↑ <sup>c</sup>	↑ <sup>s</sup>	↑ <sup>s</sup>	↑ <sup>s</sup>	↑ <sup>s</sup>
Sample Size	985 patients	1419 patients	161 patients	12,349 patients	12,555 patients	3063 patients
Population	≥18 years	≥18 years	≥18 years	≥18 years	≥18 years	≥18 years
Study Design	PSC	PSC	PSC	RSC	RSC	MA
Level of Evidence	II	I	I	II	I	I
Quality of Evidence	B	B	B	C	B	A
Any other information important to the PICOT question	Used in conjunction with <u>qSOFA</u>	Used in conjunction with Anion Gap levels	Used in conjunction with <u>qSOFA</u> and other labs	N/A	Used in conjunction with <u>qSOFA</u>	Point-of-care lactate testing

**Legend:** ↓=decrease; ↑=increase; ∅=not discussed in study; s=statistical significance; c=clinical significance; qSOFA=quick sequential organ failure assessment; PSC=prospective cohort study; RSC=retrospective cohort study; MA=Meta-analysis

**Grading system:** ACC/AHA Grading System as outlined in Melnyk, B. M., & Fineout-Overholt, E. (2019, p. 243). Evidence-based practice in nursing & healthcare a guide to best practice. Philadelphia: Wolters Kluwer.

### Length of Stay

According to Morris et al. (2017), sepsis screening prior to hospital admission coincided with a clinically significant decrease in length of stay. This clinical significance is further supported by *Table 1* of Boran et al. (2018). Furthermore, additional literature regarding length of stay is presented by Paoli, Reynolds, Sinha, Gitlin, & Crouser (2018). Their research states “On average, non-present-on-admission sepsis cases spent nearly double the amount time in the hospital, in the ICU, and on mechanical ventilation compared with sepsis present-on-admission cases.” Despite the clinical significance presented by Morris et al. (2017) and Paoli et al. (2018) in their meta-analysis and retrospective observational study respectively, other studies reflected contrary results.

Two studies conducted by Shetty et al. (2017) and Shetty et al. (2018) express an increased length of stay both statistically significant and clinically significant respectively. This data; however, is the culmination of a retrospective cohort study and ranks as lower quality than

the other studies within the literature review conducted. Incidentally, Shetty et al. (2018) concedes that the early identification of possible sepsis should prompt “initiation of specific interventions and increased monitoring.”

While most of the articles in the literature review acknowledge length of stay as a directly affected component of sepsis screening, Berkman, Ufberg, Nathanson, & Shapiro (2009) and Fernando et al. (2018) neglect to mention a correlation. Their research; however, is centered more prominently around mortality prediction and mortality rates.

### **Mortality Prediction**

The utilization of sepsis screening in patients not yet hospitalized, according to *Table 2* of Fernando et al. (2018), reflects a statistically significant increase in accurate mortality prediction, especially when a need for lactic acid screening is identified. In addition to Fernando et al. (2018), Shetty et al. (2017), Shetty et al. (2018), and Boran et al. (2018) all reported statistically significant increases of mortality prediction when performing sepsis screening prior to hospitalization. Berkman et al. (2009) was the only study to report a clinically significant increase in mortality prediction when using sepsis screening prior to hospitalization, especially when testing for lactic acid levels.

Shetty et al. (2018) states that patients who are found to have greater than 2.0 mmol/L lactate levels should initiate sepsis treatment, while lactate levels greater than 4.0 mmol/L reflect a two-fold increase for adverse events and potential in-hospital mortality. Berkman et al. (2009) also acknowledge the predictive mortality when lactic acid levels rose above 4.0 mmol/L; however, their study focused more around the implications of elevated anion gap levels. These two studies demonstrate the importance of recognizing sepsis prior to hospitalization despite the

timespan between the two articles. Berkman et al. (2009) was not the only study that utilized additional criteria to predict mortality.

