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Optimizing Sepsis Management Through Enhanced Protocol Compliance in the Emergency Department

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Emergency Department

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Abstract

Problem: Compliance and timeliness with the sepsis bundle protocol are continuously increasing, resulting in poor patient outcomes. This quality improvement project aims to increase sepsis bundle compliance and earlier sepsis management in the Emergency Department (ED) to reduce sepsis mortality rates and length of hospital stay.

Context: Hospital A's emergency department is a level II adult trauma center located in the Greater Bay Area that treats a range of patients presenting with life-threatening diagnoses such as sepsis, traumatic injuries, and electrolyte imbalances.

Interventions: The sepsis committee team was provided recommendations to implement post-data analysis. Interventions recommended included standardizing and increasing sepsis training frequency, creating case reviews on near misses, using hands-on sepsis simulations, and refining technology-assisted intravenous (IV) placement. Additional resources included badge buddy cards with visual aids detailing sepsis guidelines and incorporating automated warning parameters into the EPIC system.

Measures: A randomized chart audit was used to find discrepancies in sepsis bundle compliance. Surveys comprised of 9 open-ended questions were distributed to staff members to assess where change is needed to achieve a higher rate of sepsis bundle compliance.

Results: Post-analysis of random audited charts regarding sepsis bundle compliance provided by Hospital A revealed a 41% compliance rate. Training, education, and barriers to the sepsis bundle were the most prominent findings in the inability to implement the bundle promptly.

Conclusion: After collecting and analyzing data from the questionnaire, the team identified opportunities such as the inability to meet sepsis protocol compliance stemmed from a lack of sepsis training frequency, insufficient remedial or debriefing processes, a missing ED sepsis

screening policy, and a faulty charting system. In presenting this data to the sepsis faculty at Hospital A, our recommendations include increasing training frequency, establishing an ED-specific sepsis screening policy, creating badge reel cards that detail sepsis policies and escalation processes, and revising the current charting system to increase bundle compliance. Post-intervention data was unable to be collected due to time constraints

Keywords: Emergency Department, sepsis, sepsis bundle, champions, septic shock, timeliness, barriers

Section II: Introduction

Sepsis is a life-threatening complication that can arise from an already present infection within the body leading to multiple organ system failure and even death if not treated appropriately. Every year approximately 1.7 million adults develop sepsis in which 350,000 of these patients die from sepsis or are released to hospice care (Central for Disease Control and Prevention, 2023). Hospitalizations have increased by 8.7% per year due to sepsis incidence rates (Paoli et al., 2018). A rise in sepsis rates has drastically increased the rates of hospital deaths as sepsis accounts for more than 50% of hospital deaths, and mortality rates significantly increase based on severity (Paoli et al., 2018). Sepsis management in the United States accounts for the highest cost in hospital expenses, standing at around $24 billion (Paoli et al., 2018).

Due to the rise in mortality and morbidity rates, the Surviving Sepsis Campaign created an international sepsis core measure (SEP-1) which helps prevent the life-threatening progression of sepsis to septic shock. The actions involved in this measure include blood cultures, lactate levels, fluid resuscitation, antibiotics, and vasopressors ordered at 3-hour and 6-hour time intervals (Cranston et al., 2023). Timing is a critical component in sepsis diagnoses as the outcomes for sepsis patients could be detrimental if treatment is not provided rapidly.

Adherence to the SEP-1 protocol decreases mortality and morbidity rates by a significant amount.

Sepsis is a life-threatening condition that can result in rapid decline and fatality. Furthermore, the Centers for Disease Control and Prevention (CDC) has created a Hospital Sepsis Program outlining structural and procedural components associated with multidisciplinary expertise to support the care of patients with sepsis. Elements focused on are hospital leadership commitment, accountability, multi-professional expertise, action, tracking, reporting, and education. The purpose of this program is to aid in the recognition of sepsis, facilitate the implementation of evidence-based management of sepsis, support the recovery of patients after sepsis, and monitor the impact of hospital-based interventions to improve care and outcomes of sepsis (2023). These guidelines serve medical facilities with an outline to improve sepsis outcomes and decrease the burden of sepsis.

Utilizing a sepsis bundle, Hospital A aims to reduce the morbidity and mortality rates of sepsis cases in the emergency department. After examining random sepsis chart audits provided by the sepsis team, the data revealed reasons for increasing morbidity and mortality rates. The main reason for higher rates is related to sepsis bundle compliance in which only 41% of cases achieved sepsis bundle compliance. Our study aimed to find reasons behind low bundle compliance rates and examine how adherence to compliance impacts morbidity and mortality rates.

Problem Description

Hospital A's emergency department is a 44-bed unit located in the Greater Bay Area. Their current sepsis bundle compliance is currently at a rate of 41%, resulting in increased morbidity and mortality rates. Low rates with sepsis bundle compliances correlate to poorer

patient outcomes since some cases do not receive all of the required components of the sepsis

bundle. Our study aimed to pinpoint the reasons behind a lack of bundle compliance to analyze

where effective change is necessary. Following this quality improvement project, recommended

interventions can be utilized to achieve a higher rate of sepsis bundle compliance, reduce

morbidity and mortality rates, and decrease hospital expenses.

PICOT Question

A Patient, Intervention, Comparison, Outcome, and Time (PICOT) question was created

to guide this quality improvement project. The PICOT question was stated as followed: Does

providing nursing staff support, accountability, and ongoing education enhance the timely

implementation of sepsis bundle and compliance compared to current practices in the Emergency

Department within four months?

Rationale

Our quality improvement project aligns with the awareness, desire, knowledge, ability,

and reinforcement (ADKAR) mode created by Jeff Hiatt. This model reveals vital concepts that

influence successful change and actionable insights for implementing these concepts (Kaminski,

2022). Jeff Hiatt developed Prosci's ADKAR model after studying the change patterns of more

than 700 organizations. It is based on how people experience change. This model is most

applicable to businesses and corporations but can be used in healthcare to measure initial

inclination and readiness in individuals and evaluate their readiness to accept change (Kachian et

al., 2018). Our quality improvement project analyzed where Hospital A requires change and

assessed nurses' willingness to change to create improvement.

Using the ADKAR model, the ability to determine the staff's readiness to change can be

assessed, and follow up preparation can be made to outline the strengths and resolve weaknesses

following the questionnaire (Kachian et al., 2018). After analyzing randomized sepsis chart

audits, the inability to reach timely implementation and compliance with the sepsis bundle was

brought to awareness. Desire to support change is the second part of this model in which our

intended change is to increase bundle compliance from 41% to 60%. An increase in timely

implementation and compliance with the sepsis bundle would decrease morbidity and mortality

rates.

The third letter in ADKAR stands for knowledge of what needs to be changed. Post-

survey data found that nurses understand there needs to be a change in sepsis education and

training, higher staffing rates, reintroduction of the sepsis champion, and protocol revision. The

fourth step is the ability to implement desired skills, and initiating these changes could support

the timely implementation of the sepsis bundle and compliance and improve patient outcomes.

The last part of this model is reinforcement to create long-lasting change. More education and

training, an increase in staff support, and protocol revision can help reinforce consistent

improvement and increase compliance with the sepsis bundle.

Search Strategy

An extensive literature review was conducted using search strategy tactics between

September and December 2023 assisted in search strategy tactics (Appendix K). Databases

provided by the University of San Francisco included CINAHL, PubMed, and Cochrane

Database of Systematic Reviews and were accessed for this QI project. Key search words such as

"sepsis", "bundle compliance", "septic shock", "timeliness", "emergency department", and

"barriers" along with articles from 2016-2023 aided in finding the most current peer-reviewed

studies.

Specific Project Aim

This quality improvement project aims to enhance the compliance rate for the sepsis bundle and its utilization in the Emergency Department of a level II adult trauma hospital located within the greater Bay Area. The project started with distributing a self-administered survey comprised of 9 open-ended questions to nurses across various shifts for a duration of 5 weeks. Survey data was intended to assess the nurse's baseline knowledge of the sepsis protocol and prioritization, barriers to timely sepsis management, education and remedial training patterns, and improvement suggestions. After collecting data, recommendations were made based on the results that hindered compliance with the sepsis bundle. Implementation of the interventions will be assessed through four months of chart auditing to determine if there has been improvement in sepsis bundle compliance and a reduction in morbidity and mortality rates.

Baseline data was collected from sepsis chart audits collected from EHR outlining misses in sepsis cases and non-adherence to the sepsis bundle. This project aimed to increase compliance from 41% to 60% after four months of implementing recommendations. After further review and presenting the results of survey collections to the sepsis leadership team, students anticipate that bundle compliance rate will increase timely sepsis management, resulting in a reduced hospital length-of-stay, a decrease in the risk of sepsis-related mortality rates, and decreased readmission rates among this population. Due to time constraints, the success of this quality improvement project will be measured by implementing the presented recommendations by the sepsis committee team.

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Section III: Methods

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Project Overview

The intended goal of this project is to gather data to address the reasons behind the lack of sepsis bundle compliance to create interventions that would increase compliance rates. Surveys distributed to nurses between October and November aided in analyzing quantitative and qualitative data associated with discrepancies in sepsis bundle compliance. The importance of adhering to sepsis bundle compliance is due to the increased mortality and morbidity rates.

Baseline data was collected from internal EHR that outlined misses in sepsis cases and non-adherence to the sepsis bundle. The intent of this project is to increase compliance from 41% to 60% after four months of implementing recommendations. After further review and presenting the results of survey collections to the sepsis leadership team, the CNL students anticipate that improving the current bundle compliance rate will increase timely sepsis management, resulting in a reduced hospital length-of-stay and a decrease in the risk of sepsis-related mortality rates and readmission rates among this population. Due to time constraints, the success of this quality improvement project will be measured by implementing the presented recommendations by the sepsis committee team.

