Optimizing Sepsis Management Through Enhanced Protocol Compliance in the Emergency Department

Emily Beck

University of San Francisco, eabeck2@usfca.edu

Follow this and additional works at: https://repository.usfca.edu/capstone

Recommended Citation
https://repository.usfca.edu/capstone/1638
Optimizing Sepsis Management Through Enhanced Protocol Compliance in the
Emergency Department

Emily Beck
School of Nursing & Health Professions, University of San Francisco

NURS 653: Clinical Internship

Nneka Chukwu, DNP-HCSL, MBA, NEA-BC, RN, CLNC, CNL

December 10, 2023
# TABLE OF CONTENTS

**Abstract**.................................................................................................................................................. 3  
**Introduction**............................................................................................................................................. 5 
  - Problem Description................................................................................................................................. 5  
  - PICOT Question....................................................................................................................................... 6  
  - Rationale.................................................................................................................................................. 6  
  - Search Strategy....................................................................................................................................... 7  
  - Available Knowledge................................................................................................................................. 8  
  - Specific Aim............................................................................................................................................ 10  
**Methods**.................................................................................................................................................. 11  
  - Project Overview..................................................................................................................................... 11  
  - Microsystem Assessment......................................................................................................................... 11  
  - Plan, Do, Study, Act (PDSA) Cycle........................................................................................................ 12  
  - Root Cause Analysis (RCA)................................................................................................................... 13  
  - Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis.............................................. 14  
  - Cost-Benefit Analysis (CBA).................................................................................................................. 15  
  - Timeline.................................................................................................................................................. 15  
  - Intervention............................................................................................................................................ 15  
  - Study of Intervention............................................................................................................................... 16  
  - Measures.................................................................................................................................................. 17  
  - Ethical Considerations.............................................................................................................................. 17  
**Results**.................................................................................................................................................... 17  
**Discussion**............................................................................................................................................. 18  
  - Limitations............................................................................................................................................. 20  
  - Summary.................................................................................................................................................. 20  
  - Conclusion.............................................................................................................................................. 21  
**References**............................................................................................................................................... 21  
**Appendices**.......................................................................................................................................... 24  
  - Appendix A: Statement of Determination............................................................................................... 24  
  - Appendix B: Literature Synthesis Table.................................................................................................. 25  
  - Appendix C: Plan, Do, Study, Act (PDSA) Cycle .................................................................................. 28  
  - Appendix D: Root Cause Analysis (RCA)............................................................................................... 29  
  - Appendix E: Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis.......................... 30  
  - Appendix F: Pre-Intervention Questionnaire.......................................................................................... 31  
  - Appendix G: Questionnaire Results........................................................................................................ 32  
  - Appendix H: Cost-Benefit Analysis (CBA)............................................................................................. 35  
  - Appendix I: Gantt Chart.......................................................................................................................... 36  
  - Appendix J: Standard Order Set............................................................................................................. 37
Abstract

**Problem:** With a recent influx of sepsis cases, hospital stakeholders identified gaps between sepsis protocol and practice. This quality improvement project aimed to increase sepsis bundle compliance and utilization among registered nursing staff in the emergency department to improve sepsis management and patient outcomes ultimately.

**Context:** The microsystem assessed is a 44-bed emergency department at Hospital A, a level II adult trauma center within the greater San Francisco Bay Area. The current registered nurse roster within this department, excluding four on leave, is 115 individuals and represents the target population for this change project.

**Interventions:** Interventions were not implemented due to project time constraints. However, proposed recommendations were presented to unit leadership for future implementation. Suggested interventions would standardize the sepsis screening policy, escalation pathways, and training opportunities as well as increase unit signage with visual aids which detail sepsis guidelines.

**Measures:** Data collection and microsystem assessments sought to measure current sepsis protocol compliance for this change project. Post-intervention sepsis bundle adherence remains the primary metric to evaluate the effectiveness of quality improvement initiatives going forward.

**Results:** Pre-intervention questionnaire results revealed discrepancies in staff training frequency, chain of command, and leadership follow-up on near misses and fallout cases. The microsystem’s unpredictable patient volume presented barriers to timely sepsis management. Post-intervention results remain inconclusive and outside of this project’s allotted time frame.
Conclusions: Analysis of gaps in sepsis bundle compliance revealed multiple causative factors that delay sepsis care within the emergency department. Proposed interventions sought to increase standardization and collaboration in the unit to improve bundle compliance. Project continuation is necessary to implement proposed recommendations and study their effectiveness in enhancing sepsis bundle compliance rates.