Boran et al. (2018) incorporated different mortality scoring systems to correlate with the lactate levels obtained, specifically the sequential organ failure assessment (SOFA). When using the SOFA scoring system in conjunction with lactate levels, the hospital personnel were capable of predicting mortality more efficiently. Although the likelihood of mortality is an important factor when developing and initiating a treatment plan, a few articles did not include predictive data in their studies. Morris et al. (2017) and Paoli et al. (2018) did not directly address the prediction of mortality when using sepsis screening; however, the studies did explore the effect on mortality itself.

### **Mortality**

Despite variations of clinical and statistical significance, all of the articles in the review of literature unanimously attributed early identification of sepsis through screening to a decrease in overall mortality. This piece of data alone should be enough to encourage further investigation and randomized clinical trials to determine the importance of pre-hospitalization screening and testing. Although each article agreed on the fact that sepsis screening decreases mortality, the articles approached the data uniquely.

Berkman et al. (2009), Morris et al. (2017), and Shetty et al. (2018) reported statistically significant findings that support the idea of decreased mortality rates in conjunction with sepsis screening and testing. Morris et al. (2017) reports that five of the studies that were analyzed reflected a downward trend for mortality when sepsis screening and testing was employed.

The articles by Fernando et al. (2018), Boran et al. (2018), and Shetty et al. (2017) found a clinically significant decrease in mortality with utilization of sepsis screening and testing.

Fernando et al. (2018) states that “improved outcomes in patients with septic shock have been associated with clearance of lactate.” This statement is suggestive that individuals with unidentified septic conditions have an increased mortality rate. Additionally, the statement made by Fernando et al. (2018) stresses the importance of early identification and treatment to prevent subsequent mortality.

Boran et al. (2018) discusses the advantage of using screening tools, specifically SOFA scoring, to diagnose sepsis quicker and allow for prompt treatment to decrease mortality in affected individuals. Similarly, Shetty et al. (2017) also acknowledges the use of SOFA scoring and states “our study suggests that until other risk stratification tools are validated, patients presenting with suspected infection should undergo lactate testing where this is readily available.”

In addition to the previously discussed studies, Paoli et al. (2018) also suggests evidence of identifying sepsis prior to hospitalization as a means for decreasing mortality. Figures shown in *Table 3* of Paoli et al. (2018) express a decrease in mortality of almost half when sepsis is identified prior to admission. Not only do they acknowledge the usefulness of early screening to decrease the mortality rate, but also the financial burden of a sepsis diagnosis post-admission.

### **Cost of Treatment**

While most of the articles in the literature review do not directly publish data surrounding the cost of treatment, there are implications and suppositions that can be derived from decreased length of stays. Despite the majority of the articles excluding treatment cost figures, Paoli et al. (2018) does allude to the fact that screening prior to hospital admission greatly reduces treatment costs.



According to Paoli et al. (2018), sepsis management in the United States ranks as the highest in financial burden when compared with other conditions requiring acute care treatment. Specifically, the study stated that “in 2013 sepsis accounted for \$24 billion in hospital expenses.” Paoli et al. (2018) explains that sepsis hospitalization on average costs an individual close to \$60 thousand if sepsis is not identified prior to admission and about \$18 thousand if it is identified prior to admission.

Although the cost of treatment is staggering regardless, the ability to save patients an estimated \$42 thousand in hospitalization costs should be utilized. Paoli et al. 2018 states that it is known that not only do delayed diagnoses of sepsis lead to increasingly poor outcomes, but also higher costs of treatment. The authors state that it is imperative to quickly identify the presence of or risk for sepsis to decrease mortality and financial burden for the patient and their family members.

After the critical appraisal and synthesis was completed, the strength of common recommendations was assessed. Table 2 depicts the strength of recommendations adapted from the selected articles using the ACC/AHA grading system. Although the recommendations listed vary slightly from the proposed implementation of this project, the commonality is the early screening for individuals at an outpatient facility.