Microsystem Assessment

Sepsis is a life-threatening disease that can cause a cascade of complications if not caught and treated early on. Hospital A is a level II adult trauma center that receives hundreds of sepsis cases yearly, primarily screened and treated in the emergency department. Early recognition of sepsis is critical for timely treatment, and compliance with the bundle is associated with improved patient outcomes (Husabo et al., 2020). This quality improvement project aims to improve compliance and timeliness of the sepsis bundle in this microsystem through provided recommendations.

To begin assessing the microsystem of Hospital A, we utilized the 5 Ps model, which focuses on the purpose, patients, professionals, processes, and patterns seen. Many of the patients seen in the emergency department are caught with late sepsis, which can be detrimental to their outcome. The emergency department is the first to treat a majority of sepsis cases. The care outcomes depend on early implementation and adherence to the sepsis bundle. Patients are walk-in or brought in by EMS and include all levels of sepsis. Focusing on this microsystem aims to improve early sepsis management and compliance with bundled care to impact patient outcomes positively.

This unit consists of 115 nurses placed in specific areas of the emergency department, and the nurse-to-patient ratio can vary depending on the acuity of the patients in each area. Other professionals within this microsystem that impact compliance with the sepsis bundle and patient outcomes are physicians, phlebotomists, respiratory therapists, x-ray technicians, registration clerks, and rapid response teams. Each individual can cause a delay in timely treatment if their job is not performed adequately.

Sepsis diagnosis requires a specific process determined by the Surviving Sepsis Campaign and each microsystem can change this protocol to align with their hospital requirements. The process begins when patients present to the ED with parameters that meet sepsis requirements. The microsystem at Hospital A has a procedure to determine and treat sepsis patients through screening for systemic inflammatory response syndrome (SIRS) and sequential organ failure, utilizing electronic cardiac arrest risk triage (eCART) software to flag those that meet sepsis parameters, and performing all components of the sepsis bundle. Once sepsis screening is flagged as positive, the nurse reports to the MD or charge nurse to initiate the sepsis bundle for prompt treatment (Appendix H).

Patterns seen in the emergency department for sepsis patients include efficient charting in the patient's EHR for communication purposes. Missed steps in the bundle and noncompliance with timeliness are audited for further research. Additional patterns seen in sepsis cases are noncompliance with the bundle and delayed orders that impact patient outcomes. Staff reporting helps to understand where there is a potential gap in knowledge and lack of prompt treatment and recognition (Appendix A).

Intervention

Interventions included collecting passive and active data through survey questionnaire responses, the 5 P's microsystem assessment tool, creating a Plan, Do, Study, Act (PDSA) Cycle, and a SWOT analysis. This data was further explored and evaluated through a Root Cause Analysis (RCA) and Cost Benefit Analysis (CBA). The questionnaire was distributed over the course of 5 weeks and participants remained anonymous. Content in the survey aimed to assess the knowledge of sepsis protocol and priority, barriers to timely sepsis management, escalation processes, education and remedial training patterns, placing a standard order set, and improvement suggestions. Results that support this quality improvement project included information regarding education and training, barriers to timely sepsis management, and protocol revision to improve patient outcomes.

Plan, Do, Study, Act (PDSA) Cycle

The Plan, Do, Study, Act (PDSA) cycle provided this quality improvement project with the framework necessary to initiate change in Hospital A (Appendix B). According to the Institute for Healthcare Improvement, the PDSA cycle can be used to assess and adjust changes made to ensure the desired improvement is achieved (2023). The first step in the PDSA cycle is the planning phase where the project's initiative is developed. To improve sepsis compliance in

the emergency department, our team collaborated with Hospital A's leadership team to identify

gaps between sepsis management protocol and practice. Internal data provided a baseline of

sepsis bundle compliance and revealed a rate of 41% adherence to the sepsis bundle. Sepsis

bundle compliance rates influenced the project's specific aim statement, PICOT question, and

survey questionnaire to begin assessing where improvement is needed.

The second step is the Do phase, where the plan to initiate improvement is implemented.

This occurred through administering a questionnaire to nurses over the course of 5 weeks to

gauge an understanding of where a gap of knowledge in sepsis bundle compliance existed. The

respondents attributed the low bundle compliance rate to insufficient education and training.

They also identified other barriers to timely implementation, such as difficulties establishing IV

access. The team called for a revision of the ED-specific protocol. Data collection provided a

means to create a Root Cause Analysis and S.W.O.T. diagram to explore the organization's

strengths and weaknesses further.

The third step in this model is the Study phase, where we analyzed the results of the

questionnaire to begin implementing interventions and change within this facility. Hospital A

reported a 41% sepsis bundle compliance rate during the last quarter of 2023. After analyzing

data collected from the questionnaires, key findings included a need for more education and

training, methods to overcome barriers related to the inability to implement the sepsis bundle,

and approaches to begin protocol revision.

The final step in this cycle is the Act phase where interventions are implemented and

adjustments to the plan can occur as needed. Several conclusions were made beginning with an

increase in sepsis training regularity. This can be done through implementing a more interactive

"simulation style" training to bring more attentiveness and responsiveness than online modules.

Post-training questionnaires with close-ended questions would thoroughly assess the competency

and learning of nurses. Routine IV training can be bundled into education and training to

alleviate the common dilemma of difficulty in obtaining IV access. The current sepsis policy is a

general overview of measures to take when a patient with sepsis is admitted without specificity

to the emergency department. An ED-specific policy is necessary to help standardize practice.

The nurses will benefit from badge reel care cards that include an algorithm for sepsis

management. Additionally, standardizing the escalation process will enhance communication

across the microsystem.

Strengths, Weaknesses, Opportunities, Threats (SWOT) Analysis

Utilizing strengths, weaknesses, opportunities, and threats (SWOT) analysis aids in

visualizing internal and external components of Hospital A's emergency department that could

be evaluated for improvement. SWOT analyses are most commonly seen as a management

instrument but can be a meaningful tool to ensure a valuable and correct connection between

management and the internal and external environments in the emergency department (Swysen et

al., 2012).

Beginning with the internal components of this microsystem, strengths found within

Hospital A are their usage of online education modules and the nursing staff's ability to place

standing orders when SIRS criteria are met. Another strength is the establishment of an

evidence-based sepsis bundle. The second internal component is the weaknesses within a

microsystem which were found to be discrepancies with the frequency of annual training, a

sepsis protocol that is not tailored to the ED, the minimal use of a sepsis champion, and a lack of

collaboration and standardized follow-up noncompliance. External components include

opportunities for improvement which were determined to be a reduced risk of sepsis, increased

protocol compliance, a reduced length of stay, readmission rates, associated financial burden,

and improvement in nursing skills, education, and critical thinking. Threats to this quality

improvement project were deemed to be the time and cost for education, training, and sepsis

resources, staff reluctance to conduct change, unpredictable ED workflow and patient numbers,

and current EPIC charting (Appendix D).

Root Cause Analysis (RCA): Fishbone Diagram

A fishbone diagram is useful for examining the cause and effect of the lack of bundle

compliance and timeliness in sepsis management. People involved in this policy change are

septic patients, ED nursing staff, and a lack of sepsis champion. Missing physician orders,

difficulty obtaining IV access, and pending beds in the waiting room negatively affect

compliance rates. Policy and procedures impacting sepsis compliance are a missing ED-specific

policy, inexperienced triage staff screening for sepsis, and discrepancies with sepsis training

frequency. There is a need for more monitoring in the areas of entering the order-set for protocol

initiation, delays in lab collection and results, and supervision in treatment compliance

(Appendix C).

Gap Analysis

A gap analysis is used to identify the current knowledge, skills, and practices of a unit

and determine gaps in services or processes. By examining the performance of the unit a

microsystem can determine the areas of services that are meeting requirements and what needs

improvement. This helps create the most optimal opportunities for change in a singular area

where improvement is needed to achieve competitive performance levels.

Masters in Nursing students created a questionnaire comprised of nine questions to assess

the factors that contribute to low sepsis bundle compliance that impact care outcomes. This

anonymous survey consisted of questions regarding the nurse's knowledge of the sepsis protocol and prioritization, barriers to timely sepsis management, escalation processes, education, remedial training patterns, chain of command for placing standard order sets for SIRS, and improvement suggestions. After distributing this survey and gathering data, poor adherence to the sepsis bundle was related to barriers to timely sepsis management, education and remedial training processes, and improvement suggestions.

Education is critical to properly train nurses and increase confidence in skillsets when treating life-threatening cases such as sepsis. It is vital to ensure nurses are competent in the recognition, identification, and treatment of patients with sepsis because sepsis rates are continuously rising (Rechter et al., 2022). Nurses reported that 70% of them attend training annually, 25% never attend training, and 5% rarely attend training. When compliance with the sepsis bundle is not met 61% of nurses claimed no debriefing or remedial training on missed cases to assess where mistakes were made, 22% said communication via email is received, 9.8% said they receive follow-up by the leadership management team, and 7.3% stated chart audits for future purposes.

Barriers preventing nurses from meeting sepsis bundle timelines included staffing issues in which 33.8% of nurses claimed poor staffing, training, and RN experience, 26.8% said difficulty obtaining IV access, 15.5% said high patient volume, and 12.7% reported delayed orders. In regards to revisions and improvements to be made, 31.1% believe there needs to be protocol revision for various reasons, 28.9% believe there needs to be more training and education, and 14.1% said they need more support from staffing. Survey data revealed areas of the unit that need improvement and helped the team create recommendations and interventions for this microsystem.

Recommendations

On December 4, 2023, the CNL students presented this quality improvement project and its findings to the sepsis committee at Hospital A (Appendix J). The overarching goal was determined to be an increase in sepsis bundle compliance and timeliness in the emergency department from 41% to 60% in four months as outlined in the PICOT question. Our first slide focused on the background of Hospital A and the current situation. The leadership team identified gaps between ED sepsis bundle protocol and practice. Some patients were receiving interventions within the first hour of sepsis identification while others received late or partial interventions.

