Optimizing Sepsis Management Through Enhanced Protocol Compliance in the Emergency Department

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Optimizing Sepsis Management Through Enhanced Protocol Compliance in the Emergency Department

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NURS653-01: Internship

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Abstract

Problem: The purpose of this quality improvement (QI) project revolves around increasing overall staff nurse compliance, enhancing their sepsis education resources, and usage of their provided education and bundle. This goal was created to produce more positive patient outcomes at Hospital X, along with its improved management of sepsis. Hospital X is an acute care facility located in the San Francisco Bay Area.

Context: The unit that was studied during this QI project was the emergency department of Hospital X. This unit provides level I trauma services in addition to other types of emergency care and contains 44 beds. Not including travel nurses, there are 115 regular staff registered nurses.

Interventions: An intervention was not implemented and observed due to the time constraints presented to the CNL students. In lieu of this, several recommendations and suggestions were presented to the nursing leadership of Hospital X. The recommendations entailed enhancing and expanding the pre-existing sepsis bundle, providing a wide variety of education, improved unit-wide sepsis communication, and badge cards for staff reference.

Measures: The students were able to demonstrate a full unit assessment to best map out the strengths and needs of the microsystem. This assessment also evaluated the level of compliance reported by the nursing staff to analyze whether the need was for additional education or a reconstructed education plan altogether. Hospital X will be encouraged to distribute a post-intervention survey to measure the effectiveness and adherence to the new recommendations that have been implemented. This survey will direct the nursing leadership team to the adjustments needed to be consistent with the latest changes.
Results: The anonymous survey that was provided to the nurses showed the CNL students that there is a heavy lack of standardization and consistency within the ED at Hospital X. Furthermore, 29.3% of the nursing staff reported they rarely or never attend any type of sepsis training as well as were unaware it was provided. In addition to this, 46.3% of the nurses reported they did not receive remedial training post-sepsis patient assignment. It was also reported that the delay in sepsis treatment also stemmed from failure to achieve difficult venous access, with 27.4% reporting this as a barrier. Some of the participants agree that a complete protocol revision to address these gaps would benefit the unit. Furthermore, 42% of nurses agreed that the team would benefit from new education and additional training on sepsis.

Conclusions: The results of the questionnaire highlighted several opportunities including communication, escalation, education/training, and inconsistencies in following the current sepsis protocols. There is a need to reevaluate the current process including staff training and sepsis timeframes and policies. A lack of resources such as adequate staffing, advanced IV access trained nurses, and communication pushed Hospital X farther from their ultimate goal of positive patient outcomes. This quality improvement project aims to provide evidence-based recommendations to the leadership team to address the gaps and opportunities identified and ultimately enhance care outcomes.

Keywords: septic shock, sepsis protocols, sepsis policies, compliance, sepsis, optimizing sepsis management.

Introduction

Sepsis is a life-threatening condition that is created by the dysregulation of the body’s inflammatory response and vital organs. Regardless of the several modern advancements and
medical discoveries, it is estimated that sepsis causes 5.3 million deaths worldwide every year (Wattanasit & Khwannimit, 2021). Education, early detection, and compliance are crucial to reduce this number and increase positive patient outcomes. When sepsis is suspected in a patient, there is a cascade of treatment that must unravel in order to get ahead of the infection and prevent further complications and death. Proper and timely implementation of these measures determines the prognosis of the patient. The severity of the sepsis and the mortality rate are reflected by the quality of the treatment, response time, accomplishment of the patient's goals, and the overall education and knowledge of the care team (Fernández-Sarmiento, 2018). Several barriers stand in the way of not only preventing sepsis but treating it effectively and in a timely manner. These barriers include poor staff compliance with the Emergency Department (ED) sepsis bundle, increased wait times and unit volume, failure to notify units of sepsis alerts, miscommunication, IV access, etc. Despite efforts by hospitals to create bundles, modules, and learning opportunities, staff compliance is low and inconsistent. This creates an uneven platform that is being used to treat septic patients which ultimately increases sepsis mortality rates. To decrease sepsis rates and create more positive patient outcomes, it is imperative that we implement more standardized and collaborative measures that are utilized and followed when a septic or near septic patient arrives at the ED.

