

The University of San Francisco

# USF Scholarship: a digital repository @ Gleeson Library | Geschke Center

---

Master's Projects and Capstones

All Theses, Dissertations, Capstones and  
Projects

---

Fall 12-15-2023

## Optimizing Sepsis Management Through Enhanced Protocol Compliance in the Emergency Department

Efrain Perez Trujillo

University of San Francisco, [eptrujillo@usfca.edu](mailto:eptrujillo@usfca.edu)

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



Part of the [Critical Care Nursing Commons](#)

---

### Recommended Citation

Trujillo, Efrain Perez, "Optimizing Sepsis Management Through Enhanced Protocol Compliance in the Emergency Department" (2023). *Master's Projects and Capstones*. 1655.

<https://repository.usfca.edu/capstone/1655>

This Project/Capstone - Global access is brought to you for free and open access by the All Theses, Dissertations, Capstones and Projects at USF Scholarship: a digital repository @ Gleeson Library | Geschke Center. It has been accepted for inclusion in Master's Projects and Capstones by an authorized administrator of USF Scholarship: a digital repository @ Gleeson Library | Geschke Center. For more information, please contact [repository@usfca.edu](mailto:repository@usfca.edu).

**Optimizing Sepsis Management Through Enhanced Protocol Compliance in the  
Emergency Department**

Efrain Perez Trujillo, RN

School of Nursing and Health Professionals, University of San Francisco

NURS-653-33: Internship

Dr. Nneka Chukwu, DNP-HCSL, MBA, RN, CLNC, CNL

December 10th, 2023

## TABLE OF CONTENTS

Section I: Abstract.....	4
Section II: Introduction.....	6
Problem Description .....	7
PICOT Question.....	7
Rationale .....	7
Search Strategy .....	8
Available Knowledge.....	9
Specific Project Aim .....	11
Section III: Methods .....	11
Project Overview .....	11
Microsystem Assessment .....	12
Plan, Do, Study, Act (PDSA) Cycle .....	13
Root Cause Analysis (RCA) .....	14
Strength, Weaknesses, Opportunities, Threats (SWOT) Analysis .....	14
Cost-Benefit Analysis (CBA) .....	15
Timeline .....	16
Intervention .....	16
Study of Interventions .....	17
Measures .....	17
Ethical Considerations .....	18
Section IV: Results .....	18
Section V: Discussion.....	19
Limitations .....	19
Summary .....	20
Conclusion .....	20
Section VI: References .....	21
Section VII: Appendices.....	23
Appendix A: Statement of Determination .....	23

Appendix B: Literature Synthesis Table.....	24
Appendix C: Plan, Do, Study, Act (PDSA) Cycle.....	27
Appendix D: Root Cause Analysis (RCA) .....	28
Appendix E: Strengths, Weaknesses, Opportunities, Threats (SWOT) Analysis.....	29
Appendix F: Pre-Intervention Questionnaire and Results .....	30
Appendix G: Cost-Benefit Analysis (CBA) .....	36
Appendix H: Gantt Chart.....	37

### Abstract

**Problem:** This quality improvement (QI) project aims to optimize early sepsis management and sepsis bundle compliance among Emergency Department (ED) registered nurses in order to reduce the risk of sepsis-related deaths and associated hospital length of stay.

**Context:** Clinical Nurse Leader (CNL) students conducted a microsystem assessment on the ED at Hospital A, located within the greater San Francisco Bay Area. This microsystem, equipped with 115 nurses and 44 rooms, consists of an acuity of care for urgent to life-threatening medical conditions, including sepsis.

**Intervention:** Following time constraints, and limitations, implementation of an intervention was not feasible; however, CNL students provided recommendations so stakeholders may further investigate and pursue. The recommended interventions include: increasing sepsis bundle training frequency, refining intravenous placement skills through technologically driven training and readily available resources, badge buddy sepsis cards, and revision of the current charting system.

**Measures:** CNL students collected data to assess the nurses' knowledge of the sepsis bundle and Hospital A's sepsis policy. The data also served to identify frequency of training, debriefings, and any barriers nurses experienced while implementing the bundle. Due to time constraints, a post-intervention survey was not conducted.

**Results:** 41 of the 115 ED registered nurses responded. Pre-intervention questionnaire responses revealed that 42% of ED nursing staff recommend protocol revision, 24.4% claim to not have attended any sepsis training with another 4.9% reporting rarely attending, and 46.3% reported there is no debriefing, or follow-up training, when sepsis bundle compliance is failed to be met. Additionally, nurses identified various barriers, prolonging sepsis bundle compliance.

**Conclusions:** Analysis of the pre-intervention questionnaire responses from Hospital A's ED registered nurses revealed knowledge gaps and barriers to timely sepsis management and bundle compliance. CNL students identified evidence-based recommendations, which stakeholders may implement to yield anticipated outcomes.