Keywords: sepsis, early treatment, protocol compliance, sepsis bundle, timely administration, emergency department, education
Introduction

Sepsis is a life-threatening and systemic bodily response to infection that affects 30 million individuals globally per year and remains a leading cause of death. Within the United States alone, sepsis accounts for over 50% of in-hospital mortality and $24 billion annually in healthcare expenditures (Paoli et al., 2018). As the frontline setting of most healthcare facilities, U.S. emergency departments (ED) are critical settings to recognize and treat the 850,000 sepsis cases they receive each year. Early identification and management of sepsis can substantially reduce morbidity and mortality. Research demonstrates that mortality increases by 8% each hour sepsis is left untreated (Mitzkewich, 2019). Sepsis exists on a continuum of severity and becomes increasingly difficult to treat as it progresses, making early action imperative.

An international task force committed to reducing sepsis mortality, the Surviving Sepsis Campaign (SSC), put forth bundle guidelines which advise fluid administration, antibiotic initiation, and blood tests within allotted timeframes, referred to as the SEP-1 bundle by the Centers for Medicare and Medicaid (CMS) (Dellinger et al., 2023). The latest guidelines recommend initiating these aims within 1-hour of sepsis recognition. Barriers to timely sepsis treatment in the ED include high patient volumes, lab processing delays, difficulty obtaining peripheral venous access, and staff knowledge deficits. This quality improvement project aimed to optimize sepsis management within the ED by increasing SEP-1 bundle compliance to promote timely treatment for patients and ultimately improve care quality, safety, and cost.

Problem Description

Stakeholders at a level II adult trauma center within the greater San Francisco Bay Area – referred to herein as Hospital A – identified gaps between sepsis care protocol and practice within their 44-bed emergency department. This quality improvement project aimed to enhance
early sepsis management and sepsis bundle compliance among Hospital A emergency department registered nurses to reduce the risk of sepsis-related morbidity and mortality as well as hospital length of stay for patients.

**PICOT Question**

Population, Intervention, Comparison, Outcome, and Time (PICOT) questions establish the capacity of a quality improvement project. The following PICOT question guided the CNL student team’s review of research on improving sepsis management. 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)?

**Rationale**

The Prosci Awareness, Desire, Knowledge, Ability, and Reinforcement (ADKAR) Model provided a structural framework for this quality improvement project. As one of Prosci’s two foundational methodologies, the ADKAR offers a simple and effective guide for leaders to achieve change by centering the individuals affected. By following this five-step outcomes process, microsystems can effectively implement change initiatives with minimal resistance and ensure change is successfully integrated into the organization’s culture (Hiatt, 2006). The first step of the model, awareness, informs employees of impending changes before implementation to decrease resistance. Within step two, desire, change agents convince employees why change is beneficial until employees readily want to implement interventions. Step three, knowledge, equips employees with the training, education, and experience necessary to initiate and sustain change. Ability, step four, refers to the employee’s successful mastery of the change. Whereas employees develop understanding in step three, step four integrates this knowledge through
practice, constructive feedback, and adjustments to improve performance. If the change produces the desired results upon evaluation, the fifth and final stage, reinforcement, establishes the change as the new status quo.

Unit leaders identified gaps in septic patient management within the ED. Alerting staff to these findings and the need for change comprised the first step of ADKAR. In step two, CNL students administered surveys to nursing staff to investigate existing barriers and ideas for improvement. Results revealed education, policy, and accountability gaps in timely sepsis management, and nursing staff vocalized a desire to change those aspects of their unit’s workflow. Step three involved proposing interventions to unit leaders based on observations and data. These included standardized training, a comprehensive screening policy, and reference badge cards. The hope for this improvement project is that ADKAR steps three and four will be implemented by incorporating these proposed interventions to increase staff knowledge and ability. The fifth step of this project will be reinforcement. Upon evaluation, if sepsis protocol compliance increases, this final step will establish the changes permanently into the unit workflow. If not, it will include reframing the initial aim or modifying proposed interventions.

Prosci’s ADKAR model emphasizes the importance of understanding the individuals affected by a change. The more receptive individuals are to a proposed change, the easier the implementation will be. By following this approach, organizations can systematically introduce unit change and effectively integrate proposed initiatives into established workflows.

Search Strategy

CNL students conducted a review of existing literature using the PubMed and CINAHL databases from September to October 2023. To search for current evidence, the following keywords were used: “sepsis,” “surviving sepsis,” “bundle therapy,” “compliance,” “emergency
department,” and “best practices.” An additional filter honed the population to adult patients over 18, and publications were limited to peer-reviewed journal articles from 2017 to present. Six relevant articles were selected and evaluated using the John Hopkins Research Evidence Appraisal Tool to determine the level of evidence, credibility, and support for the research topic (Polit & Beck, 2021).

**Available Knowledge**

A thorough review of the literature on sepsis therapy showed that treatment bundle adherence remains a significant challenge within emergency departments, particularly concerning laboratory workups and timely antibiotic initiation. Furthermore, research demonstrates that evidence-based protocols and quality improvement initiatives have been associated with increased sepsis protocol compliance and subsequently decreased mortality rates.