**Problem Description**

This quality improvement project aims to augment the hospital's approach to early sepsis management in the ED. We aim to create a more standardized and collaborative sepsis bundle that is specific to the ED but also meets the proper levels of compliance and utilization. This is implemented to decrease the risk of sepsis related patient deaths, as well as decrease a patient's overall length of admission.
Specific Aim

The aim of this improvement implementation was to illuminate and enhance the rate of compliance among the staff nurses for the sepsis bundle, sepsis regulations, and protocols. Our process started with distributing a unit-wide survey that captured the ED nurses feedback regarding barriers, compliance, knowledge, and recommendations regarding their personal sepsis training and approach. The goal is to conclude the project with a 60% or better increase in compliance and utilization of the proposed bundle and new recommendations. It is imperative that we address this issue immediately, as sepsis is the leading cause of patient deaths with over 700,000 hospitalizations and 200,000 deaths each year (Delawder & Hulton, 2020). In addition, sepsis infections and septic deaths create great financial difficulties and burdens for hospitals, thus limiting their funds to provide adequate staffing, education, and resources. Contributing to this project allows Clinical Nurse Leader (CNL) students to be a part of an environment where change is identified, implemented, and supported.

PICOT Question

To properly execute the research and quality improvements we have gathered, we needed to create a Patient, Intervention, Comparison, Outcome, and Time (PICOT) question. Our question presented as follows: Does providing nursing staff support, accountability, and ongoing education (I) enhance the timely implementation of sepsis bundles and compliance (O) compared to current practices (C) in the Emergency Department (P) within three months (T)?

Rationale

The Prosci Awareness, Desire, Knowledge, Ability, and Reinforcement (ADKAR) Model is a change model that best accommodates and pairs with our QI project and its circumstances. This
model assists in implementing change by allowing for a clear, concise, and communicative goal and checkpoint for each phase in the project. This model provides a five-step process so the microsystem that is being evaluated can propose the chosen change with an almost seamless transition.

The first stage of the ADKAR Model is Awareness. This process assists in shedding light on the new and upcoming changes that will be implemented, before their arrival. This helps to soften the transition between the current policy and the new regulations being prepared. In the second step of the ADKAR Model, the desire phase, the staff are given information about the need for change and explain why the change is best for the unit. The third step, knowledge, offers employees the opportunity to have the proper education, training, and preparation needed to best work with and accommodate future changes. Step three is one of the most essential components of this model because if the nurses are not given the proper data and necessary support, they will be resistant to change and will create complications to the process as a whole. In the fourth step, the staff's knowledge about sepsis will be challenged and strengthened. This stage provides training and specific resources that demonstrate to the employees what must happen after the change. This helps to foster an environment of consistent growth and long-term results. This stage will also address barriers to work through skill gaps and complications. After the change has been implemented, the results and performance of the staff are evaluated in the fifth step, the ability phase. If the appropriate results are achieved, the process will move on to the final step in the ADKAR model, the reinforcement stage. This stage helps to solidify the changes and mark them as a permanent policy within Hospital X’s policies and procedures. Adopting the ADKAR concept would ensure the goals for this quality improvement project are achieved.
Search Strategy

A literature review has been conducted in order to gather the appropriate resources needed to support the implementation measures and our quality improvement project. The review of literature was conducted from September 2023 to October 2023. Multiple databases and servers were utilized, such as PubMed, CINAHL, Scopus, and MEDLINE. The following search words were used to gather the literature appropriate for the project and circumstances: Septic, sepsis, sepsis bundle compliance, septic shock, sepsis education, and emergency room sepsis education. Peer-reviewed research articles published between 2018-2021 were utilized.

Available Knowledge

An extensive literature review of sepsis bundle compliance, early sepsis management, and sepsis in the emergency department was conducted to further support the goal of this quality improvement project. To evaluate the efficacy of the articles and identify the level of evidence, the John Hopkins Evidence-Based Practice for Nurses and Healthcare Professionals: Model and Guidelines was used (Dang, 2022). The six articles in this review helped to further support the need for sepsis bundle compliance, education, and early detection (Delwander, 2020; Fernandez et al., 2028; Zhang et al., 2021; Peach et al., 2020; Alexander et al., 2022; Husabo et al., 2020).