*Keywords:* sepsis, sepsis management, sepsis bundle, sepsis bundle compliance, SIRS, emergency department, and quality improvement

## Introduction

Sepsis refers to the physiological burden the body endures in response to an infection; it is a severe reaction and life-threatening medical emergency (CDC, 2023). Nearly any infection has the potential to develop into sepsis (CDC, 2023), and it remains a significant global health concern as millions are affected yearly with nearly one in every three cases resulting in death (Evans et al., 2021). Within the United States (US), sepsis is the second leading cause of death in intensive care units and ranks tenth in overall causes of death (Moore et al., 2019). Mortality rates for septic patients in the Emergency Department (ED) range from 20% to 50% (Moore et al., 2019). Early recognition and timely treatment are paramount in sepsis treatment; failure to comply with sepsis bundle guidelines may result in an escalation in the severity of sepsis, such as damage to tissue, organ failure, and ultimately death (Levy et al., 2018).

Organizations also deal with a spectrum of financial burdens. In the US, the average length of stay (LOS) for septic patients is roughly 75% more than that of most medical conditions (Paoli et al., 2018). A strong correlation is revealed between increased severity of sepsis and increase in monetary spending (Paoli et al., 2018). Such findings highlight the importance of early detection and timely management. Since 2005, the Surviving Sepsis Campaign (SSC) has established widely recognized sepsis management guidelines, with great emphasis on sepsis bundle compliance (Levy et al., 2018). In 2015, the Centers for Medicare and Medicaid Services (CMS) based reimbursement on time-sensitive interventions, which entails that sepsis bundled care must meet 100% of the quality measures for reimbursement (Moore et al., 2019). The role of nurses and healthcare professionals serve a crucial role in preventing the condition of sepsis from worsening. Delaying sepsis treatment poses a threat to patient health outcomes and the associated organization's finances.

**Problem Description**

Hospital A is a 544-bed level II trauma facility located in the greater San Francisco Bay Area. Stakeholders of the organization have identified a recent influx in the rate of sepsis incidence within its ED, consisting of 44 treatment rooms. This quality improvement (QI) project examines present gaps and barriers to enhance early sepsis treatment and sepsis bundle compliance among ED registered nurses to address some priorities for Hospital A: reducing the risk of sepsis-related deaths and associated hospital length of stay.

**PICOT Question**

To understand the full extent of this QI project, guide the scope of required research, and evaluate the findings, a Patient, Intervention, Comparison, Outcome, and Time (PICOT) question was designed. The PICOT question is as follows: Does providing nursing staff support, accountability, and ongoing education enhance the timely implementation of sepsis bundle and compliance compared to current practices in the Emergency Department within four months?

**Rationale**

Jeff Hiatt's Awareness, Desire, Knowledge, Ability, and Reinforcement (ADKAR) Change Management Model guided the change in this microsystem. According to the model, these five sequential phases are necessary for change and guide how information is shared with the project's stakeholders (MindTools, n.d.). The first phase of awareness entails identifying and acknowledging there is a current problem and making all involved stakeholders knowledgeable about the need for change (MindTools, n.d.). Identified key stakeholders include the leadership team and ED registered nurses, among others. This discussion is not close-ended but rather encourages staff to express concerns or doubts, as they need to be addressed as early as possible within the following stage. The desire phase involves gaining support from the leadership team

by being transparent throughout this QI project, addressing questions, and identifying the importance of a sepsis champion. Next, in the knowledge phase, CNL students propose recommended interventions for the ED nursing staff to learn and gain the necessary knowledge to change the current practice in sepsis bundle protocol and compliance. Recommendations, guided by evidence-based practice and assessment of hospital A's ED include standardization and increased frequency of online education modules, providing hands-on simulations, refinement of intravenous (IV) placement skills via ultrasound training and additional resources, a badge reel card, or badge buddy, outlining Hospital A's sepsis policies and escalation process, conduct case reviews on near misses and revisions to the current charting system. The ability phase aid nursing staff in transitioning the recommended interventions into practice, which will be supported through more frequent online education modules already provided through Hospital A, additional IV training, and simulations. Lastly, the reinforcement phase ensures that the desired change is not abandoned nor reverted back to the older, undesired, methods (MindTools, n.d.). The ED charge nurse, sepsis champion, and leadership will observe, support, debrief and provide constructive criticism when needed to preserve the desired behavior.

### **Search Strategy**

A comprehensive literature review was conducted utilizing various practical databases, including: PubMed, MEDLINE, Scopus, and Cumulative Index to Nursing and Allied Health (CINAHL). In conducting research, inclusion criteria encompassed key terms such as: "sepsis," "septic shock," "SIRS," "ED," and "sepsis bundle compliance." The search was narrowed to peer-reviewed articles published within the last five years, 2018 to 2023, with few sources slightly beyond the time frame, to extract relevant evidence-based practice. With further analysis

and implementation of the John Hopkins Research Evidence Appraisal Tool, articles were graded based on levels of evidence from levels I to V (Dang et al., 2022).