Dantes et al. (2023) explored sepsis program activities in acute care hospitals within the CDC’s National Healthcare Safety Network. This descriptive analysis found that only slightly more than half of U.S. hospitals provide dedicated time for leaders and committees to manage sepsis programming, engage specialists, and integrate evidence-based practice, highlighting an opportunity to enhance sepsis programming as well as care outcomes within the United States through a more standardized national approach.

Recognizing that previous research focused primarily on intensive care unit (ICU) settings, Schinkel et al. (2023) conducted a before-after interventional study in the Netherlands to assess the impact of a sepsis performance improvement program specific to the emergency department. Implemented changes included regular educational meetings, routine audits and feedback, a screening tool, and a multidisciplinary sepsis response team. Post-intervention data
revealed that all process-related outcomes, primarily time to antibiotics and the number of lactate measurements, resulted in improvement.

A systematic review and meta-analysis conducted by Kabil et al. (2022) investigated the effectiveness of interventions in the emergency department to improve early intravenous fluid administration in adult patients presenting with septic shock. Performance improvement initiatives were found to improve compliance, time, and volume of fluids administered to septic shock patients in the ED. Moreover, interventions proved most effective in microsystems with a comprehensive understanding of their facility-specific barriers to fluid administration.

Two separate studies conducted by Liu et al. (2022) and Kiser (2023) applied the Plan, Do, Study, Act (PDSA) methodology to initiate a nurse-driven sepsis protocol within the ICU in Hebei, China, and to standardize a triage screening policy in a Pennsylvania community hospital’s emergency department, respectively. Liu’s prospective cohort study compared clinical staff compliance with protocol before and after PDSA implementation and discovered unique interruptions to bundle implementation through the process. The primary reasons for poor bundle adherence on the unit included busy clinical staff, poor understanding of guidelines, lack of antibiotic stockpiles, and delays in placing order sets. These factors were analyzed via a fishbone diagram and informed change initiatives. Kiser’s study identified gaps in sepsis recognition, with fewer than half of patients diagnosed with sepsis being screened in triage. Frontline observations exposed variations in nurse-led sepsis screening related to education and experience on the unit. The community hospital ED examined the evidence and implemented human factors-influenced interventions including a centralized sepsis screening tool to increase reliability and detection. Both studies utilized the PDSA methodology to promote increased protocol adherence and
highlighted the importance of standardizing approaches based on a thorough assessment of the individual microsystems.

Bray and Kennedy (2021) focused on implementing the Surviving Sepsis Campaign’s one-hour bundle in a rural emergency department to improve timely sepsis care. A rapid cycle quality improvement test analyzed various interventions using run charts over 90 days. Gaps in timely recognition, fluid administration, and antibiotic initiation were identified. Interventions included screening in triage, sepsis education, team handoff report communication, and a sepsis checklist for nurse-driven orders to increase unit standardization and collaboration. Timely and appropriate sepsis care were the two measures evaluated, and they exceeded the initial aim at the end of the rapid cycle’s data collection.

The current morbidity and mortality rates, cost burden, and rising incidence of sepsis all demonstrate the need for prioritization of timely sepsis management within the emergency department. Evidence not only supports the clinical effectiveness of performance improvement initiatives to increase sepsis protocol adherence and decrease mortality but also underscores the importance of understanding each microsystem’s unique challenges to timely implementation.

**Specific Aim**

This quality improvement project aimed to enhance the compliance rate for the sepsis bundle and its utilization in the emergency department of Hospital A, a level II adult trauma center within the greater San Francisco Bay Area. The process began with administering a survey questionnaire to help the nursing staff identify barriers to sepsis bundle compliance. The process concluded with a presentation of recommendations that will increase compliance and utilization of the bundle to 60% or better based on evidence and assessment of the microsystem. It is essential to address this issue now, as sepsis is still considered a leading cause of
hospital-related mortality and a significant financial burden on healthcare systems. By working on this project, the CNL students anticipate improving the current bundle compliance rate, leading to increased timely sepsis management, reduced hospital length-of-stay, decreased risk of mortality, and decreased readmission rates among this population.

Methods

Project Overview

The CNL student team used various methods to assess sepsis protocol adherence in the ED microsystem thoroughly. Initially, internal data from unit leadership shaped the PICOT question, specific aim, and literature review. Improvement followed a Plan, Do, Study, Act (PDSA) cycle, with a Gantt Chart outlining the project timeline. Data collection spanned five weeks and involved both passive and active observations. This included an ED nursing staff survey, a 5 P microsystem assessment, and an analysis of the organization’s strengths, weaknesses, opportunities, and threats (SWOT). These findings were key in constructing a root-cause analysis (RCA) that identified all potential factors contributing to sepsis protocol noncompliance. The RCA then guided recommendations for interventions presented to unit leadership. Additionally, a cost-benefit analysis (CBA) determined the potential cost savings from the proposed interventions.