To properly detect the early warning signs of sepsis in patients in the emergency department, there must be accurate and dependable scoring systems in place. The implementation of Sequential Organ Failure Assessment (SOFA) assists in this process of early detection and can act as a screening tool that is utilized by emergency department staff (Wattanasit & Khwannimit, 2021). Khwannimit and Wattanasit conducted a retrospective study to evaluate the accuracy and early warning signs and their capabilities in detecting sepsis in the ED (2021). They found that SOFA and Modified Early Warning Score (MEWS) outperformed other
scoring methods that were used in the ED as they provided the most accurate scoring level (Khwannimit & Wattanasit, 2021).

Early recognition within sepsis is crucial for igniting proper treatment. Husebo et al. found in their study that carefully observing the time between diagnostic screening and antibiotic treatment can play an integral part in patient mortality (2021). This study found that if procedures were delayed or not completed correctly, the antibiotic and fluid treatment in septic patients would be delayed. This article speaks volumes to the goal the CNL students have, which is increased and additional information for the nurses. Failure to provide proficient sepsis education and remediation to the staff can result in malpractice of procedures and inappropriate treatment timing that can impact sepsis treatment.

Improving staff compliance with the sepsis bundle is significant to ensure that education is retained and utilized. The Centers for Medicare & Medicaid Services found that when compliance levels drop, the monthly sepsis target expectations are not met (Alexander et al., 2022). To be considered compliant, an organization and its employees must comply with all standards and expectations outlined in the sepsis policies and protocols. This study spoke of how remaining in compliance allowed patients to have a decreased length of hospital stay, lower mortality rate, and low readmission rates (Alexander et al., 2022). Since sepsis is one of the leading causes of hospital deaths, addressing the issues of sepsis and mortality require delicate and time sensitive measures. To maintain hospital compliance, it is essential to identify factors that hinder the staff nurses from following the sepsis bundle policies and how those issues can be mitigated. Peach (2020) found that higher sepsis case volumes, a slimmer number of ICU beds, and increased nursing hours per patient day are all factors that are associated with increased sepsis. However, if the organization is classified as a teaching hospital and is larger in size with more than 250 hospital beds, a lower level of nursing sepsis compliance was found. This shows
that as corporations and organizations grow, they have the potential to lose sight of what is important, which is to increase positive patient outcomes (Peach, 2020).

To coincide with the recommendations of the CNL students, standardized nursing procedures and order sets play an essential role in the sepsis escalation process. Research outlines that when nurses use the tools provided to them during their assessment, sepsis order sets, electronic alert systems, and nurse-initiated protocols, it decreases the time it takes to start treatment on a septic patient (Delawder, 2020). Compliance with education, training, and debriefings allows the nurses to be aware of their capabilities while still having their nursing license protected by their organization. Compliance among the emergency department has a significant impact on a patient's total hospital stay and can be assessed for both children and adults using before-and-after method analysis (Fernandez-Sarmiento et al., 2018). In addition, educating the patients on how to care for themselves after discharge plays a role in preventing hospital admission. It is crucial that sepsis guideline recommendations for discharge are communicated properly by the nurse and care team to promote the effectiveness and longevity of hospital treatment (Fernandez-Sarmiento et al., 2018).

With evolving medicine and science, the hope for enhanced sepsis treatment and discoveries is momentous. A study was conducted to test a sepsis detection model that aids in the early detection of sepsis. This model, Long Short Term Memory (LSTM), can detect sepsis in patients 4 hours before the onset of symptoms (Zhang et al., 2021). A set of screening tools that can detect sepsis, even before the “early detection” window, will change how sepsis is treated and significantly decrease mortality rates, hospital stays, readmission rates, and irreversible damage.
Methods

Project Overview

A Plan, Do, Study, Act (PDSA) cycle was used to organize and adequately represent the data for this project. Before data collection, the CNL students crafted PICOT questions correlated with a specific aim statement. The team performed a review of sources and literature to evaluate sources and articles that address sepsis and its care and complications. Once the CNL students were physically at Hospital X, they completed a thorough unit assessment of the ED. In addition to the PDSA, a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis was conducted. A pre-intervention questionnaire was distributed to gather information from the nursing staff. The questionnaire was available as a QR code for easy access, and a paper format was printed and placed in the break room and nursing stations. Based on data analysis, the CNL students established evidence-based recommendations for addressing the opportunities identified to the leadership team. A Cost Benefit Analysis (CBA) was created to support these recommendations financially, highlighting the possibilities of cost-saving benefits. Lastly, a Gantt chart was generated to properly represent the timeline appropriate for this project and the unit's needs.