The next few slides outlined the methods used to combine qualitative and quantitative data provided. They expanded upon the 5 P's assessment, PDSA cycle, SWOT analysis, and fishbone diagram. These methods outlined the strengths and weaknesses found within this microsystem and areas that need improvement with suggestions discussed in later slides. Visual representation of the nursing questionnaire along with data and direct statements from the nursing staff were displayed.

Following data representation, recommendations were made for the leadership team to take into consideration and implement. A majority of nurses attend minimal training which served as a guideline to recommend standardizing and increasing the frequency of sepsis training. Increasing training is crucial because it enhances a nurse's short-term memory on early recognition, identification, and initiation of the sepsis bundle. Training and education should include hands-on simulations to grasp learning concepts and post-training evaluations would assist in soliciting feedback. In regards to sepsis compliance, creating case reviews on near misses would prevent a similar situation from occurring in the future. To address barriers to

implementing the sepsis bundle in a timely manner, a recommendation made was to include training to refine technology-assisted IV placement skills. In return, there would be a larger pool of nurses who are highly skilled in rapid IV placement, leading to the initiation of timely sepsis bundle protocol.

Microsystem recommendations included establishing a comprehensive sepsis screening policy in the emergency department as the current protocol is a set protocol for the entire hospital without direct guidance for the ED. Creating a protocol that focuses on treating sepsis in the emergency department allows for a different set of regulations that could assist nurses in implementing the sepsis bundle within the timeline provided. Badge Buddy cards with visual aids detailing sepsis guidelines would serve as an accessible tool to help in following bundle guidelines.

The presentation ended with follow-up steps once recommendations are implemented as our team was unable to do so due to time constraints. The team recommended follow-up steps including a post-intervention survey as well as staff interviews to monitor the effectiveness and consistency of the new changes. Further data collection and analysis would aid in assessing areas where gaps continue to exist and further progress is required. Through collecting post-survey data and evaluating responses, the hospital sepsis committee can make adjustments accordingly. It is important to remain consistent with upholding nurse education and compliance with newfound sepsis protocol and policies to increase the overall compliance goal from 41% to 60% and reduce patient mortality and morbidity rates.

Cost Benefit Analysis (CBA)

A cost-benefit analysis (CBA) for two years of implementation of this quality improvement project was generated. Difficulty obtaining IV access being a stand-out barrier,

guided our decision to train 3 RNs per shift to become skilled in ultrasound-guided IV placement. Individual IV training would cost $2,400 and the recommendation is to train 9 nurses in total which would cost around $21,600. This would equip the emergency with highly trained healthcare professionals to act quickly in sepsis cases presenting with difficult IV sticks.

The cost estimated for sepsis badge buddy cards came out to be $7. There are currently 115 staff members which would equate to $805 for two years. Badge buddy cards provide the nurses with quick access to sepsis guidelines and parameters to be on the lookout for. To address training frequency, it is recommended to increase training to a minimum of two times per year. The estimated cost for semiannual training would be $180 per training granted the nurses make an estimated $90 per hour. This would total $360 per year for each nurse yielding a cost of $41,000 per year. Implementing these interventions for two years would cost a total of $105,205. A further breakdown of the cost and benefits can be found in Appendix G.

Ethical Considerations

This quality improvement project has been approved using QI review guidelines. Provision 7.1 in the American Nurse Association Code of Ethics (ANA COE) supports the project by stating that a nurse in all roles and settings advances the profession through research and scholarly inquiry. The provision states that nurses must participate in the advancement of the profession through knowledge development, evaluation, dissemination, and application to practice. Without contribution to research and scholarly inquiry, there is no room for development and evaluation of the practice.

Section IV: Results

Due to time constraints, post-intervention data was unable to be attained. The success of this QI intervention project will be determined by sepsis compliance for the following four

months upon implementation of the recommendations. The team has presented recommendations and follow-up steps to facilitate an increase in sepsis bundle compliance to an achievable goal of 60% for the upcoming year. Data collection revealed factors relating to noncompliance with the sepsis bundle to be found in education and training, barriers to implementation, and protocol suggestions to find solutions (Appendix F).

Out of 115 nurses, 41 participated in survey completion yielding a result of 36% completion. The nurses that participated in this survey were from day, evening, and night shifts. The first two questions of the survey focused on knowledge of the sepsis protocol and prioritization of treatments listed. The nurses were knowledgeable about protocol components with the most common answer being labs with cultures, 2 IVs, fluids unless contraindicated, and antibiotics within the hour. The second question targeted the nurse's understanding of prioritization and the timeline of the sepsis bundle protocol. 33 nurses said there is a reported timeline for sepsis with administration of the sepsis bundle within one hour of presentation. Knowledge surrounding the sepsis protocol and treatment prioritization was clear and concise.

The third question aimed to gain a better understanding surrounding the barriers that prevent the nurses from meeting sepsis bundle timelines. 33.8% reported poor staffing, training, and inexperienced nurses in the emergency department are a barrier to timely implementation. Sepsis timeliness is crucial to patient outcomes as evidence has shown that a delay in executing each intervention and completing the bundle has been proven to be associated with higher mortality rates (Chua et al., 2023). Although there is a bundle to support sepsis practice, implementation of the sepsis bundle requires ED healthcare workers to have a solid knowledge of sepsis, its etiology, and its manifestations (Storozuk et al., 2017). Implementation of the sepsis bundle timeline was impacted by difficulty in obtaining IV access, which was reported by 26.8%

of nurses, and delayed orders reported by 12.7% of nurses. Timeliness can cause a sepsis patient to deteriorate drastically if not attended to adequately.

Although annual sepsis training is a requirement for the nurses, only 70% of the nurses claimed attending training annually, and 25% reported never having attended training. A knowledge gap occurs when training is not attended regularly, especially among inexperienced or new emergency department nurses. Studies have supported education and training done throughout the year have an outcome of significantly higher sepsis knowledge scores than those who do not frequently attend training (Chua et al., 2017). Alongside training, 61% of nurses revealed mismanagement in debriefing and remedial training processes if sepsis compliance is not met. A lack of accountability and discussion of where a mistake occurred creates a higher probability of repetitive actions and outcomes. Frequent training and remediation are fundamental in creating a continuous understanding and ability to recognize early sepsis markers.

Improvements nurses believe could help increase patient outcomes were found in training and education. Sixteen nurses reported an increased need for frequent training and education to feel confident in implementing the sepsis bundle protocol. Fourteen nurses said there needs to be protocol revision for timelier implementation of the bundle protocol and to improve patient outcomes. Six of the participants stated a need for increased staffing to achieve sepsis bundle compliance.

Several barriers hindered the project results. After reading audits and data our project aim shifted during the middle of survey collection. Out of 115 ED nurses, only 41 completed surveys yielding a response rate of about 36%. Furthermore, survey distribution was extended due to

minimal survey completion at the original end date. The project spanned over the course of one semester which was about 16 weeks (Appendix I).

Section V: Discussion

Limitations

Time constraints created an obstacle in implementing recommendations appropriately and gathering supportive and post-intervention data. Continuation of this quality improvement project would provide follow-up data on sepsis bundle compliance after further implementation of the interventions made. Post-intervention data is crucial to validating an improvement in changes made within a microsystem. Limited staff participation generated a small sample of data to be analyzed for project purposes. Increased survey collection would help develop and support the gap between sepsis management and compliance.

Summary

This project revealed several findings contributing to a deficit in sepsis bundle compliance and timeliness. Key findings included a lack of education and training in sepsis protocol compliance. Minimal training and education in sepsis creates a gap surrounding the staff's knowledge and confidence in treating these cases promptly. Without proper education and training, sepsis cases remain unattended until septic shock occurs and the patient's life is at greater risk of poorer outcomes.

Barriers to implementing the sepsis protocol bundle were found to be a key component in the inability to implement the sepsis bundle on time. Some of the greatest barriers were found to be difficulty in obtaining IV access, delayed orders to begin sepsis bundle initiation, poor staffing and training, inexperienced nurses in the emergency department, and a high patient volume. A combination of these barriers supports the 41% rate of sepsis bundle compliance seen

in previous years and will continue to remain apparent until further change is initiated. Insufficient implementation of the sepsis bundle timeline is partially based on a lack of accountability taken when compliance is not met. Accountability is an integral aspect of leadership that should be applied to ensure that nurses follow established protocols and guidelines.

Analyzing this data assisted in finding gaps in this microsystem. Addressing key factors and presenting the project to the hospital sepsis committee provides a foundation for the continuation of this project. Furthermore, initiating the changes and recommendations made can create improvement in sepsis bundle compliance rates and decrease morbidity and mortality rates seen in sepsis cases.

Conclusion

Consistency in training and practices is crucial to integrating in healthcare to produce positive results. Sepsis education is vital to ensure that nurses are knowledgeable in this disease process and can spot early signs and symptoms. The success of this quality improvement project was determined by finding the underlying gaps between sepsis management and the implementation of the sepsis bundle protocol. Optimizing patient outcomes partially relies on understanding where staff members require the most support and desire change. This project found a need for increased education and training, methods to overcome barriers present to implementation, a need for a specific emergency department sepsis protocol, and overall protocol revision.

Sepsis is increasing at alarming rates due to stagnant microsystem protocols. Analyzing the causes behind a lack of sepsis compliance and implementing interventions rooted in these findings can help optimize patient outcomes. This quality improvement project has provided a

solid base and interventions for effective change to be made. Implementing the recommendations

could help increase sepsis bundle compliance and optimize patient outcomes.