Table 2. *Table of Strength of Recommendations*

Recommendation	Strength of Evidence for Recommendation	References in Support of Recommendation
<p><b>1. Statement of Recommendation</b> It is <b>strongly recommended</b> to initiate sepsis screening through the SOFA scoring system along with lab testing.</p>	Based on the “High” grade of evidence using the ACC/AHA grading system, initiating sepsis screening along with lab testing enables early identification and response to patients with sepsis.	Fernando et al., (2018); Berkman et al., (2009); Boran et al., (2018)
<p><b>2. Statement of Recommendation</b> It is <b>strongly recommended</b> to initiate sepsis screening prior to hospitalization to begin fluid resuscitation and/or antibiotic therapy.</p>	Based on the “High” grade of evidence assigned through the use of the ACC/AHA Grading System, initiating sepsis screening prior to hospitalization will enable fluid and antibiotic therapy earlier and reduce mortality and length of stay.	Morris et al., (2017); Shetty et al., (2017)

Grading system: ACC/AHA Grading System as outlined in Melnyk, B. M., & Fineout-Overholt, E. (2019, p. 243). Evidence-based practice in nursing & healthcare a guide to best practice. Philadelphia: Wolters Kluwer.

### Literature Review Summary

To summarize, the literature review conducted for the efficacy of sepsis screening revealed four common themes throughout the articles. Length of stay, prediction of mortality, mortality, and cost of treatment were addressed in one form or another in each article. The majority of the articles acknowledged a decreased length of stay when screening was utilized for early identification of sepsis.

Similar to the universal understanding of mortality prediction, each of the articles also agreed that sepsis screening led to a decrease in overall mortality. This observation was emphasized in Morris et al. (2017) and Paoli et al. (2018) more so than the other articles; however, the others either depicted downward trends of mortality or implied higher survivability.

Despite the omission of financial data in most of the articles, Paoli et al. (2018) focused largely on the potential costs of hospitalization when sepsis is not identified prior to admission. The authors' data expressed the need to utilize early screening to effectively reduce patient costs and overall mortality.

Although there were many limitations throughout the articles, especially a lack of randomized control trials, evidence is beginning to show a need for improved screening for sepsis. Sepsis screening and lab-work are mentioned throughout each article that they have the potential to lead physicians and other providers to initiate cost-saving and life-saving treatments as an effort to combat sepsis.

### **Theoretical Framework**

Butts & Rich (2018) state that a behavioral scientist by the name of Kurt Lewin, devised and implemented a change model in the 1940s. Lewin's model is centered around three principles: unfreezing, moving, and refreezing. Unfreezing, as proposed by Lewin, was to realize that the current practice was in need of revision. Butts & Rich (2018) explain that this unfreezing is imperative for outdated routines to be unlearned or revised. Lewin acknowledged that while the force for change moved in one direction, an opposite force originating from individuals that preferred the current practice moved against the change. To adequately implement a change in procedure or policy, the professionals that utilized the current practice would have to acknowledge the need for improvement and begin to metaphorically and realistically move toward a solution.

Lewin's moving phase is presented as a seamless transition from the unfreezing phase. Researchers and practitioners would begin to reevaluate and experiment with a new method. As the culmination of new ideas began, they would be tested and analyzed to determine their

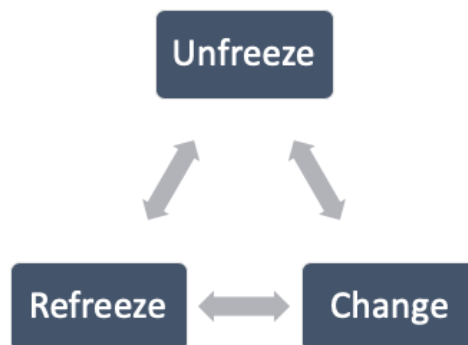
feasibility. Butts & Rich (2018) explained that the moving phase was a period of transition, not only for the policy, but also for the team implementing the change.

The refreezing stage of Lewin's change theory required the recognition of a new standard of care. During this stage, research and implementation would halt and the new practice would be carried out. The practice would undergo close monitoring and if it was later determined that there may be a more efficient practice, the cycle would begin again. Lewin's change theory is a practice/situation specific theory used to move away from an outdated or insignificant practice to an updated and more efficient standard. The theory and its use have the ability to not only change a practice, but also the approach to the practice as well as the practice environment.