Microsystem Assessment

A microsystem assessment was conducted to evaluate the workflow of Hospital A’s 44-bed emergency department for the sepsis change project. Employing the 5 P assessment technique, the CNL student team scrutinized various microsystem domains: purpose, patients, professionals, processes, and patterns. The primary purpose of the ED is to deliver life-saving medical care to patients seeking stabilization or urgent treatment for emergency conditions. An
interdisciplinary team of healthcare professionals, including physicians, registered nurses, phlebotomists, pharmacists, technicians, respiratory therapists, physical therapists, medical social workers, clinical care coordinators, unlicensed assistive personnel, and unit secretaries, provides direct and indirect care within the ED.

For patient populations identified with sepsis, the ED aims to administer crystalloid fluid replacement, broad-spectrum antibiotic therapy, and vasopressors as indicated. The ED’s triage process screens patients for sepsis following the Sepsis-2 criteria outlined by the International Sepsis Consensus Definitions Task Force, defining sepsis as an infectious source plus two or more SIRS criteria (Mitzkewich, 2019). When a patient screens positive, the subsequent process entails the nurse notifying the rapid response team or charge nurse for a repeat screen, alerting the medical provider, and initiating the sepsis standard order set outlined in Appendix J. The patients are placed on strict monitoring. Other measures include lab orders for lactate levels and blood cultures, placement of two intravenous access lines, fluid resuscitation, and antimicrobial therapy.

The observed routines within the microsystem encompass shift huddles, nursing staff handoff reports, physician rounding, and documentation within the electronic medical record. Analysis of unit patterns revealed inconsistencies in sepsis bundle completion when SIRS criteria were met. Internal data collected by unit leadership uncovered gaps in timely administration of fluid and antibiotics. Additionally, qualitative interviews with registered nursing staff highlighted inadequacies in current training, triage protocols, and fallout evaluation measures.

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

The Plan, Do, Study, Act (PDSA) cycle is a technique to evaluate the effectiveness of a proposed change prior to permanent implementation (Harris et al., 2018). Proposal construction
comprised the initial ‘Plan’ stage of the PDSA cycle. Hospital A’s leadership team identified gaps between sepsis management protocol and practice within the emergency department. In collaboration with unit leadership, CNL students created a proposal for the study which included a PICOT question, specific aim statement, and survey questionnaire to determine sepsis management knowledge and bundle compliance among ED nursing staff. In the second ‘Do’ stage of the PDSA cycle, CNL students assessed the current sepsis bundle and compliance in the ED microsystem through survey administration, SWOT analysis, and the 5 P microsystem assessment. Data collection occurred over five weeks and included both passive and active observations. With the accumulated data, a root cause analysis (RCA) was constructed to examine all possible sources of sepsis bundle noncompliance. These findings informed and shaped recommendations that CNL students presented to unit leadership on December 4, 2023.

While time constraints did not allow for the implementation of suggested recommendations, the hope is that unit leadership will implement and evaluate proposed standardization and collaboration suggestions within the third ‘Study’ stage of the PDSA cycle. If the interventions yield positive results, according to the increased sepsis protocol compliance metric, the final ‘Act’ stage of the PDSA cycle will establish recommendations for ongoing nursing support, accountability, and education within the microsystem workflow. Appendix C contains a more detailed illustration of this project’s PDSA cycle.

**Root Cause Analysis (RCA)**

Amid a recent surge in sepsis cases, Hospital A’s unit leadership identified gaps in the utilization of sepsis bundles to manage the care of septic patients in the ED. Collaborative data collection and analysis revealed instances where some sepsis cases received interventions within the first hour of sepsis identification. Other cases experienced delayed or incomplete
implementation of the sepsis bundle. To investigate these delays and partial executions, a root cause analysis (RCA) was conducted to pinpoint factors contributing to this noncompliance and devise suitable solutions. A fishbone diagram detailing the RCA is available in Appendix D.

The findings highlighted various probable contributors to noncompliance, spanning people, procedural, material, and monitoring issues. The unpredictability of patient volume in the emergency department poses challenges in maintaining adequate staffing, room availability, and patient assignments. Moreover, unforeseen delays in lab work, waiting for results, difficulties obtaining intravenous access, and inadequate triage screening collectively prolong the sepsis bundles’ administration. Additionally, responses from survey questionnaires uncovered disparities in staff understanding of ED policies related to sepsis training frequency, escalation pathways, and follow-up procedures for missed cases. These policy discrepancies disrupt workflows, leading to inefficiencies and ineffective delivery of sepsis care due to the lack of standardization.

Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis

A SWOT analysis is a tool used for strategic planning to assess an organization’s risks and opportunities influencing future decisions (Harris et al., 2018). It helps anticipate internal and external factors that could hinder or support a planned change project. CNL students conducted a SWOT analysis to evaluate Hospital A’s ED sepsis protocol and training which is available in Appendix E. Some strengths identified were an evidence-based sepsis bundle, online education modules, and nursing staff capable of initiating order sets when patients meet SIRS criteria. Weaknesses included discrepancies in staff training, the absence of a comprehensive screening policy, and limited evaluation for cases of sepsis noncompliance. Improvement opportunities encompassed shorter patient stays, lower readmission rates, reduced hospital costs,
and increased bundle compliance. Potential threats include the time and cost of additional education, staff reluctance, and unpredictable ED workflows. This analysis preceded proposed interventions for sepsis management optimization and may require further examination after implementing recommendations.

Cost-Benefit Analysis (CBA)

A cost-benefit analysis (CBA) is a strategic assessment used to weigh the potential expenses of implementing a change initiative against the anticipated benefits or savings it is expected to generate. This change project’s proposed recommendations encompass additional staff training, a standardized sepsis screening policy, and the use of badge buddies and posted visual aids to outline the sepsis bundle across the ED unit. The upfront expenses associated with implementing these interventions were compared directly to the care delivery costs for septic patients. This comparison is included in Appendix H for reference. The evidence rationalizes this comparison given its support for the proposed interventions’ capacity to increase sepsis bundle compliance, subsequently leading to decreased patient morbidity and mortality rates and thereby reducing associated hospital stays (Paoli et al., 2018).

Timeline

This quality improvement project lasted from September to December 2023. A Gantt Chart enabled task organization and timeline tracking. Refer to Appendix I for a chart outlining the complete record of objectives and specific dates they were accomplished.

Intervention

The time frame of this quality improvement project did not permit the implementation of the proposed recommendations. However, the project successfully achieved its objective of examining the current state of sepsis bundle adherence and identifying barriers to prompt
treatment within the ED microsystem. A self-administered questionnaire was distributed among registered nursing staff over five weeks to investigate sepsis management knowledge, compliance, and qualitative input. The responses, collected through interview, paper, and electronic formats, ensured participant anonymity. Methods included a QR code in the ED nurse break room, a paper version available at the charge nurse station, and in-person distribution by the CNL student team from September to October 2023. Nurses were incentivized to participate with edible rewards. The questionnaire content examined staff understanding of sepsis bundle components, barriers to timely administration, escalation pathways, noncompliance debriefing practices, training frequency, and order set submissions. A final open-ended question solicited nurses’ opinions on what changes to the sepsis protocol could improve patient outcomes. For the complete pre-intervention questionnaire, refer to Appendix F.

Proposed recommendations based on available evidence and pre-intervention questionnaire data will guide the next steps of the change project. Proposed interventions for implementation encompass standardizing Hospital A’s sepsis screening policy, escalation processes, and training methods, alongside enhancing unit signage using visual aids that outline sepsis bundle guidelines.

**Study of Intervention**

Hospital A’s ED stakeholders are urged to adopt the proposed recommendations as a part of this ongoing change initiative. Subsequently, post-intervention evaluation becomes imperative to assess the effectiveness of the changes. To gather nursing staff feedback on the implemented interventions, the CNL student team suggests administering a post-intervention survey. Analyzing these responses will reveal gaps and identify necessary adjustments to enhance sepsis bundle compliance. Additionally, stakeholders will benefit from evaluating the post-intervention
rate of sepsis bundle adherence through internal electronic medical record documentation and comparing this to previously collected data from before the initiation of this quality improvement project.

**Measures**

Active and passive observations within the microsystem, alongside survey responses, served as the primary measures to evaluate Hospital A’s current sepsis protocols and septic patient management in practice. The pre-intervention questionnaire gathered both quantitative data via closed-ended questions necessitating a binary response and qualitative insights through open-ended inquiries, aiming to elicit input or identify perceived barriers to timely sepsis management in the nursing staff’s own words.

Following the implementation of proposed interventions, effective measures for ED stakeholders to gauge the changes’ impact include a post-intervention survey seeking feedback from nursing staff. Additionally, assessing post-intervention sepsis bundle adherence rates retrieved from the electronic medical record (EMR) allows for a comparison with pre-intervention adherence data. Adherence is measured through sepsis bundle compliance metrics outlined in Appendix J.

**Ethical Considerations**

Unlike clinical research, quality improvement projects analyze existing data to implement strategic processes. This project met federal guidelines for an evidence-based change in practice project and did not require institutional review board (IRB) approval.

**Results**

The CNL student team administered a pre-intervention questionnaire to emergency department registered nurses to assess sepsis protocol knowledge and compliance. Of the 115
registered nurses rostered within Hospital A’s emergency department, 41 nurses participated, yielding a 36% survey response rate. The questionnaire, available in Appendix F, comprised nine questions.