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    Care Pathways, *16*(4), 146–151. https://doi.org/10.1258/jicp.2012.012009
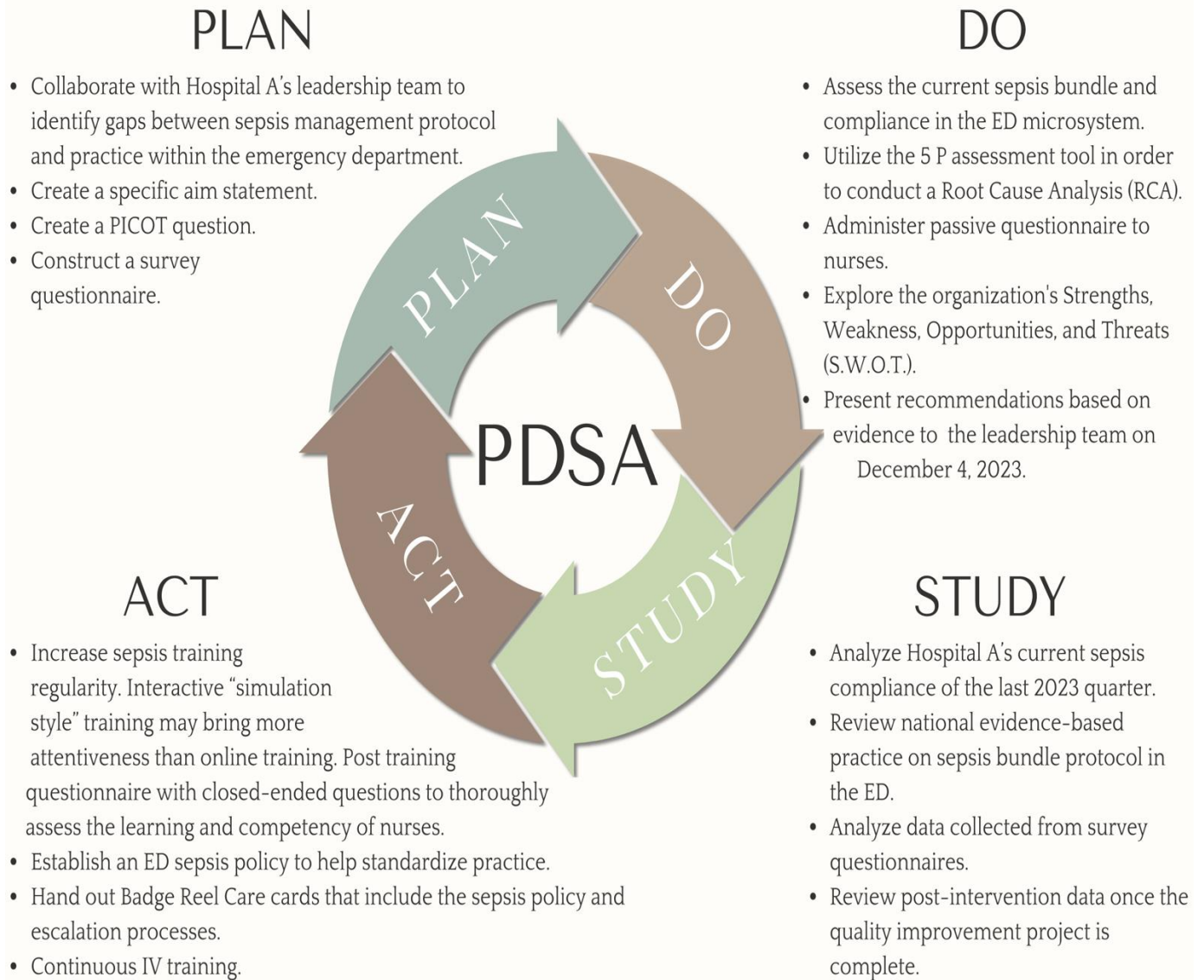
Section VII: Appendices

Appendix A

Purpose, Patients, Professionals, Processes, Patterns (5 P's) Framework

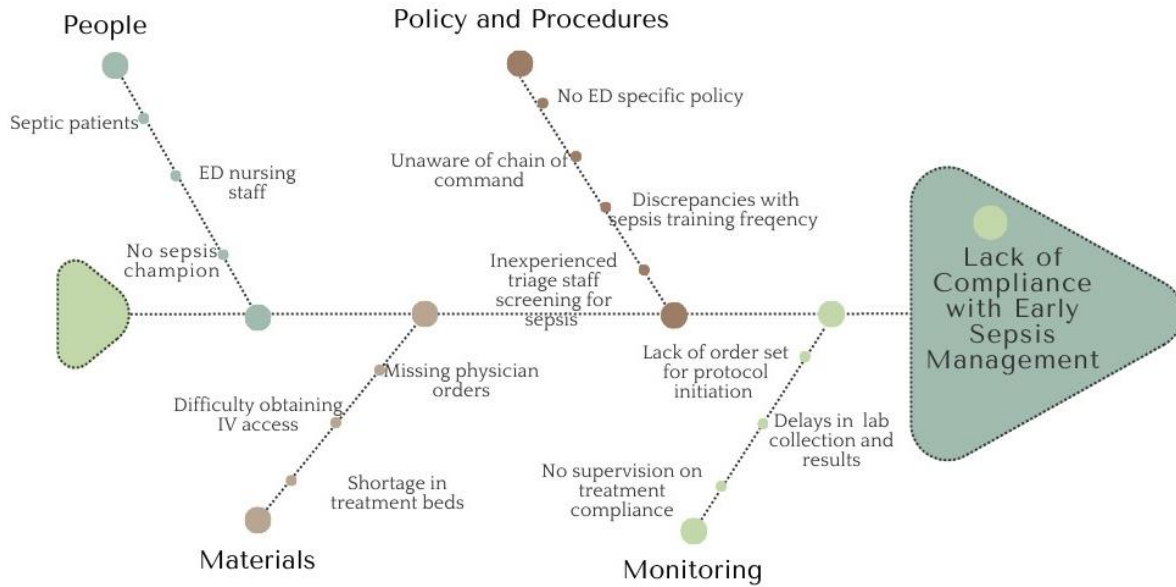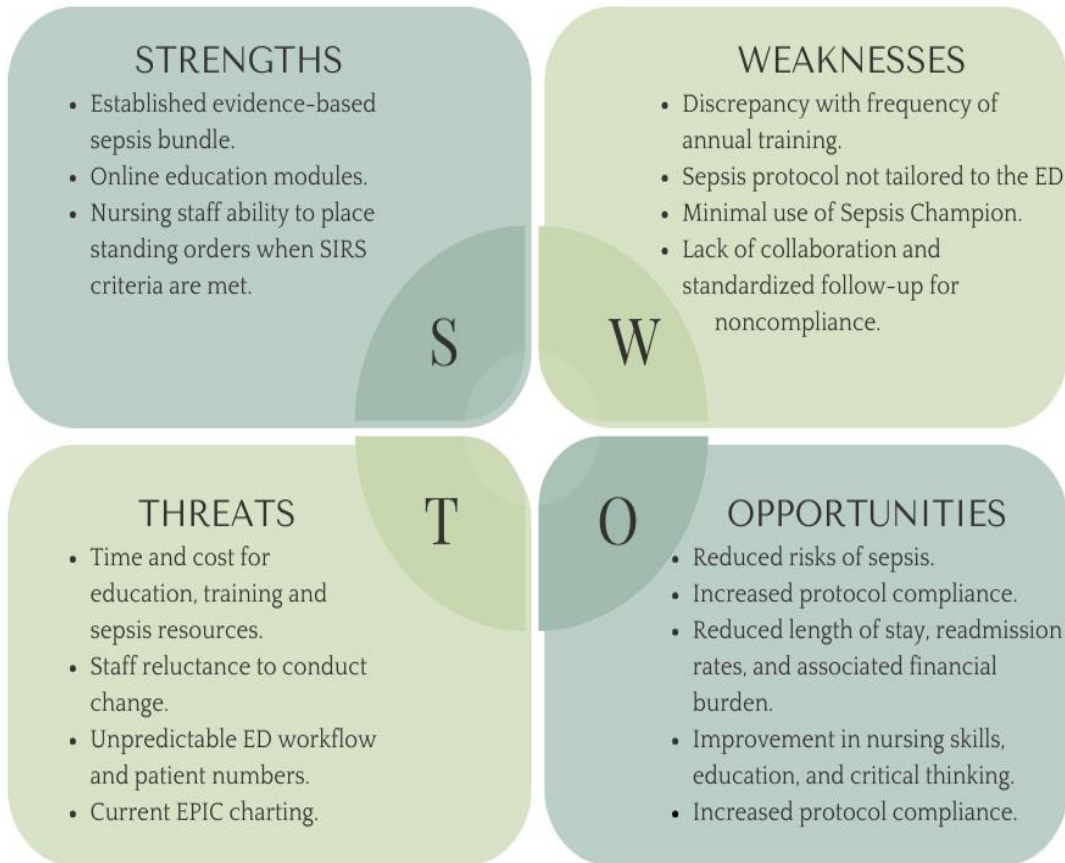| Purpose	To improve early sepsis management and compliance with bundled care.
Patients	Emergency Department Sepsis Patients.
Professionals	Interdisciplinary team comprising registered nurses, physicians, phlebotomists, respiratory therapists, X-ray technicians, laboratory staff, registration clerks, and a rapid response team (RRT).
Processes	Screening patients for Systemic Inflammatory Response Syndrome (SIRS) and Sequential Organ Failure (SOFA), documenting electronic Cardiac Arrest Risk Triage (eCART), and following the sepsis bundle policy.
Patterns	Shift huddles, staff reporting, and charting in patients electronic health record for communication purposes.

Appendix B

Plan, Do, Study, Act (PDSA) Cycle

PLAN

- Collaborate with Hospital A's leadership team to identify gaps between sepsis management protocol and practice within the emergency department.
- Create a specific aim statement.
- Create a PICOT question.
- Construct a survey questionnaire.

DO

- Assess the current sepsis bundle and compliance in the ED microsystem.
- Utilize the 5 P assessment tool in order to conduct a Root Cause Analysis (RCA).
- Administer passive questionnaire to nurses.
- Explore the organization's Strengths, Weakness, Opportunities, and Threats (S.W.O.T.).
- Present recommendations based on evidence to the leadership team on December 4, 2023.