Microsystem Assessment

The students determined that the 5 P’s Assessment was the best approach for a thorough and concise review. This assessment includes purpose, patients, professionals, processes, and patterns. These aspects help to identify the performance of the unit and its efficiency. This quality improvement project aims to optimize sepsis management in the emergency department by increasing staff compliance and education. The patients that were observed were those coming into Hospital X’s ED with potential sepsis diagnosis. The professionals that were
evaluated were regular staff nurses in the ED. Although we did not collect data from the nursing leadership team directly, they are a contributing party to the “professional” portion of the 5 P’s Assessment. The nursing leadership will help to carry out any and all recommendations and interventions that the CNL students provide. In addition to the nurses, the professionals that are caring for septic patients in the ED are physicians, ED technicians, nursing assistants, phlebotomists, radiology staff, respiratory therapists, and social workers. In order to ensure the safety of potentially septic patients, the nursing staff and designated professionals are required to complete specific processes that adhere to sepsis policies and procedures. Some of these processes are staff-wide training, specific sepsis documentation, proper sepsis communication, and adherence to Hospital X’s sepsis policies. Lastly, the patterns that were crucial for the unit to keep are staff communication, sepsis rounding, nurse bedside report, physician/nurse communication, and nurse/ED technician communication.

**Plan, Do, Study, Act (PDSA) Cycle**

The Institute for Healthcare Improvement's (IHI) Plan, Do, Study, Act cycle was also adopted for this improvement project. This tool is used for a small test of change to determine what change is needed and actions to be implemented following a review of those actions. The purpose of this cycle was to demonstrate the recommended change before the unit implemented the changes permanently. To start the Plan Stage, the CNL students reviewed the data from Hospital X to determine the current state. The team created a survey to further evaluate the nurses’ understanding of the current process and their knowledge of sepsis, sepsis care, and management. In addition to the questionnaire provided, the students also crafted a PICOT question and specific aim. These assist the students with gathering information and data from the nurses. In the next step of the PDSA plan, the Do phase, the students dove into the current
policies and regulations that the unit had. Surprisingly, the unit did not have a sepsis bundle specific to the ED. In addition, the students created a SWOT analysis and a 5 P’s assessment for the ED unit. Due to the slow response rate, the team extended the data collection phase to 5 weeks to gather enough information. The final presentation to the leadership team consisted of the quantitative and qualitative data, potential cost–savings, and recommendations for improvement.

Due to conflicts with scheduling and unit availability, the CNL students were not able to see out the progress of the implementation suggestions and recommendations that were made. The ultimate goal of this project is to better a unit, aid in research, and increase positive patient outcomes. We hope that the provided recommendations will be considered and change will be made to the current sepsis policies, compliance, and protocols. The observation of these implementations falls within the third phase of the PDSA cycle, which is the “study” step. In the last stage of the cycle, the Act phase, the presented interventions should be reinforced, and education should be provided to maintain consistency among the progress and positive outcomes. Although we cannot assess our recommendations, we hope the staff will continue to implement our suggestions and strengthen and adapt to them as needed when unit changes occur.

**Root Cause Analysis (RCA)**

Due to Hospital X's discrepancies regarding sepsis, the CNL students felt it would be essential to perform an RCA. This was done to assist in detecting reasons for this problem occurring on the unit. A fishbone diagram represented the RCA the best and was a straightforward way to display the barrier of staff compliance and communication among the unit regarding sepsis. Contributions to lack of compliance with early sepsis management are difficulty obtaining IV access, no supervision of compliance, lack of order set for protocol, and
no specific ED policy. High patient volume can overwhelm the ED staff and lead to frequent cut corners when triaging and assessing patients. This can lead to decreased sepsis care and a delay in the cascading protocols. There are several different suggestions that the students believe may help to decrease the factors within the ED, but to increase staff compliance and participation, efforts from within must be utilized. These efforts include mandatory paid training, performance reviews after the training, the implementation of badge card references, and unit sepsis representatives.