Although there are varying graphical representations of Lewin's change theory, it is frequently depicted as a cycle. Figure 2 shows the cyclical nature of Lewin's change model as it will be utilized for the project. The process of enhancing current practice is ever evolving and does not end with the step of refreezing but allows it to unfreeze once again to reevaluate efficiency. Throughout my experiences as a nurse, I have identified an area of practice that needs a policy revision.

Figure 2.

## Kurt Lewin's Change Model



Through my observations and experience with patients suffering from the various stages of sepsis I determined that a change is needed. Reacting to late signs and symptoms of the disease process is not enough to prevent mortality. Relying on a single nurse to identify the complex clinical manifestation of sepsis does not work and places patients at a greater risk for developing complications from sepsis.

The practice problem that I have identified is the delayed screening in patients that are at risk for sepsis. These screenings are not typically performed until the patient is already hospitalized, preventing the potential early identification and treatment of sepsis. This delayed response to the disease process contributes to the progression of sepsis to multi-organ dysfunction syndrome (MODS) and subsequently mortality. Lewin's change theory provides the opportunity to analyze and develop a more efficient process for screening patients that are at risk for developing sepsis.

Lewin's theory will provide a framework for my development of strategies by allowing me to examine current practice. I will then be able to initiate the unfreeze step to begin the departure from current practice, utilize the move phase to implement a new and more efficient screening strategy, and refreeze the updated method. This mode of change ensures that the most applicable practice is employed while building off of previous data and current evidence.

Currently, the standard for sepsis screening is a more reactive process. Using Lewin's change theory, I aim to implement a policy change that takes a proactive approach. By preemptively screening patients prior to hospitalization, evidence suggests that patients with sepsis will be identified earlier leading to decreased mortality and subsequent cost reduction of treatment.

### III. IMPLEMENTATION

As a nurse, I was tasked with caring for patients at all stages of illness. During my time on a step-down unit in Johnson City, Tennessee I was assigned multiple patients with sepsis; however, I was also assigned patients with undiagnosed sepsis infections. As nursing students, we learn different signs and symptoms to look for if sepsis is suspected, but in living patients the signs are not always obvious.

While caring for my patients with sepsis, I came to expect fluid bolus orders and broad-spectrum antibiotics. Often after these orders were initiated, I would notice a large improvement in the patient's condition. Unfortunately, there were many times that a provider was notified of a patient's subtle signs and symptoms without interventions being ordered.

I was forced to watch two of my patients succumb to sepsis because as a nurse, any further action would have been out of my scope of practice. Despite paging the provider multiple times and contacting the house supervisor, timely treatment did not occur. Watching the families of these patients grieve over their loved ones that were admitted with seemingly unrelated conditions pulled at my heart strings. Through scholarly research and comparison, I recognized large improvements that could be made to sepsis policy and protocols.

Jozwiak, Monnet, & Teboul (2016) provide common signs and symptoms of potential sepsis including elevated heart rate over one hundred beats per minute, decreased urine output, and elevated lactic acid levels. Unfortunately, lactic acid levels are not always easily obtainable due to facility limitations and their short viability time. Interventions are not usually initiated until a noticeable decline has already presented in the patient. My project aims to transform sepsis policy into a proactive process in an attempt to decrease mortality and financial burden.

### Methodology

Paoli et al. (2018) provides data demonstrating that a sepsis diagnosis made prior to admission into an acute care facility effectively halves mortality rates. Despite evidence of improved mortality rates, many cases of sepsis are not diagnosed until it is too late. My project aims to equip providers with clinical proof to initiate interventions and a sepsis diagnosis prior to entrance into the hospital.

Currently, most outpatient facilities do not utilize sepsis screening tools. The most common labs drawn are a complete blood count (CBC) and basic metabolic panel (BMP). These labs are useful; however, they do not provide enough evidence that an infection has reached the level of septicemia.