The initial questions focused on nurses’ knowledge of sepsis protocol and priorities. Most respondents demonstrated familiarity with sepsis bundle components: obtaining labs with cultures, establishing two intravenous access sites, and initiating fluids and antibiotics. When asked about the prioritization of these treatments, 80.5% of respondents reported a timeline for bundle administration of one hour from sepsis recognition. When asked about barriers to timely treatment, respondents cited lack of staffing/education/training (33.8%), difficulty gaining intravenous access (26.8%), patient volume (15.5%), delayed orders (12.7%), and triage inexperience (8.5%).

Regarding escalation pathways for concerns about sepsis protocol, responses varied between physicians (35.4%), charge nurses (29.3%), and various other professionals (35.4%). Responses about debriefing or remedial training for instances of bundle noncompliance varied from chart audits, follow-up by leadership, email communications, to none. The frequency of sepsis training varied, to which 70% of respondents replied annually, 25% never, and 5% rarely. Most nurses (95%) reported not waiting for a doctor to place order sets, instead initiating sepsis protocol themselves when necessary. Regarding suggestions for protocol improvement, nurses identified themes such as protocol revision (31.1%), training and education (28.9%), and staffing (14.1%). Visual representations of the questionnaire results are available in Appendix G.

**Discussion**

The results demonstrate several vital findings that informed this project’s proposed recommendations. Despite nursing staff successfully identifying sepsis bundle components and
priorities, respondents are split over the escalation process when presented with questions regarding sepsis treatment protocol. Thus, a recommended intervention for the unit is to standardize the escalation pathway, with a designated point person identified within the policy to field concerns during each shift.

Additionally, survey responses revealed that unit training and evaluation measures appear disjointed. Nurses report varied frequency of regular training and mixed formats of remedial training. Some participants deny the existence of either. Proposed interventions would standardize and increase training frequency. Enhanced training methodology would address critical barriers to timely sepsis management that nurses identified in the questionnaire. Additionally, increased training frequency would aim to refine technology-assisted intravenous (IV) placement skills, provide hands-on simulations, solicit post-training feedback, and review cases of fallouts and near misses to provide more thorough sepsis education for registered nursing staff.

According to the results, nurses routinely and overwhelmingly placed standard order sets to initiate sepsis protocol, but triage screening discrepancies were noted within nurses’ qualitative insights. Current policies outline an inpatient sepsis screening document, but Hospital A categorizes the emergency department as outpatient and lacks a documented screening policy. To address this concern, CNL students recommend establishing a comprehensive, hospital-wide sepsis screening policy accessible for clinical staff to reference to minimize inconsistencies in sepsis recognition ultimately.

Finally, in accordance with evidence-based practice and to address survey input that suggested “the protocol is fine” but “implementation is the issue,” CNL students propose posting additional signage throughout the unit and on badge buddies that detail sepsis bundle guidelines
using visual aids. Badge buddies allow for quick and easy identification of sepsis bundle components and hospital personnel for clinical staff, promoting bundle adherence and reducing barriers to its timely implementation.

**Limitations**

Several project limitations are worth noting. Despite using multiple recruitment strategies, offering participation incentives, and alternating solicitation times, a key challenge was the low survey response rate from emergency department nurses for various reasons. Thus, data analysis was restricted to responder results, which reflected 36% of the total ED registered nurse roster. Non-responders lack representation within this dataset. Moreover, while the survey’s provision of anonymity to participants enabled them to offer candid responses, it was at the expense of differentiating between staff nurses and visiting float or travel nurses. Both of these factors potentially skewed the survey results. Due to time constraints, project interventions could not be executed, but recommendations were presented to unit leadership for future implementation.

**Summary**

Hospital A’s stakeholders identified a gap between the sepsis protocol and its actual implementation in the emergency department. In collaboration with nursing leadership, CNL students thoroughly investigated the reasons behind noncompliance by collecting and analyzing both quantitative and qualitative data. This involved a comprehensive assessment of the microsystem using the 5 P model, a nursing staff questionnaire, SWOT analysis, root cause analysis (RCA), and cost-benefit analysis CBA) using the Plan, Do, Study, Act (PDSA) cycle. These evaluations informed potential solutions aimed at enhancing early sepsis management in the emergency department. Due to time limitations, interventions could not be implemented and
subsequently assessed. Nonetheless, proposed recommendations were presented to unit stakeholders for future project follow-up.

**Conclusion**

This project effectively fulfilled its initial goals of examining evidence, collecting microsystem-specific data, conducting analysis, and presenting recommendations to hospital leadership. The hope is that leadership will implement suggested interventions, which would require additional evaluation to measure their impact on improving sepsis bundle compliance. Sepsis remains a preventable leading cause of death worldwide and a substantial financial burden for hospitals. Research underscores the benefits of early sepsis recognition and treatment, with the 2021 Surviving Sepsis Campaign guidelines stressing the crucial role of early crystalloid fluid replacement and antimicrobial therapy within an hour of sepsis identification (Bray & Kennedy, 2021). Aligned with evidence and the organization’s quality improvement objectives, this educational project aimed to enhance early septic patient management in Hospital A’s emergency department by bolstering adherence to the sepsis protocol.
References