PDSA

ACT

- Increase sepsis training regularity. Interactive "simulation style" training may bring more attentiveness than online training. Post training questionnaire with closed-ended questions to thoroughly assess the learning and competency of nurses.
- Establish an ED sepsis policy to help standardize practice.
- Hand out Badge Reel Care cards that include the sepsis policy and escalation processes.
- Continuous IV training.

STUDY

- Analyze Hospital A's current sepsis compliance of the last 2023 quarter.
- Review national evidence-based practice on sepsis bundle protocol in the ED.
- Analyze data collected from survey questionnaires.
- Review post-intervention data once the quality improvement project is complete.

Appendix C

Root Cause Analysis: Fishbone Diagram

Root Cause Analysis: Fishbone Diagram

People

Septic patients

ED nursing staff

No sepsis champion

Policy and Procedures

No ED specific policy

Unaware of chain of command

Discrepancies with sepsis training freqency

Inexperienced triage staff screening for sepsis

Lack of order set for protocol initiation

Lack of Compliance with Early Sepsis Management

Missing physician orders

Difficulty obtaining IV access

Shortage in treatment beds

Materials

No supervision on treatment compliance

Delays in lab collection and results

Monitoring

Appendix D

Strengths, Weaknesses, Opportunities, Threats (SWOT) Analysis

STRENGTHS
- Established evidence-based sepsis bundle.
- Online education modules.
- Nursing staff ability to place standing orders when SIRS criteria are met.

S

WEAKNESSES
- Discrepancy with frequency of annual training.
- Sepsis protocol not tailored to the ED.
- Minimal use of Sepsis Champion.
- Lack of collaboration and standardized follow-up for noncompliance.

W

THREATS
- Time and cost for education, training and sepsis resources.
- Staff reluctance to conduct change.
- Unpredictable ED workflow and patient numbers.
- Current EPIC charting.

T

O

OPPORTUNITIES
- Reduced risks of sepsis.
- Increased protocol compliance.
- Reduced length of stay, readmission rates, and associated financial burden.
- Improvement in nursing skills, education, and critical thinking.
- Increased protocol compliance.

Appendix E

Questionnaire for ER Nurses

Questionnaire for ER nurses

1. What is your protocol when treating a patient in the emergency room who is identified with sepsis?

2. How do you prioritize the treatments listed above? Is there a timeline?

3. What barriers prevent you from meeting sepsis bundle timelines?

4. What is your escalation process if you had questions or concerns regarding the sepsis treatment protocol?

5. When compliance with the sepsis protocol bundle is not met, what type of debrief or remedial training, if any, is conducted?

6. How often do you attend sepsis training?

7. How often do you place the standard orders for SIRS?

8. Do you wait for the doctor to submit the orderset before initiating the sepsis protocol?

9. What changes do you feel can be made to sepsis protocol in order to improve patient outcomes?

THANK YOU FOR YOUR TIME! <3 USF nursing students

Appendix F

Survey Questionnaire Results

Question 2B: Is there a timeline?
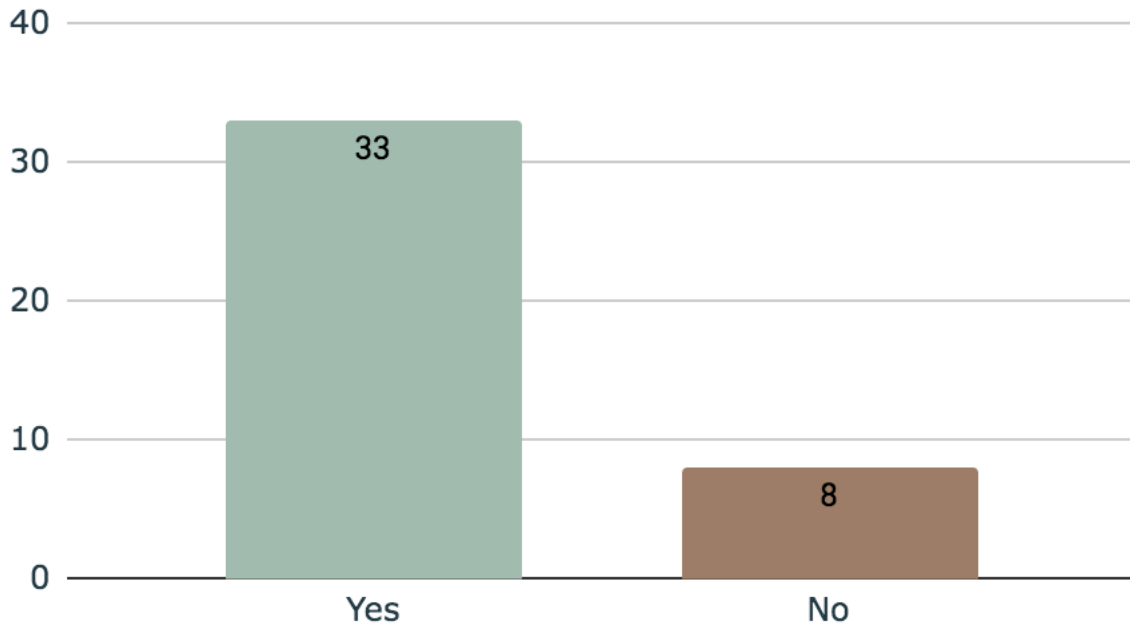
Question 3: What barriers prevent you from meeting sepsis bundle timelines?

Supplies 1.4%
Triage Inexperience 8.5%
Poor Staffing/Training/RN Experience 33.8%
Difficult IV Access 26.8%
Delayed Orders 12.7%
Patient Volume 15.5%
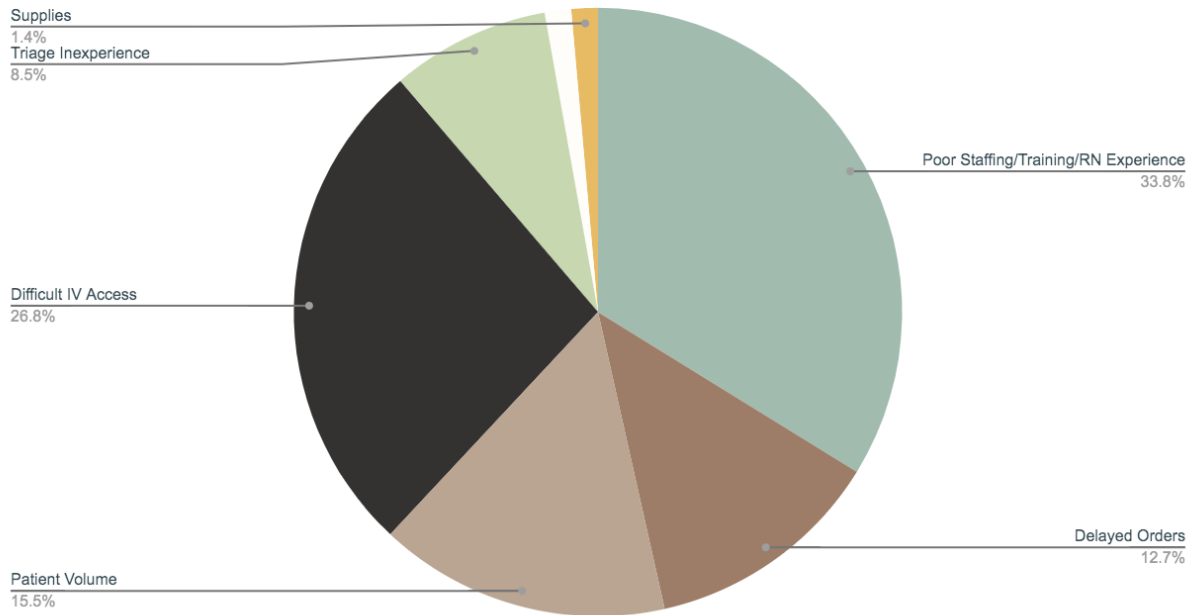
Question 5: When compliance is not met, what type of debrief/training is conducted?
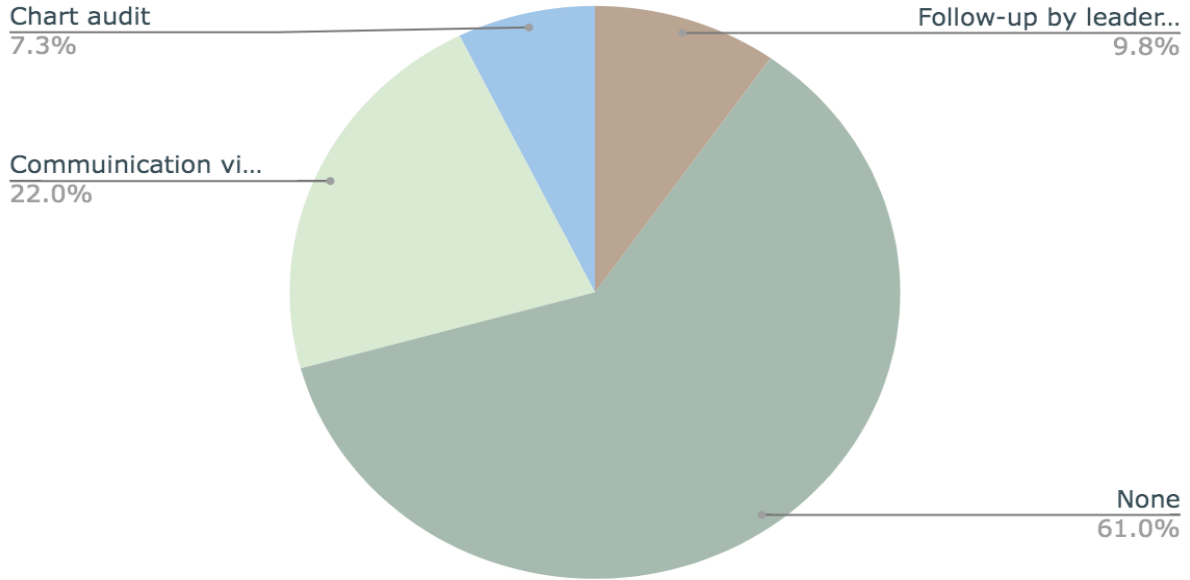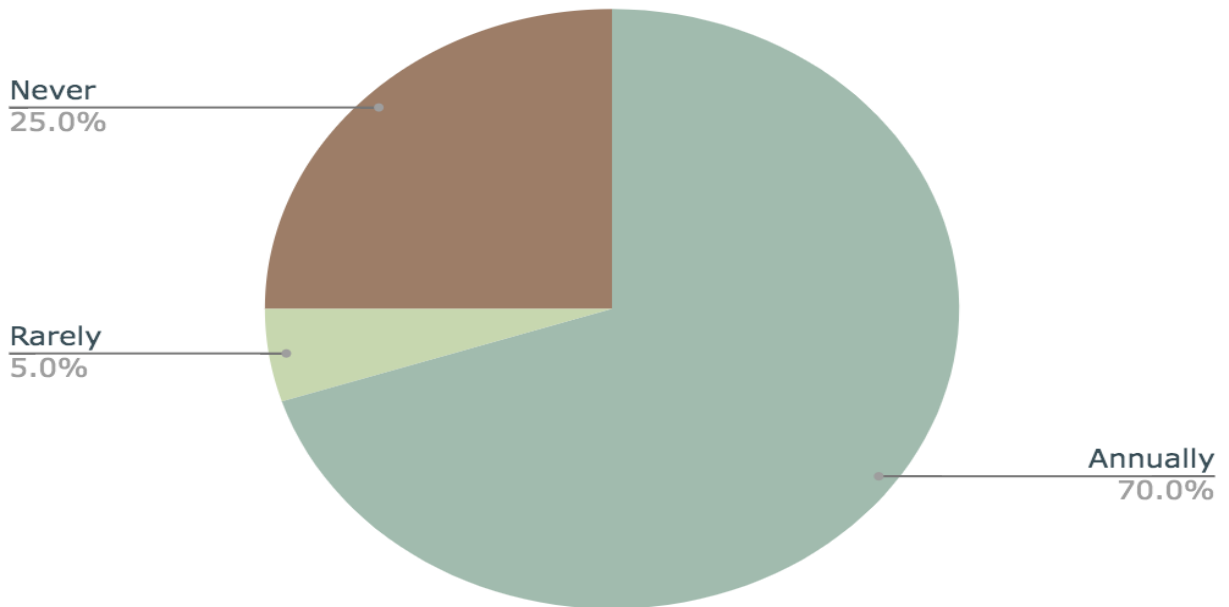
Chart audit
7.3%