By using a screening tool in conjunction with other labs, the provider will be able to differentiate between an isolated infection and sepsis. Boran et al. (2018) states that screening tools, such as the SOFA tool that they used, are effective at predicting patient outcomes and risk factors pertaining to possible sepsis and its progression. Interventions can be delayed if the patient is not screened prior to hospitalization. Despite the evidence of usefulness associated with my project, there is always a potential for roadblocks. Table 3 outlines some of the barriers and facilitators associated with my project site.

Table 3.

<b>Barriers</b>	<b>Facilitators</b>
<ul style="list-style-type: none"> <li>• Resistance to change.</li> <li>• Providers neglecting to use new tool.</li> <li>• Lack of knowledge for need to screen.</li> </ul>	<ul style="list-style-type: none"> <li>• Proficient nurses.</li> <li>• Project site passion for improving patient care.</li> <li>• Negligible financial footprint.</li> <li>• Healthcare system cooperation.</li> </ul>

My project will focus on implementing a new sepsis screening tool to be used at an outpatient urgent care with the potential to be used throughout the primary care offices associated with the project site.. The provider will be responsible for referring to and using the screening tool in conjunction with other labs, while the nursing staff will be required to familiarize themselves with sepsis criteria and ensure patient presentation is accurately charted. Once the provider assesses the patient, if the provider determines the patient is septic, the patient will be ready for crystalloid and antibiotic therapy upon arrival to the inpatient facility.

Through early identification of sepsis, the patient can begin treatment prior to relying on hospital staff to identify sepsis amidst the other admission criteria. Patients will be able to have blood cultures drawn and broad-spectrum antibiotics administered upon arrival to the acute care facility. Utilizing this expedited process will improve both mortality rates of sepsis afflicted patients, as well as financial burdens placed on the patients and family members receiving care.

### **Setting**

The setting of my project will take place primarily in outpatient healthcare offices in Johnson City, Tennessee. This includes primary care offices, urgent cares, and walk-in clinics. These settings all allow for screening to be performed and for the patient's condition to be monitored by nursing personnel while awaiting provider orders. Each of these types of outpatient care facilities have the capability of responding to patient decline and contacting emergency services if necessary.

In addition to the actual outpatient facilities, the area around Johnson City is host to many large hospitals that have the ability to accept and treat patients with sepsis. Once the outpatient facility identifies a patient with sepsis, the trip to the closest hospital should be no longer than ten



minutes. The close proximity of hospitals in this area allow for a quick transition and treatment of time sensitive conditions such as sepsis and septic shock.

### **Population**

The population of interest for my project will be providers and clinical staff. The individuals that will receive the new sepsis screening tool will be doctors, nurse practitioners, and physician assistants. In addition, nursing/clinical staff will be provided with educational materials about sepsis. The population affected by project interventions will most likely be the clinical staff at the project site, as well as patients presenting with potential sepsis..

### **Interventions**

The interventions that will be implemented will ensure early identification of impending sepsis or septic shock. When a patient presents to the outpatient facility with an acute infectious condition, the patient will be screened using the new tool. Ideally the provider will complete their assessment, determine the origin of infection and refer the patient to an appropriate treatment center.

The provider will be responsible for calling the recipient facility and discussing the patient's condition with either a nurse or provider. In addition to relaying clinical manifestations of illness, the provider will make a point of mentioning the sepsis screening and communicate the need for blood cultures and broad-spectrum antibiotics on patient arrival. If the outpatient clinic is directly admitting the patient to the hospital, it is important for the sepsis diagnosis to be included in admission criteria to ensure the patient receives the necessary interventions once admitted to a floor.

In addition to the previously mentioned interventions, nursing staff will be responsible for monitoring patient condition until emergency services arrive or the patient leaves the clinic.

This may include repeat vital signs if the provider feels it is necessary. Additionally, nursing staff should print a summary of the patient's visit and include all medications and interventions performed. If emergency services are needed, the provider will be responsible for handing patient off to the paramedics.

### **Outcome Measures**

In an effort to collect data with meaningful responses and measurable outcomes, two surveys will be distributed to the healthcare staff at the clinic. The first survey will be a pre-survey that gauges whether or not the healthcare worker is familiar with sepsis and if they have ever used a sepsis screening tool in the past. The staff will then be provided with the sepsis screening tool that has been developed for the clinic. After the staff has had an opportunity to familiarize themselves with the screening tool, the post-survey will be distributed to determine if the screening tool increases provider confidence and nurse knowledge of sepsis presentations.