Appendices

Appendix A: Statement of Determination

Student Project Approval: Statement of Determination

<table>
<thead>
<tr>
<th>Title of Project:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimizing Sepsis Management Through Enhanced Protocol Compliance in the Emergency Department</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Brief Description of Project:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stakeholders at a level II adult trauma center within the greater San Francisco Bay Area identified gaps between sepsis care protocol and practice within their 44-bed emergency department. This quality improvement project aims to enhance early sepsis management and sepsis bundle compliance through increased education, standardized protocol, and badge reels among Hospital A emergency department nurses to reduce the risk of sepsis-related morbidity and mortality as well as hospital length of stays for patients.</td>
</tr>
</tbody>
</table>

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) 11/29/23

Signature of Student: ___________________________ (date) 11/15/23
## 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>Schinkel, Holleman, Vleghels, Brugman, Ridderikhof, Dzelili, Nanayakkara, &amp; Wiersinga (2023)</td>
<td>This before-after interventional study evaluated the effectiveness of a performance improvement program on sepsis outcomes, specifically incorporating a multidisciplinary sepsis response team to analyze management &amp; outcomes of ED septic patients.</td>
<td>This study included 265 participants total (132 pre, 133 post intervention) in the emergency department of Amsterdam University Medical Centers, the Netherlands.</td>
<td>All process-related sepsis outcomes resulted in improvement (number of lactate measurements obtained, time to initial antibiotic administration); patient-related outcomes had no statistically significant improvements apart from immediate vs. delayed ICU admit numbers.</td>
<td>Level III</td>
</tr>
<tr>
<td>Dantes, Kaur, Bouwkamp, Haass, Patel, Dudeck, Srinivasan, Magill, Wilson, Whitaker, Gladden, McLaughlin, Horowitz, Posa, &amp; Prescott (2023)</td>
<td>This descriptive analysis of the CDC tracking system survey evaluated the prevalence and characteristics of sepsis programs in acute care hospitals within United States. Sepsis programs can coordinate efforts across hospital disciplines and departments to optimize patient outcomes.</td>
<td>This study included 5,228 U.S. acute care hospitals of the 5,397 enrolled in the NHSN Patient Safety Component; all U.S. hospitals (approximately 6,129) are eligible to enroll in NHSN.</td>
<td>Sepsis committees were least commonly established among smaller-sized hospitals. Only 55% of hospitals provided dedicated time for committee leaders to manage &amp; conduct daily program activities, identifying opportunities for improvement with integration of programs to ultimately improve early screening, care, and outcomes of patients with sepsis in the U.S.</td>
<td>Level V</td>
</tr>
<tr>
<td>Kabil, Frost, Hatcher, Shetty, Foster, &amp; McNally (2022)</td>
<td>This systematic review &amp; meta-analysis of quantitative studies with experimental or quasi-experimental design investigated the effectiveness of interventions in the ED to improve compliance with early fluid administration for septic management &amp; examine barriers that may be present.</td>
<td>Adult septic patients (&gt; 17 years) presenting to the emergency department across 31 studies were included, 21 in the meta-analysis &amp; 11 in the narrative synthesis.</td>
<td>Performance improvement interventions improve protocol compliance with time and volume of fluid bolus administration to septic patients in the ED. Barriers included delayed identification of sepsis and unit overcrowding. A background understanding of factors</td>
<td>Level II</td>
</tr>
<tr>
<td>Author(s)</td>
<td>Study Description</td>
<td>Study Details</td>
<td>Level</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td>Liu, Liu, Tian, Zhang, Hao, Shen, &amp; Du (2022)</td>
<td>This prospective cohort study compared clinical staff compliance with sepsis treatment bundle before &amp; after PDCA management model implementation over the course of one year.</td>
<td>113 patients with sepsis were included in the cohort study, divided b/w control and study group, in the Department of Critical Care Medicine in Hebei General Hospital, China. Post-implementation study group sepsis treatment bundle compliance within 1 hr increased from 66.4% to 81.4% and the study group had shorter ICU hospital stays compared to the control group in treating patients. The PDCA cycle can effectively improve treatment efficacy for sepsis and improve medical care quality.</td>
<td>Level IV</td>
<td></td>
</tr>
<tr>
<td>Kiser (2023)</td>
<td>This study utilized PDSA methodology to identify &amp; manage potentially septic patients more proactively by increasing awareness of sepsis criteria triggers in triage rather than reacting to patient deterioration. The objective was to improve compliance with sepsis best practice treatment and decrease mortality.</td>
<td>ED frontline nursing staff, physicians, and nurse managers comprised the sample within an 8-bed ED unit at Allegheny Health Network Grove City Hospital in Pennsylvania. Hospital compliance with sepsis best practice treatment improved by 23% post PDSA cycle interventions of RN sepsis triage screening and physician use of the order set compared to pre-intervention. Mortality rates reflected this improvement, decreasing from 7.2% to 3.6%.</td>
<td>Level III</td>
<td></td>
</tr>
<tr>
<td>Bray &amp; Kennedy (2021)</td>
<td>This quasi-experimental quality improvement study was designed to improve timely sepsis</td>
<td>This study included 744 total patients in 4 PDSA cycles within 90 days within a rural, 10-bed, critical care unit. The rapid cycle improvement model was effective in demonstrating that pre- and post-implementation</td>
<td>Level III</td>
<td></td>
</tr>
<tr>
<td>care to 75% for patients in a rural ED. Quantitative and qualitative data collection assessed staff participation with the standardized hand-off tool, patient surveys regarding sepsis education received during stay, and chart audits to evaluate the effectiveness of the screening tool and nurse-drive orders for timely care of septic patients.</td>
<td>access emergency department.</td>
<td>results varied, and the objective was met. The project improved sepsis screening to 100% and timely antibiotic treatment to 83% following the intervention. Cost was also evaluated and decreased by nearly $3,000/patient due to decreased length of stay. Improvement was seen in both patient and team engagement, screening, and sepsis treatment measures.</td>
<td></td>
<td></td>
</tr>
</tbody>
</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 S 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 (RCA)