Follow-up by leader...
9.8%

Commuinication vi...
22.0%

None
61.0%

Question 6: How often do you attend sepsis training?

Never
25.0%

Rarely
5.0%

Annually
70.0%

Question 9: What changes do you feel can be made to sepsis protocol in order to improve patien…

Other
6.7%

Staffing
14.1%

Protocol Revision
31.1%

No Answer
19.3%

Training and Education
28.9%
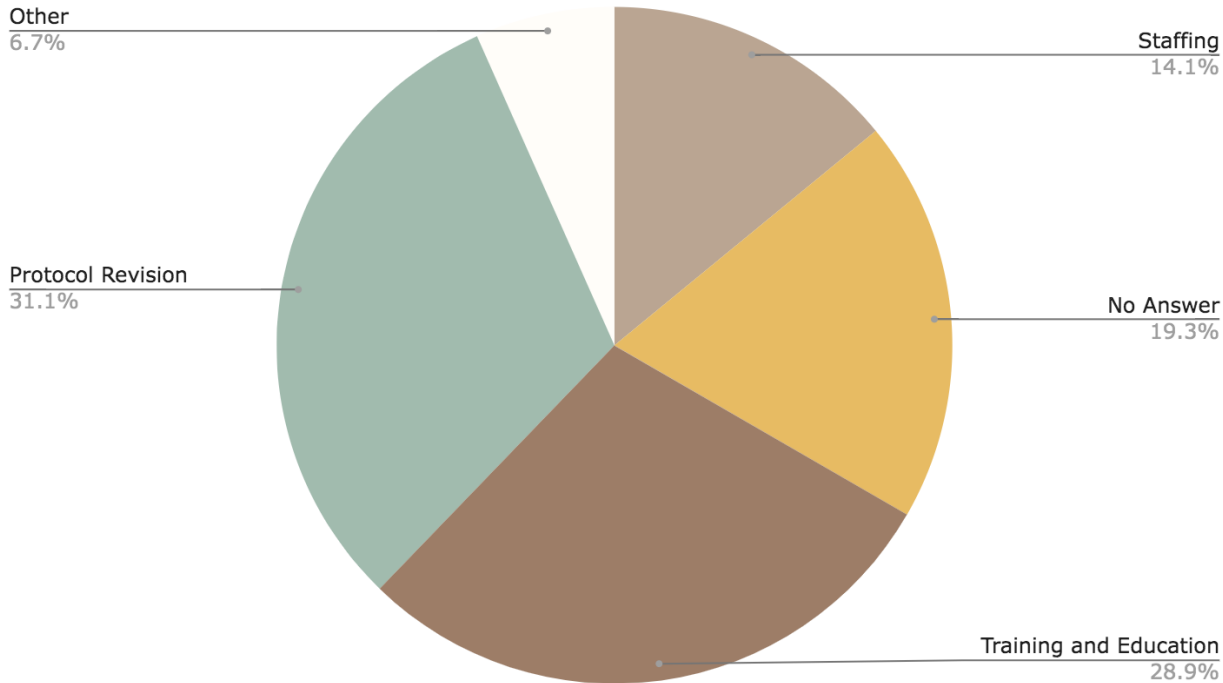
Appendix G

Cost Benefit Analysis

Appendix G: Cost-Benefit Analysis			
Materials and Labor	**Year One**	**Year Two**	**Two-Year Total**
Ultrasound Guided IV Training ($2,400 x 9 ED RNs)	$21,600	N/A	$21,600
Sepsis Badge Reel Cards ($7 x 115 RNs)	$805	N/A	$805
Sepsis Bundle Training ($90/hr x 115 ED RNs x 2)	$41,400	$41,400	$82,800
Benefits			
Benefits based on the average U.S. national yearly costs for septic patients, and related complications, times 15 patients at Hospital A's Emergency Department.	$1,030,000	$1,030,000	$2,060,000
Net Benefits	$966,195	$988,600	$1,954,795
Benefit-Cost Ratio	15.1	23.9	18.6

Cost Estimated For Ultrasound Guided IV Training
    IV training: $2,400
    Train 3 RNs/shift: 9 nurses
    $2,400 x 9 = **$21,600**

Cost Estimated For Sepsis Badge Cards
    Price of cards: $7
    ED RN staff: 115
    $7 x 115 = **$805/year**

Cost Estimated for Sepsis Bundle Training (2x/year)
    ED RN wage at Hospital A: $90 x 2hrs of training = $180
    Frequency 2x/year: $180 x 2 = $360/year
    Staff: 115 ED RNs
$360 x 115 = **$41,400/year**

Appendix H

Hospital A Sepsis Screening

Title:	PC – Adult Sepsis Screening			
Policy Level	☐	System Level – Sets expectations for all __ . employees		
	☒	Entity Level – Sets expectations for employees in <u>multiple departments</u> within one or more entities		
	☐	Department Level – Sets expectations for employees in <u>only one</u> department at one or more sites		
Department	☐			
Entity(ies)	☒	(___)	☒	
	☐	Physician Network (PN)	☐	Behavioral Health Center (BHC)
Document Type	☐ Policy ☐ Procedure ☒ Policy and Procedure			

I. Purpose: To increase the early identification of sepsis in adults 18 years and older **in the inpatient setting** and allow implementation of early sepsis therapy.

Definitions:

Electronic Cardiac Arrest Risk Triage (eCART): **A software based predictive analytics tool that leverages multiple clinical variables including vital signs, age, and labs to calculate a risk of deterioration score. Scores patients from 1-100% based on their risk of having a critical condition change in the next 8 hours. An average eCART risk percentile is below 93%, a moderate risk percentile is 93-96% and a high risk percentile is > 97%.**

Sepsis: Presence of infection (probable or suspected) together with systemic manifestations of infection.

Sepsis-Induced Hypotension: Systolic blood pressure (SBP) < 90 mmHg or mean arterial pressure (MAP) < 70 mmHg or > 40 mmHg or less than two standard deviations below normal for age in the absence of other causes of hypotension.

PC – Adult Sepsis Screening

Page 1 of 5

Sepsis-Induced Tissue Hypoperfusion: Infection-induced hypotension, elevated lactate level, or oliguria.

Septic Shock: Severe sepsis plus hypotension not reversed with fluid resuscitation.

Severe Sepsis: Sepsis plus sepsis-induced organ dysfunction or tissue hypoperfusion.

II. Policy:

A. All adult patients assigned to an inpatient nursing unit will be **screened for sepsis routinely**.

   1. Patients in the adult intensive care units (ICU), are screened within four hours of admission and every 8 hours thereafter using the Sepsis Screen flowsheet template in the **Electronic Health Record (**EHR).

   2. **Patients in the stepdown units and medical-surgical units are screened utilizing eCART when patients are flagged as moderate or high risk.**

III. Procedure:

A. **Adult ICU**

   1. The Registered Nurse (RN) will utilize the **Sepsis Screen flowsheet template** to assess for possible sepsis.

   2. The sepsis screen is composed of three screening sections and one intervention section.

      a. Two or more new signs of systemic inflammatory response syndrome (SIRS).
      b. New signs of organ dysfunction.
      c. New signs of infection.
      d. Interventions.