Participant identification will be protected using anonymous surveys. The surveys will be stored on the survey software until data can be disseminated from participant responses. At the completion of the project, the surveys collected will be deleted.

### **Benefits and Risks**

Utilizing a screening tool will not incur any additional risks for the patients in need of sepsis investigation. In truth, providing a screening tool available for all providers present can only provide additional confidence for the healthcare provider when arriving at a diagnosis. It is important to note that there is little to no risk associated with implementing a new screening tool as it is intended for reference rather than definitive diagnosis.

Not only does the screening tool lack added risks for the patient and healthcare staff, but it would be devoid of a financial footprint as well. The screening tool could be delivered to the healthcare providers either through electronic mail, or a hardcopy to keep for reference.

### **Budget**

Due to the nature of implementing a new screening tool, there is little to no cost associated with the proposed project implementation. The survey software that will be used to obtain qualitative data and feedback from healthcare staff is also free. In respect to the almost nonexistent financial impact, the project serves as a sustainable addition to the proposed site.

### **Evaluation Plan**

Evaluation of project efficacy is an important part of the implementation that my scholarly project aims to affect. Through the utilization of a new sepsis screening tool, my project is designed to increase healthcare staff confidence when encountering possible sepsis. Due to the qualitative nature of the proposed project, data will be collected in real time via survey response before and after viewing the associated screening tool.

While the evaluation period that occurs will be continuous as staff responses are received, the project timeframe is projected to last about 60 days to ensure adequate response volume and accommodate the busy schedules of healthcare staff members. At the end of the project, responses will be analyzed to assess team member opinions on the usefulness in permanent implementation of the proposed screening tool.

### **Data Maintenance/Security**

Moran, Burson, & Conrad (2020) state that “data security is an important issue to consider in any clinical inquiry project and requires a protocol to protect participants.” The authors continue to state that coded lists should be used to protect patient identification or other

identifiers that could be used to identify individuals. Additionally, there are laws that must be upheld when handling a patient's personal information.

The Health Insurance Portability and Accountability Act of 1996 (HIPAA), also known as Public Law 104-191, set guidelines to ensure patient information remains confidential and secure. The Privacy Rule incorporated in HIPAA ensures patient's information remains private while still allowing for "high quality healthcare" (HHS Office of the Secretary & Office for Civil Rights, 2013). Not only is upholding the security and privacy of patient information ethical, but it is also against the law to potentially reveal personal patient information without an individual's consent.

Due to the sensitive nature of healthcare information, it is important to develop a data management plan to ensure privacy is maintained throughout the course of the project implementation. The data management plan should include who will have access to the data, how data will be logged and stored, and the method for disposing of documents containing sensitive patient data after the project period. In addition, Moran, Burson, & Conrad (2020) recommend a codebook to be utilized to further encrypt patient data when reporting results in publications.

The individuals that will have access to patient data should be limited to prevent loss of data and/or misuse of patient information. The project leader will be primarily responsible for handling and collecting project data. In the proposed project, the data that is to be collected will come in the form of an anonymous survey that gauges the usefulness of a new sepsis screening tool.

Data storage will occur in two different ways throughout the project timeframe. The primary method of data storage will be within the survey software as anonymous responses are

received from the healthcare team. This method requires little concern as there will be no identifiers readily available aside from the unlikely potential to track IP addresses through electronic responses.

The second method of data storage will require the use of a spreadsheet. A spreadsheet will be created for project data and will feature demographics and variables in coded form. An example of demographics to be used include provider status and facility classification. Using the codebook created for the project, each demographic will be recorded as a number; for example, providers will be coded with a "1." Additionally, other variables that will be coded include responses in favor of the screening tool, responses against the screening tool, and indifference. To ensure electronic documentation of the codebook and spreadsheet remain private, the files will be password encrypted.