**Strengths, Weakness, Opportunities, and Threats (SWOT) Analysis**

Hospital X’s ED was equipped with a past sepsis bundle. This bundle assisted the students in identifying the first stage of the Strengths, Weakness, Opportunity, Threats (SWOT) Analysis. The staff refer to the previous sepsis bundle when needed and are assigned online training modules each year. A frequent response from the questionnaires was that the staff were rarely compliant with their yearly sepsis training. There was an inconsistency among the staff of Hospital X, as some stated they completed the yearly sepsis training, and others were unaware the education was provided. In addition to low compliance, IV access, training for advanced IV access, and the lack of communication among the unit when a sepsis positive patient is identified, were among the common responses the students received from the staff. These weaknesses assisted the CNL students to gather data on where the best recommendations lie.

Opportunities that Hospital X can benefit from are increased levels of communication amongst the unit when a patient arrives and is suspected of sepsis, such as broadcasting a “Sepsis Alert”, with the room number so that staff may aid the primary nurse with meeting the sepsis criteria and timelines. Along with improved education and standardization, ultrasound guided IV access training for 3 nurses on each shift would assist in breaking the barrier of complicated
access that the staff feel is standing in their way. Threats that Hospital X may approach are costs of proposed training, staff resistance to change of policy, inability to stay consistent with the changes due to time constraints, and low leadership support. Our hope is that when potential threats arise for Hospital X, the nursing leadership can support the staff in ways that benefit and motivate the unit to strive towards decreasing emergency department sepsis complications.

**Cost-Benefit Analysis**

A Cost-Benefit Analysis (CBA) was conducted in order to properly assess the benefits of the recommendations and improvements that are proposed to the ED. The goal was to evaluate if the benefits of the various proposed improvements outweigh the overall costs of the strategies that could create an improvement in sepsis at Hospital X’s ED. To carry out the appropriate recommendations, the annual cost for Sepsis Bundle Badge Cards is $805. These cards will be distributed to all 115 nurses and will be useful in providing triggers, values, and timelines specific to Hospital X’s sepsis protocol. In addition to these staff cards, it is imperative that the staff receive training that will break through the barriers that were directly expressed in our data collection. The training involved both Sepsis Bundle Training and Ultrasound Guided IV Training. The estimated cost of providing Ultrasound Guided IV Training to nine nurses is $21,000. The intention is to provide each shift, day, evening, and night shift with three nurses that are capable of placing difficult vascular access lines. In addition to this, it is recommended that the staff attend Sepsis Bundle Training. This online training would address the policies, procedures, and protocols that Hospital X has in place for positive septic patients. This training would cost $41,400 for 115 nurses. These costs are compared to the yearly cost of care for sepsis and complications of sepsis, estimated at $1,030,000.
Timeline

To effectively develop a timeline that accommodated the CNL students' goals and the restraints of Hospital X, a Gantt Chart was created as a time management tool for the project. This tool assisted in showcasing the objectives from our PDSA cycle and was a frequently visited source throughout the duration of the project. The project timeline was between September 2023 to December 2023.

Intervention

The recommendations presented to the nursing leadership of Hospital X revolved around increasing and improving nursing staff compliance, supporting the education and skill enhancement of the staff, and housing a more specific sepsis policy. Additionally, each staff member should be provided a sepsis badge reference card, communication and sepsis processing guidelines, and protocols. Due to time constraints, the CNL students could not implement the interventions for this quality improvement project. However, we anticipate the leaders will accept and implement them. The recommendations are supported by evidence-based practice in that they are proven to increase sepsis survival rate and decrease the length of stay for sepsis complications.

The nurses were able to access the questionnaire through a QR code as well as paper copies were provided at the nursing charge station and break rooms from September 2023-October 2023. The team offered incentives to the staff, such as snacks, to encourage participation.
Study of Interventions

We anticipate that following the implementation of the recommended interventions, the leadership staff of Hospital X will thoroughly evaluate the team's progress to determine the next steps. The CNL students suggested that the unit provide a post-intervention survey to gauge whether the staff feels the interventions have been helpful and created a more productive sepsis workflow or if they lead to additional barriers and gaps that need further evaluation.

Measures

The data collected using our questionnaire evaluated how the staff approached septic cases, their sepsis education, and their resources regarding sepsis care and management. There were additional observations that were made upon the unit such as reviewing the current policies and procedure of sepsis for Hospitals X. The survey approach was to include open-ended questions to assess the truth lengths of the unit's education and standards, barriers, and what the staff themselves felt would best benefit the unit. To protect the identity of the ED staff, the questionnaire responses were collected anonymously.

Ethical Considerations

The project meets the appropriate guidelines for an evidence-based quality improvement project and does not meet the regulations for institutional board approval (IRB).