   3. Clinical findings for severe sepsis include:

      a. Documented or suspected infection.
      b. New suspected source of infection.
      c. New worsening current infection.
      d. In addition to one of the above, two or more of the following SIRS criteria which indicate a positive SIRS screen:

PC – Adult Sepsis Screening

Page 2 of 5

      1) Heart rate > 90 beats per minute.
      2) Temperature > 101° (38°C) or < 96.8° (36°C).
      3) Respiratory rate > 20 breaths per minute or PaCO2 < 32 mmHg.
      4) White blood cell ≥ 12,000mm^3 or ≤ 4,000mm^3 or bands > 10%.

  e. And at least one of the following indicators of tissue hypoperfusion or sepsis related acute organ dysfunction:

      1) Acute/worsening altered mental status.
      2) SpO2 < 90% on room air.
      3) Patient requires more O2 to maintain SpO2 > 90%.
      4) Less than 240 mL urine output in 8 hours (excludes end stage renal disease).
      5) Systolic blood pressure < 90 mmHg, or ≥ 40 mmHg below baseline, or mean arterial pressure (MAP) < 70 mmHg.

  f. Criteria for a positive screen

      1) Any two SIRS and any "yes" under new signs of infection or
      2) Any "yes" under new signs of organ dysfunction and any "yes" under new signs of infection.

4. Sepsis best practice alert (BPA) will fire for patients with a positive screen.

  a. Confirm with Charge Nurse/**Unit** Supervisor that the screen is positive.

  b. Order the following STAT labs if the patient has orders (refer to EHR Active Orders):

      1) Lactic acid.
      2) Blood cultures x 2 peripherally.
      3) Complete Blood Count (CBC) w/ Differential.
      4) Complete metabolic panel (CMP).

  c. Notify the attending the physician and ask if additional treatment orders need to be initiated (i.e. IV fluids, antibiotics).

  d. If the patient does not have orders for the STAT labs, notify the attending physician of the positive screen. Ask if additional diagnostic and treatment orders need to be initiated (i.e. labs, IV fluids, antibiotics).

  e. Once the RN acknowledges the BPA, it will not fire for 8 hours or until the screening criteria has been updated.

5. Placing orders.

  a. Confirm that the Sepsis Lab Panel is pre-checked and click "accept" on the BPA to place the lab orders.

PC – Adult Sepsis Screening

       b. Complete the "acknowledge" reason section on the BPA after the labs are ordered.

6. Interventions

       a. Once the RN completes the "acknowledge" reason section, follow up actions are documented under "Interventions" in the Sepsis Screen flowsheet.

       b. Document the **physician notification:**

          1) Reason for communication
          2) Interventions
          3) Provider name
          4) Provider role
          5) Method of communication
          6) Response
          7) Physician notification time

B. **Stepdown Units and Medical-Surgical Units**

1. **The RN will utilize eCART to assess for possible sepsis.**

2. **The RN will review patients' eCART scores at a minimum of every 4 hours with a goal to recognize initial elevation of the eCART score within 1 hour.**

3. **If the eCART risk percentile is 93% or greater, open the Pathways/CDS tab in the EHR.**

4. **Review the eCART trend view, access the nursing pathway and follow prompts to assess the patient and determine a disposition.**

       a. **If the patient is on comfort care or on hospice, update the disposition accordingly. Further management of the patient through eCART is optional.**

       b. **Assess patient's respiratory rate, and Glasgow Coma Scale to verify eCART risk percentile. If risk percentile is still 93% or greater and a pathway has not yet been completed for the RNs and/or there has been a significant change in patient condition, continue with screening via the pathway.**

          1) **If the patient is not currently on antibiotics, a screen for infection is completed.**
          2) **If infection is likely, a lactic acid is ordered.**
          3) **If the lactic acid is > 2, the Rapid Response Team (RRT) is called. The RRT RN will perform a focused assessment of the patient and will activate a Code Sepsis if sepsis is suspected (see PC – Adult Rapid Response Team).**

4) **If the lactic acid is ≤ 2, notify the physician.**

IV. Patient/Family Education: Patient and family education by caregivers occurs throughout the hospitalization and is documented in the EHR.

V. Documentation: Sepsis Screen within EHR.

Reference/Regulations:
Society of Critical Care Medicine. (2016). *Surviving Sepsis Campaign.* https://www.sccm.org/SurvivingSepsisCampaign/Guidelines/Adult-Patients Bartkowiak, B., Snyder, A.M., Benjamin, A., Schneider, A., Twu, N.M., Churpek, M.M., Roggin, K.K., Edelson, D.P. (2019). Validating the electronic cardiac arrest triage (eCART) score for risk stratification of surgical inpatients in the postoperative setting. *Annals of Surgery, 269* (6), 1059-1063. doi: 10.1097/SLA.0000000000002665 Churpek, M.M., Yuen, T.C., Winslow, C., Robicsek, A.A., Meltzer, D.O., Gibbons, R.D., Edelson, D.P. (2014). Multicenter development and validation of a risk stratification tool for ward patients. American Journal of Respirator and Critical Care Medicine, 190(6), https://doi.org/10.1164/rccm.201406-1022OC

Supersedes:

Primary Sponsor Name & Title:
Trudy Lovell, RN, Director of Critical Care Services

Owner(s) Name & Title:
Trudy Lovell, RN, Director of Critical Care Services

Record of Review Dates
List Stakeholder, Committee, Medical Staff, etc. Reviews: (with approval dates)
Sepsis Transformation Committee 11/2020

Origination Date:	December 2015
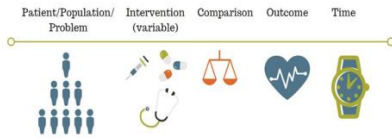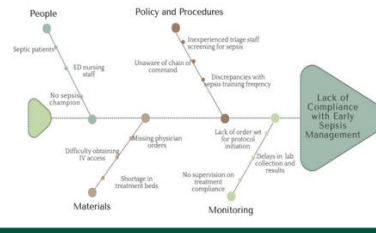
Record of Approval Dates – System or Entity Level Documents		
PPRC:		
JMPN:N/A		
MEC – BHC:N/A	MEC – WC: 5/3/21	MEC – CC:5/4/21
Operations Council:	5/11/21	Senior Exec. / VP, or designee(s):	N/A
Board *(if applicable)*	3/2016, 5/26/21		

Positive SIRS screen	- CBC - CMP - Lactate - UA with C&S if indicated - Blood Cultures X2 - ER Trop - PT/aPTT **HCG, plasma/serum quantitative, if female between 12 – 50 years of age with intact uterus and possible pregnancy**	- PCXR 12-lead EKG		- Place on cardiac monitor and pulse oximeter, monitor blood pressure - IV saline lock x2 - NS 1 liter bolus - O2 2-4 L/min to maintain oxygen saturation >94% **Weigh patient – rounded to the nearest whole kilogram**

Appendix I

GANTT Chart

GANTT CHART

TASK TITLE	START DATE	DUE DATE	AUGUST WEEK				SEPTEMBER WEEK				OCTOBER WEEK				NOVEMBER WEEK				DECEMBER WEEK			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Project Conception																						
Define Project	8/25/23	8/25/23																				
Develop AIM/Draft Proposal	8/25/23	9/7/23																				
Literature Review	8/25/23																					
Sepsis Steering Committee Meeting	9/12/23	9/12/23																				
Identify Stakeholders	8/25/23	9/12/23																				
Project Planning																						
Microsystem Assessment/On-site Walkthrough	9/12/23	9/12/23																				
Develop Questionnaire	8/25/23	9/13/23																				
Project Proposal to Leadership	9/13/23																					
Project Implementation																						
Questionnaire Administration	9/13/23	10/29/23																				
Microsystem Observation	9/12/23	10/29/23																				
Project Evaluation and Synthesis																						
Data Analysis																						
Project recommendation to leadership																						
Effort and Cost Tracking																						

Appendix J

Presentation to Hospital A Committee

Agenda
- Background
- PICOT Question
- Microsystem Assessment
- PDSA Cycle
- SWOT Analysis
- Fishbone Diagram
- Nursing Questionnaire
- Results Summary
- Recommendations
- Next Steps

PICOT Question
Does providing nursing staff support, accountability, and ongoing education (I) enhance the timely implementation of sepsis bundle and compliance (O) compared to current practices (C) in the Emergency Department (P) within four months (T)?

Background
Current Situation:
Leadership identified gaps between ED sepsis bundle protocol & practice. While some patients received interventions within the first hour of sepsis identification, others received late or partial interventions.

- Sepsis is a life-threatening condition that can lead to organ dysfunction secondary to infection (CDC, 2023).
- Over the last two decades, sepsis incidence has increased, affecting 1.7 million U.S. patients annually & accounting for more than 50% of hospital deaths (Rhee et al., 2019).
- Sepsis is the single most costly condition, accounting for > $24 billion annually in U.S. health expenditures (Paoli et al., 2018).
- Research demonstrates that mortality increases by 8% each hour sepsis is left untreated (Mitzkewich, 2019).
- Early recognition & treatment can substantially improve outcomes in safety, quality, & cost domains (Dellinger et al., 2023).
- Compliance with sepsis bundle administration is associated with lower mortality rates & improved survival (Milano et al., 2018).

5 P's Assessment

PDSA Cycle

RCA Fishbone Diagram
Root Cause Analysis: Fishbone Diagram

SWOT Analysis

Nursing Questionnaire
*Survey Participation: 41/115 Nurses = 36% Response Rate

Results Summary: Questions 1-2

Question 1: What is your protocol when treating a patient in the emergency room who is identified with sepsis?

❖ **Implement the sepsis bundle**
  ➢ Nurses were knowledgeable about protocol components & responded accordingly.
    ■ "Labs with cultures + 2 IVs, fluids (unless contraindicated), abx within 1 hr"

Question 2: How do you prioritize the treatments listed above? Is there a timeline?