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 Questionnaire

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: Questionnaire Results

Question 1: Identified Sepsis Protocol in the ED

Question 2: Is there a timeline?

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

- Poor Staffing/Training/RN Experience: 33.8%
- Difficult IV Access: 26.8%
- Patient Volume: 15.5%
- Delayed Orders: 12.7%
- Other:
  - Supplies: 1.4%
  - Triage inexperience: 6.5%
Question 4: What is your escalation process if you had questions or concerns regarding the sepsis treatment protocol?

- MD: 33.4%
- Charge RN: 29.3%
- Misc: 35.4%

Question 5: When compliance is not met, what type of debrief/training is conducted?

- Chart audit: 0.5%
- Communication: 22.0%
- Follow-up by leader: 9.9%
- None: 65.6%

Question 6: How often do you attend sepsis training?

- Never: 25.0%
- Rarely: 5.0%
- Annually: 70.0%
Question 7: How Often/Frequently are Standing Orders placed?
- No Answer: 4.9%
- All The Time: 9.8%
- Often/Frequently: 41.5%
- Daily/Every Shift: 43.9%

Question 8: Do you wait for the doctor to submit the orderset before initiating the sepsis protocol?
- Depends: 5.0%
- No: 95.0%

Question 9: What changes do you feel can be made to sepsis protocol in order to improve patient outcomes?
- Other: 6.7%
- Staffing: 14.1%
- Protocol Revision: 31.1%
- No Answer: 19.3%
- Training and Education: 28.9%
Appendix H: Cost-Benefit Analysis (CBA)

<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</td>
<td></td>
<td></td>
<td></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>
</tr>
<tr>
<td>Net Benefits</td>
<td>$966,195</td>
<td>$988,600</td>
<td>$1,954,795</td>
</tr>
<tr>
<td>Benefit-Cost Ratio</td>
<td>15.1</td>
<td>23.9</td>
<td>18.6</td>
</tr>
</tbody>
</table>
# Appendix I: Gantt Chart

## Gantt Chart

<table>
<thead>
<tr>
<th>Task Title</th>
<th>Start Date</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Conception</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Define Project</td>
<td>9/25/23</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>
<td></td>
</tr>
<tr>
<td>Sepsis Steering Committee Meeting</td>
<td>9/12/23</td>
<td>9/12/23</td>
</tr>
<tr>
<td>Identify Stakeholders</td>
<td>8/25/23</td>
<td>9/12/23</td>
</tr>
<tr>
<td>Project Planning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microsystem Assessment/On-site Walkthrough</td>
<td>9/12/23</td>
<td>9/12/23</td>
</tr>
<tr>
<td>Develop Questionnaire</td>
<td>8/25/23</td>
<td>9/13/23</td>
</tr>
<tr>
<td>Project Proposal to Leadership</td>
<td>9/13/23</td>
<td></td>
</tr>
<tr>
<td>Project Implementation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Questionnaire Administration</td>
<td>9/13/23</td>
<td>10/29/23</td>
</tr>
<tr>
<td>Microsystem Observation</td>
<td>9/12/23</td>
<td>10/29/23</td>
</tr>
<tr>
<td>Project Evaluation and Synthesis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project recommendation to leadership</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effort and Cost Tracking</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>AUGUST</th>
<th>SEPTEMBER</th>
<th>OCTOBER</th>
<th>NOVEMBER</th>
<th>DECEMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WEEK</td>
<td>WEEK</td>
<td>WEEK</td>
<td>WEEK</td>
<td>WEEK</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>11</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
Appendix J: Standard Order Set

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 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.
   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