When it is time for the disposal of data, which will occur after the project timeframe is complete, the electronic survey will be erased. The project leader, while accompanied by either the nursing supervisor or business manager, will shred any paper documents that may be generated in response to the project. The document shredder is locked as well and can be only unlocked by a third-party company for removal from the facility. Electronic documents will be unlikely due to encryption and coding of project participants.

### **Evaluation and Dissemination**

At the completion of the project implementation and after data has been gathered, a statistical analysis will be performed by an experienced statistician at The University of Tennessee. The primary data that will be calculated will include the percentage of staff that are in favor or against the implementation of a new sepsis screening tool. Additionally, data will be generated to assess provider confidence levels before viewing the screening tool and after

viewing the screening tool. Success of the project will be measured by demonstrating an increase in confidence levels for healthcare staff, as well as the percentage of healthcare staff in favor of implementing the screening tool.

After the project has been successfully implemented and completed, and the data has been gathered and interpreted, the project will be ready to be reported back to the project site. The project site's business manager and medical director will be given a copy of the project write-up. Results will be highlighted and relayed to the project site staff to demonstrate the project's efficacy.

Once the project site has been notified of the results of the project, the project leader will work with the project chairperson to refine the documentation for potential publication. Publication will be directed toward nursing and medical journals to share the benefits of improved sepsis policy. In addition to publication, the project and its results will be presented at various institutions in east Tennessee that are hosting healthcare seminars. The presentation of improved policy is important to spread throughout different sources to ensure that patients outside of the project area can benefit from previous studies and current evidence-based practice.

### **Study Design**

The original intention of this project was to illuminate the efficacy of drawing lactic acid levels on patients presenting to outpatient facilities with acute infective processes. The goal of the original design was to demonstrate the reduction of patient mortality and financial burden through early sepsis diagnosis prior to acute care admission. While much of the preparation for the original intended project was completed, the emergence of the COVID-19 virus and subsequent protocols and restrictions on human subject testing implemented by the university forced a restructuring of the proposed project. Although the originally intended project would

have yielded higher statistical significance, the revised design still demonstrated clinical significance throughout the project.

The revised project was carried out in a quasi-experimental design. Two surveys were created, each containing five questions. Surveys were emailed to participants and responses were submitted anonymously through the survey engine, Survey Monkey. The first survey was a “pre-survey” that identified the participant as either a provider or non-provider. The remaining four questions gauged the familiarity of the participants with sepsis identification and previous use of a sepsis screening tool.

The questions used to determine how familiar each participant was with sepsis criteria and prevalence included what temperature ranges are associated with sepsis, common heart rate and respiratory rate deviations seen in septic patients, and how many sepsis cases occur annually. Upon completion of the “pre-survey” participants were instructed to review the qSOFA screening tool that was attached to the original email.

After participants completed the “pre-survey” and reviewed the qSOFA, they were instructed to complete the post-survey. The post survey focused on whether or not the pre-survey questions and review of the qSOFA screening tool increased their confidence in recognizing potential sepsis patients, increasing their confidence in alerting inpatient providers of probable sepsis, whether or not the pre-survey and screening tool helped participants understand the importance of early sepsis recognition, if they were now comfortable identifying sepsis symptoms, and whether or not a sepsis screening tool would be useful in an outpatient setting.

### **Formative Evaluation**

Weekly review of participant responses was conducted by this DNP candidate. Additionally, bi-weekly email reminders were sent in an effort to maximize participant

responses. Both the practice manager, and director of nursing personally reminded the clinic staff to complete the provided surveys to encourage a substantial quantity of responses.

### **Statistical Analysis**

Although this project was conducted in a primarily qualitative design, certain statistics were able to be discerned after the completion of the project. While this DNP candidate has a basic understanding of statistical analysis, a licensed statistician employed by the University of Tennessee was consulted for interpreting the collected data. Using SPSS, p-values were calculated to determine whether or not participant response were statistically significant. Of the 41 employees invited to complete the survey, 26 completed the surveys in their entirety.