Results

In order to gather effective and appropriate data, the CNL students provided the ED nurses a questionnaire that consisted of nine questions revolving around their sepsis knowledge, the policies of the unit, how they manage their sepsis patients, and barriers. The survey was
offered to 115 nurses within the ED at Hospital X. After gathering data for five weeks, the response rate for the survey came to be 36%. Although this was lower than we had hoped, we received invaluable information from former sepsis representatives, charge nurses, and a sepsis coordinator.

After reviewing the data results, there were several indicators that led the CNL students to believe there is a significant gap in the education and training provided to the staff. Of the nurses that recorded responses, 65.9% stated they attend sepsis tanning once a year. However, 29.3% of the nurses reported to never attending sepsis training. When there’s a discrepancy or failure to follow the sepsis protocol and policies, a debrief or remediation should be performed to educate the team on how to better address the situation in the future. Also, 46.3% of nurses reported they did not engage in any type of remediation or review post sepsis patients. This response was incredibly surprising as each septic patient assignment is an opportunity for the unit to improve and manipulate how to approach it again in the future. There are countless learning opportunities lost without debriefing and remediation amongst the care team.

**Discussion**

The CNL students provided several evidence-based recommendations aimed at decreasing sepsis complications and establish a supported environment for the team involved in the case. After much feedback, creating a more specific sepsis protocol that is tailored towards ED specific outpatient settings is a helpful strategy to optimizing positive sepsis patient outcomes. Currently, Hospital X is operating on a sepsis policy that revolves around a basic outpatient setting. This does not meet the needs of the ED and creates gaps in the sepsis workflow. Furthermore, this causes a cascading effect that is the misunderstood and under-communicated sepsis bundle. The CNL students are recommending the intervention of a
reconstructed sepsis bundle that is specific to the logistics and metrics of Hospital X’s ED. Within the bundle, we recommend there be increased education based around improving IV access, the units protocols, sepsis EPIC charting, reviewing near misses, and increased hands on simulation training. In addition, creating a standardized escalation process along with having visual cues, such as badge reel references cards, will create a smoother sepsis management pathway. These interventions can be best implemented with the participation and communication of everyone involved in caring for septic patients in the emergency department.

**Limitations**

The CNL students encountered some limitations during this process. The responses received from the questionnaire were only from the staff nurses from Hospital X. The travel nurses, float pool nurses, and the leadership team did not participate in this project. The CNL students believe there would have been a more significant percentage of participation if we had incorporated their responses. Also, only 41 of the staff participated in this initiative for a response rate of 35.6% despite the students’ efforts to be present at different times.

Despite these limitations, the team obtained valuable data and information from participants. Furthermore, responses from nurses who led or participated in previous sepsis workgroups provided helpful insight.

**Summary**

CNL students collaborated with nursing leadership staff from Hospital X, a level I trauma center on opportunities to enhance the utilization of sepsis protocol and management. The students started this process by assessing the current state and reviewing baseline data. This
evaluation assisted the students in identifying causal and contributing factors of the opportunities identified. Furthermore, it ensured the recommendations for improvement addressed the factors identified. Husabo et al. (2020) found that sepsis recognition procedures that were delayed or rendered incomplete lead to increased mortality, increased hospital lengths or stay, and irreversible damage if the patient survived.

The CNL students had a goal of creating a project that not only encapsulated the research and data that support early sepsis recognition, but allowed the organization to dig deeper by allowing staff to play a larger role in improving their sepsis deficits. This is to be done through improving staff compliance to the provided and enhanced education and training, improving how sepsis is communicated about throughout the unit, establishing a much more defined, and prominent sepsis escalation plan and bundle. Unfortunately, the CNL students faced time restrictions that prevented the recommended interventions to be sought out and further analyzed. However, Hospital X has been provided with the steps necessary to conduct a post-intervention survey that will allow for measurement of success and additional changes necessary to maintain improvement.