❖ 80.5% of nurses reported a timeline for sepsis treatment

❖ Sepsis bundle administration within 1 hr

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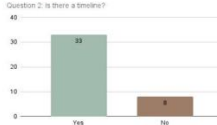
Results Summary: Questions 4-5

Question 4: What is your escalation process if you had questions or concerns regarding the sepsis treatment protocol?

❖ 35.4% said MD
❖ 29.3% said charge RN
❖ 35.4% said others: pharmacist, fellow staff RN, manager, medical director, educator, sepsis champion, unit members, or look up protocol for assistance with issue
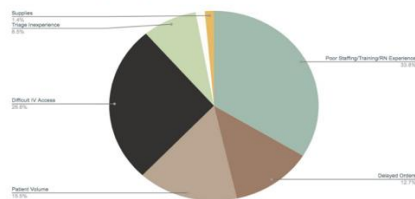
Question 5: When compliance with the sepsis protocol bundle is not met, what type of debrief or remedial training, if any, is conducted?

❖ Chart audit
❖ Follow-up by leadership
❖ Communication via email
❖ None

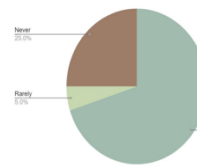UNIVERSITY OF SAN FRANCISCO

Results Summary: Question 3

Question 3: What barriers prevent you from meeting sepsis bundle timelines?

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Results Summary: Questions 6-8

Question 6: How often do you attend sepsis training?

Question 7: How often do you place the standard orders for SIRS?

❖ "Every shift": 43.9%

❖ "Frequently": 41.5%

❖ "All the time": 9.8%

Question 8: Do you wait for the doctor to submit the orderset before initiating the sepsis protocol?

❖ 95% said no, 5% said yes

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Results Summary: Question 9

Question 9: What changes do you feel can be made to sepsis protocol in order to improve patient outcomes?

Qualitative Data:
"Protocol is fine, implementation is the issue."

"Maybe a prompt to ask MD for antibiotics in addition to standing order."

"Should allow RN to drive protocol/orders."

"More hands-on education."

"Alert fatigue… inpatient & outpatient orders to cross over more fluidity."

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Next Steps

If the proposed recommendations are implemented…

❖ Conduct a post-intervention survey as well as staff interviews to monitor effectiveness and consistency of the new changes

❖ Analyze nurse responses and data to see where gaps still exist and where further progress is needed

❖ Make necessary adjustments based on survey data

❖ Remain consistent with upholding nurse education and compliance for newfound sepsis protocol and policies

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Recommendations

❖ Standardize & increase sepsis training frequency
❖ Refine technology-assisted intravenous (IV) placement skills
❖ Provide hands-on simulations
❖ Develop post-training evaluations to solicit feedback
❖ Case reviews on near misses
❖ Establish a comprehensive sepsis screening policy
❖ Design Badge Buddy cards with visual aids detailing sepsis guidelines
❖ Standardize escalation pathway
❖ Incorporate automated warning/clinical decision support system into EPIC

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Milano, P. K., Desai, S. A., Eiting, E. A., Hofmann, E. F., Lam, C. N., & Menchine, M. (2018). Sepsis bundle adherence is associated with improved survival in severe sepsis or septic shock. *The Western Journal of Emergency Medicine, 19*(5), 774–781. https://doi.org/10.5811/westjem.2018.7.37651

Mitzkewich, M. (2019). Sepsis screening in triage to decrease door-to-antibiotic time. *Journal of Emergency Nursing, 45*(3), 254-256. https://doi.org/10.1016/j.jen.2018.08.002

Paoli, C. J., Reynolds, M. A., Sinha, M., Gitlin, M., & Crouser, E. (2018). Epidemiology and costs of sepsis in the United States—An analysis based on timing of diagnosis and severity level. *Critical Care Medicine, 46*(12), 1889–1897. https://doi.org/10.1097/CCM.0000000000003342

Rababa, M., Bani-Hamad, D., & Hayajneh, A. A. (2022). The effectiveness of branching simulations in improving nurses' knowledge, attitudes, practice, and decision-making related to sepsis assessment and management. *Nurse Education Today, 110*, 105270. https://doi.org/10.1016/j.nedt.2022.105270

Rhee, C., Jones, T. M., Hamad Y, Pande, A., Varon, J., O'Brien, C., Anderson, D. J., Warren, D. K., Dantes, R. B., Epstein, L., & Klompas, M. (2019). Prevalence, underlying causes, and preventability of sepsis-associated mortality in US acute care hospitals. *JAMA Network Open, 2*(2). https://doi.org/10.1001/jamanetworkopen.2018.7571

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Appendix K

Literature Review Table

Literature Review				
Study Author(s)	**Study Objective and Design**	**Sample and Setting**	**Results**	**Level of Evidence**
Bahl, A., Pandurangadu, A. V., Tucker, J., & Bagan, M.	Randomized prospective single site study to analyze outcomes associated with ultrasound-guided intravenous placement by nurses, compared to standard intravenous access, for patients with poor vascular access.	A total of 124 participants, 63 of whom were randomized to the US-guided arm. Originally, 61 participants were randomized into the SOC arm, but 2 patients were excluded leaving 59 in the second group	There was a 76% success rate for the US-guided arm and 56% for the SOC arm.	Level II (Dang et al., 2022)
Chua, W. L., Teh, C. S., Basri, M. A. B. A., Ong, S. T., Phang, N. Q. Q., & Goh, E. L	A cross-sectional survey to examine RN's knowledge and confidence in recognizing and managing patients with	709 nurses from an acute care setting	Out of 709 nurses only 369 (52%) could correctly define sepsis. There was a weak correlation between sepsis knowledge test scores and self-confidence levels.	Level II (Dang et al., 2022)

	sepsis and to identify nurse and workplace factors that influence their knowledge on sepsis.			
Coulter, K. J., &. Hintzsche, M. F.	Mixed methods study examining if the implementation of a sepsis education program would impact and reduce the knowledge gap in first responders' ability to identify patients at risk for sepsis.	213 first responders and ER nurses	A significant difference in the mean of pre-education and post-education test score suggested that the education of first responders is effective in increasing their knowledge of sepsis with participants reporting feeling more prepared to encounter instances of sepsis.	Level III (Dang et al., 2022)
Husabø, G., Nilsen, R. M., Flaatten, H., Solligård, E., Frich, J. C., Bondevik, G. T., Braut, G.S., Walshe, K., Harthug, S., &	Observational study using linear and logistic regression analyses.	1,559 patients and 24 emergency departments in Norway.	A significant number of patients in the emergency department had incomplete or delayed diagnostic measures for sepsis, leading to extended antibiotic treatment times.	Level III (Dang et al., 2022)

Hovlid, E.				
Kabil, G., Frost, S. A., Hatcher, D., Shetty, A., Foster, J., & McNally, S.	Systematic review, meta-analysis and narrative review. Examine how to effectively improve compliance with early fluid administration, alongside investigating non-interventional measures and any barriers that may influence fluid.	Researchers used various databases to search for relevant studies. Such databases included MEDLINE Ovid/PubMed, Ovid EMBASE, CINAHL, and Scopus.	The effectiveness of interventions was assessed through meta-analysis, while non-interventional measures were evaluated through narrative studies. The meta-analysis studies found a 47% improvement in compliance, while narrative studies showed a 48% compliance rate for early fluid administration with an average 24-minute reduction in time.	Level III (Dang et al., 2022)
Paoli, C.J., Reynolds, M.A., Sinha, M., Gitlin,M., & Crouser, E.	Retrospective observational study representing 20% of inpatient discharges among private and academic hospitals to characterize the	2,566,689 adult sepsis patients with discharge code of sepsis from January 1, 2010 to September 30,201	Mortality rate. In sepsis patients was 12.5%. There was a 5.6% mortality rate for patient with sepsis without organ dysfunction and cost was $16,324. Severe sepsis patients represented 14.9% of	Level II (Dang et al., 2022)

	current burden, outcomes, and costs of managing sepsis patient in U.S. hospitals .		mortality rates and cost was $24,638. Septic shock patients had a 34.2% mortality rate and cost $38,298.	
Storozuk, S. A., MacLeod, M. L. P., Freeman, S., & Banner, D	A descriptive cross-sectional survey to examine nurses knowledge of systemic inflammatory response syndrome (SIRS), variables associated with sepsis, and sepsis definitions, general knowledge and treatment.	312 nurses from four emergency departments in a western Canadian city	51.8% of the nurses scored poorly on questions examining SIRS variables associated with sepsis, and sepsis definitions, general knowledge, and treatment. Nurses acknowledge their lack of knowledge and indicate a desire for further sepsis education	Level II (Dang et al., 2022)

Appendix L

Statement of Determination

APPENDIX F
Student Project Approval: Statement of Determination

Title of Project:

Optimizing Sepsis Management Through Enhanced Protocol Compliance in the Emergency Department

Brief Description of Project:

This quality improvement project aims to enhance the compliance rate for the sepsis bundle and its utilization in the Emergency Department of a level II adult trauma hospital within the greater Bay Area. Throughout the course of 5 weeks, a survey comprised of 9 questions was distributed to nurses across a variety of different shifts. This survey questionnaire provided data collection to identify barriers and gaps in knowledge related to sepsis bundle compliance with the intent of increasing compliance and utilization to 60%. After further review and presenting results to the sepsis leadership team, student's anticipate that improving the current bundle compliance rate will increase timely sepsis management, resulting in a reduced hospital length-of-stay and a decrease in the risk of sepsis-related mortality rates and readmission rates among this population.

To qualify as an Evidence-based Change in Practice Project, rather than a Research Project, the criteria outlined in federal guidelines will be used:
(http://answers.hhs.gov/ohrp/categories/1569)

This project meets the guidelines for an Evidence-based Change in Practice Project as outlined in the Project Checklist (attached). Students may proceed with implementation.

Comments:

Signature of Supervising Faculty _nekes_____ (date) 12/4/2023

Signature of Student _____H_____ (date) 12/03/2023