The first analysis performed was between providers and non-providers that have used a sepsis screening tool prior to this project. A p value of 0.024 was calculated from the data that reflected 70% of providers and 25% of non-providers had used a sepsis screening tool in the past.

The next analysis performed was on the first pre-survey question that read “Which temperature reading is part of SIRs criteria?” and was found to have a p value of 1.000. While the participant responses for this question were not statistically significant, clinical significance was demonstrated with 80.8% of participants answering the question incorrectly.

The third analysis that was conducted was on the second pre-survey question that read “Which of the following vital signs are part of SIRS criteria?” This analysis had a p value of 1.000 with 42.3% of participants answering incorrectly. Roughly half of the non-providers and over half of the providers surveyed answered the question correctly. While the third question on the pre-survey was analyzed, the question itself which reads “On average, how many cases of



sepsis occur annually?”, it does not contribute to participant recognition of possible sepsis but rather whether they are familiar with sepsis prevalence overall.

The next analysis worth noting was conducted on the first statement of the post-survey which reads “I feel more comfortable approaching patients with possible sepsis after reviewing the qSOFA screening tool.” While the calculated p value was 1.000, clinical significance was demonstrated with 90% of providers and 87.5% of non-providers responding with “True.” Similarly, the second analysis performed on the post-survey question number two reading “The qSOFA will help me alert inpatient providers to the patients' current suspected sepsis status,” also had a p value of 1.000 but showed clinical significance with 80% of providers and 100% of non-providers answering “True.”

Although many of the questions surveyed resulted in a statistical insignificance, post question four stating “I feel confident in recognizing the signs of possible sepsis after taking the pre-quiz and reviewing the qSOFA.” had a p value of 0.027 demonstrating statistical significance. All of the providers surveyed acknowledged that they felt confident recognizing sepsis after reviewing the pre-quiz and qSOFA criteria and 62.5% of the non-providers felt the same way.

The final data set to be acknowledged is the response to post question 5 which reads “The qSOFA or similar screening tool will be beneficial in the outpatient setting for determining the potential for sepsis.” Per the statistician, a p value could not be calculated to determine if there was a statistical significance between providers and non-providers on this question because 100% of participants answered “True” to the statement. This suggests a strong clinical significance of the efficacy of utilizing a sepsis screening tool in the outpatient setting.

While most of the pre-survey responses and post-survey responses suggested clinical significance, the project was not without threats to internal validity. The most noticeable threat to internal validity was the small sample size of  $n=26$ . Another obvious threat to the internal validity of the project was the fact that it took place in a single outpatient healthcare office. Validity would undoubtedly increase with a larger sample size, as well as multi-office participation.

### **Discussion and Implications**

Although there are improvements to be made to further increase the validity of this project, it can be inferred through the unanimous responses that utilizing a sepsis screening tool, such as the qSOFA, can be greatly beneficial in increasing healthcare staff identification of septic patients. Not only did the providers that participated in the study report an increase in confidence when recognizing sepsis, but also non-provider staff within the clinic. One immediate method for strengthening this study would be to greatly increase the sample size.

By enlarging the number of study participants, as well as branching out into other outpatient offices, an opportunity to better understand sepsis screening tool use and its relation to increasing healthcare worker confidence can be established. Subsequently, by increasing provider confidence and efficiency for recognizing sepsis, an expected decrease in patient mortality and financial burden would result.

### **Conclusion**

Sepsis is responsible for roughly 270,000 deaths annually in the United States, bearing an average hospital stay of 9 days, with an average hospital bill of \$42 thousand. Currently, there is not a policy in place for outpatient clinics to utilize sepsis screening tools prior to hospital admission. Research has shown; however, that the use of a screening tool when approaching

sepsis has the potential to increase healthcare workers' confidence and ability to correctly identify septic patients, and thus is expected to contribute to the decrease in patient mortality and financial burden.

Through the utilization of a cost-free project, the proposed organizational change will create a sustainable method to improve patient outcomes and elevate healthcare provider confidence. Analysis of qualitative data allows for adjustments to be made to the proposed screening tool to ensure the usefulness of the tool in the outpatient setting, budgetary adherence, and ultimately sustainability.

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