**Conclusion**

Optimizing sepsis management and care through enhanced protocol compliance in the emergency department is much more than just a strategic method to decrease hospital costs. Furthermore, it is a moral obligation that we as healthcare professionals, patient advocates, and humans have for ensuring the greatest standard of patient care. Sepsis is continuously reaching record numbers and remaining one of the most preventable patient complications and deaths. Sepsis is the leading cause of hospital-related deaths and continues to be a financial burden and global epidemic (Zhang et al., 2021). It is proven that protocol compliance is a cornerstone in the
ongoing battle that is sepsis. There is an urgent need for healthcare professionals to prioritize and headway the sepsis bundle compliance, education, support, and evaluation. By doing so, we are affirming our commitment to society and to providing the highest standard of care to all patients.
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https://doi.org/10.1111/1475-6773.13444

Appendices

Appendix A: 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:

The purpose of this quality improvement project is to identify the gaps and sepsis needs of the emergency department at San Francisco Bay Area hospital. The goal is to optimize the sepsis management as well as improve staff compliance by providing additional education, specific emergency department outpatient protocols, and sepsis reference badge reed cards. We hope that these recommendations will assist in reducing sepsis related complications, decreasing patient length of hospital stay, and lower morbidity and mortality for septic patients.

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 ____________________________ Date 12/4/2023

Signature of Student ____________________________ Date 1/3/2023
Appendix B: Literature Synthesis Table

<table>
<thead>
<tr>
<th>Study Authors</th>
<th>Objective &amp; Design</th>
<th>Sample &amp; Setting</th>
<th>Results</th>
<th>Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delawder (2020)</td>
<td>This study was a quality improvement project that aimed to implement an interdisciplinary team with the goal of implementing sepsis bundles in the emergency department. The study compared bundle compliance 3 months pre and post implementation.</td>
<td>The sample population included all patients 18 years of age or older who presented to the emergency department with sepsis or septic shock. Electronic health records, switchboard-paging records, and billing data were all collected.</td>
<td>The author’s project implementation showed improvement in all bundle areas except for antibiotics and blood cultures. Following implementation, mortality rates declined steadily from 12% to 5%</td>
<td>Level II</td>
</tr>
<tr>
<td>Khwanimit &amp; Wattanasit (2021)</td>
<td>This was a retrospective study evaluating the accuracy of early warnings scores (NEWS MEWS, MEDS, SOS) and compare with qSOFA and SIRS for detecting sepsis in the ED</td>
<td>The sample is 652 patients with classified sepsis infections. The study took place in an ED at a university hospital</td>
<td>MEWS and SOS outperformed other scoring methods in predicting sepsis-2. The MEDS and NEWS scoring methods proved to be the most accurate in predicting sepsis-3.</td>
<td>Level III</td>
</tr>
<tr>
<td>Fernandez-Sarmiento, Carcillo, Salinas, Galvis, Lopez,</td>
<td>Objective: Evaluation of adherence to sepsis bundle</td>
<td>Setting: ED of quaternary care hospital from Jan-Dec 2014</td>
<td>Hospital stay may be significantly reduced when patients are</td>
<td>Level III</td>
</tr>
<tr>
<td>Study</td>
<td>Design</td>
<td>Sample</td>
<td>Conclusion</td>
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<tr>
<td>Jagua-Gualdron (2018)</td>
<td>and its impact on total hospital stay</td>
<td>Sample: 129 pre-intervention and 79 post-intervention children who presented to the ED with severe sepsis managed after instruction in guideline recommendations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zhang, Yin, Hunold, Jiang, Caterino, Zhang (2021)</td>
<td>This study proposes a long short-term memory (LSTM) model to predict sepsis onset in patients.</td>
<td>52,802 sepsis-2 patients and 126,041 control patients had their data used in the creation of the model</td>
<td>The authors present their machine-learning LSTM method to predict sepsis onset 4 hours before it occurs in patients</td>
<td>Level III</td>
</tr>
<tr>
<td>Peach, Ng (2020)</td>
<td>This study compiled data from multiple hospitals with the goal of assessing what hospital factors contributed to compliance with the SEP1 bundle</td>
<td>Survey data from 2,429 acute care, non specialty adult US hospitals were included in the study. Hospitals were classified as either high or low compliance</td>
<td>The factors of for-profit ownership, higher number of sepsis cases, fewer ICU beds, and more nursing hours were correlated with higher rates of hospital compliance. The factors of having more than 250 beds and teaching status were correlated with lower rates of compliance</td>
<td>Level III</td>
</tr>
<tr>
<td>Alexander, Sydney, Gotlib, Knuth, Santiago-Rivera, Butki (2022)</td>
<td>The author’s team designed a Sepsis Macro and Sepsis Order Set in the hospital’s electronic</td>
<td>This study was conducted at the McLaren Oakland hospital in Pontiac, Michigan.</td>
<td>Overall hospital compliance with the SEP-1 bundle increased from 57% to 62% following the implementation of</td>
<td>Level II</td>
</tr>
<tr>
<td>Husabo, Nilsen, Flaatten, Solligard, Frich, Bondevik, Braut, Walshe, Harthug, Hovlid (2020)</td>
<td>This study is an observational study. The study’s objective was twofold. The first objective was to assess the timeliness of diagnostic procedures for the recognition of sepsis. The second objective was to determine the association between these diagnostic procedures and time to administration of antibiotics. The study also examined the association between</td>
<td>This study collected data from 24 different Norwegian hospital emergency departments. Data from 1559 patients were analyzed.</td>
<td>The study found that sepsis recognition procedures were either delayed or not completed in a number of patients. These delays in procedure result in prolonged time to receive antibiotics.</td>
<td>Level III</td>
</tr>
<tr>
<td>timeliness of antibiotics and patient mortality.</td>
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</table>
Appendix C: 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, Weaknesses, Opportunities, and Threats (S.W.O.T.)
- Present recommendations based on evidence to the leadership team on December 4, 2023.

**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 D: Root Cause Analysis

Root Cause Analysis: Fishbone Diagram

Appendix E: Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis

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

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.

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

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 F: Pre-Intervention Survey

Questionnaire Survey 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! ❤️ USF Nursing Students
Appendix G: Cost-Benefit Analysis

<table>
<thead>
<tr>
<th>Materials and Labor</th>
<th>Year One</th>
<th>Year Two</th>
<th>Two-Year Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ultrasound Guided IV Training ($2,400 x 9 ED RNs)</td>
<td>$21,600</td>
<td>N/A</td>
<td>$21,600</td>
</tr>
<tr>
<td>Sepsis Badge Reel Cards ($7 x 115 RNs)</td>
<td>$805</td>
<td>N/A</td>
<td>$805</td>
</tr>
<tr>
<td>Sepsis Bundle Training ($90/hr x 115 ED RNs x 2)</td>
<td>$41,400</td>
<td>$41,400</td>
<td>$82,800</td>
</tr>
<tr>
<td>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.</td>
<td>$1,030,000</td>
<td>$1,030,000</td>
<td>$2,060,000</td>
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<tr>
<td>Net Benefits</td>
<td>$966,195</td>
<td>$988,600</td>
<td>$1,954,795</td>
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<tr>
<td>Benefit-Cost Ratio</td>
<td>15.1</td>
<td>23.9</td>
<td>18.6</td>
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</table>
## Appendix G: Gantt Chart

### Gantt Chart

<table>
<thead>
<tr>
<th>TASK TITLE</th>
<th>START DATE</th>
<th>DUE DATE</th>
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<tbody>
<tr>
<td>Project Conception</td>
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<tr>
<td>Define Project</td>
<td>8/25/23</td>
<td>8/25/23</td>
</tr>
<tr>
<td>Develop AIM/Draft Proposal</td>
<td>8/25/23</td>
<td>9/7/23</td>
</tr>
<tr>
<td>Literature Review</td>
<td>8/25/23</td>
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<tr>
<td>Sepsis Steering Committee Meeting</td>
<td>9/12/23</td>
<td>9/12/23</td>
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<tr>
<td>Identify Stakeholders</td>
<td>8/25/23</td>
<td>9/12/23</td>
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<tr>
<td><strong>Project Planning</strong></td>
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<tr>
<td>Microsystem Assessment/On-site Walkthrough</td>
<td>9/12/23</td>
<td>9/12/23</td>
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<tr>
<td>Develop Questionnaire</td>
<td>8/25/23</td>
<td>9/13/23</td>
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<tr>
<td>Project Proposal to Leadership</td>
<td>9/13/23</td>
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<tr>
<td><strong>Project Implementation</strong></td>
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<tr>
<td>Questionnaire Administration</td>
<td>9/13/23</td>
<td>10/29/23</td>
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<tr>
<td>Microsystem Observation</td>
<td>9/12/23</td>
<td>10/29/23</td>
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<tr>
<td><strong>Project Evaluation and Synthesis</strong></td>
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<td>Data Analysis</td>
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<td>Project recommendation to leadership</td>
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<tr>
<td>Effort and Cost Tracking</td>
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