### **Available Knowledge**

Examination, analysis, and interpretation of the collected literature, guided by the John Hopkins Research Evidence Appraisal Tool, established a foundation for this QI project (see Appendix B). The collected literature expresses a great emphasis on early sepsis recognition, sepsis bundle compliance, timely treatment, and fluid resuscitation efforts. Such findings support the recommended interventions suitable for Hospital A's ED.

As mentioned, the SSC bundle has been adopted internationally and continues to advance its evidence-based guidelines through new findings and supportive evidence (Levy et al., 2018). Through the campaign's contribution, patients with sepsis and septic shock have a greater chance of survival (Levy et al., 2018). Components of the SSC bundle have been combined into a one-hour and three-hour bundle, including obtaining lactate and blood cultures, administration of antibiotics, fluid resuscitation, and vasopressor therapy in the event of severe hypotension. Antibiotic administration is regarded as a strict high priority in reducing sepsis-related deaths; for every hour beyond the three-hour threshold, mortality rates for septic shock increase by 35% (Im et al., 2022). Failure to restore fluids and adequate perfusion results in a cascade of complications, such as organ failure (Levy et al., 2018). Standardization of timely sepsis bundle compliance is paramount in sepsis management.

A notable discovery is the knowledge gap that appears to be recurrent among healthcare professionals. Studies revealed that more than half of registered nurses and physicians report being unfamiliar with or lacking education on the signs and symptoms of severe sepsis (Gripp et al., 2021). Similar to the findings at Hospital A's ED, such findings are concerning as they are

detrimental to mitigating the severity of sepsis and positive health outcomes. Providing more frequent education and training shows to strengthen staff confidence and bundle compliance (Gripp et al., 2021).

Sepsis training, provided via simulation, has been shown to be more effective when analyzing nursing staff confidence and compliance, compared to tradition educational programs (Rababa et al., 2022). While many trainings are completed via independent online education modules, researchers found that integrative teaching with branching simulations improved nurses' attitude, knowledge, and decision-making in sepsis assessment and management (Rababa et al., 2022). Additionally, telesimulation has been shown to strengthen interdisciplinary communication and overall sepsis-related skills (Chua et al., 2022).

One identified barrier from the ED nursing staff, that has shown to be a common challenge, is IV placement for difficult vascular access patients. One study found that ultrasound-guided IV placement had a success rate of nearly 80%, whereas standard of care (SOC) palpation was 56% successful (Bahl et al., 2016). It was also found that placement times were longer for SOC IV than for the ultrasound technique (Bahl et al., 2016). In the event of treating septic patients, time is paramount and Hospital A, through the use of ultrasound-guided IV placement, can prevent the escalation of sepsis.

The acuity of care for sepsis can vary significantly. One study presents the average financial burdens within the US. In a single case, sepsis ranged from \$39,336 in septic patients without organ dysfunction, roughly \$60,672 in severe sepsis, and \$68,671 in cases of septic shock (Paoli et al. 2018). Such findings reveal that the LOS is related to sepsis severity. Nurses' role in detecting and managing sepsis promptly, before signs of organ failure, results in fewer

deaths and costs. While the majority of sepsis cases are deemed mild, the progression of sepsis is highly influenced by the organization's interdisciplinary team (Paoli et al., 2018).

### **Specific Project Aim**

This QI project aims to optimize the compliance rate of early sepsis bundle implementation within the ED of a level II adult trauma hospital in the greater San Francisco Bay Area (Hospital A). A pre-intervention questionnaire consisting of nine open-ended questions (see Appendix F) was distributed to the nursing staff to identify potential barriers to sepsis bundle compliance. This QI project aims to obtain a rate of sepsis bundle compliance and proper utilization of 60%, or greater. Proper sepsis bundle compliance is paramount to optimizing patient health outcomes, and is a leading contributor to hospital-associated deaths, as well as placing an overwhelming financial burden on healthcare organizations (Paoli et al., 2018). Through proper analysis, research, and evaluation, CNL students anticipate optimizing the existing sepsis bundle compliance rate and expect an increase in timely sepsis management, reduced LOS, mitigated sepsis-related mortality, and decreased readmission rates among this population at Hospital A.

### **Methods**

#### **Project Overview**

A group debriefing, consisting of Hospital A's key stakeholders and CNL students, provided some internal data from the ED which led to CNL students developing a PICOT question, a specific aim statement, and a pre-intervention questionnaire (see Appendix F). A comprehensive literature review on sepsis management and bundle compliance also proposed credible evidence-based practices, guiding recommended interventions that stakeholders may implement in their ED, as desired. The CNL students utilized various tools for this QI project, including the 5P's Assessment, a Plan Do Study Act (PDSA) cycle, a Root Cause Analysis

(RCA), a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis, and a Cost-Benefit Analysis (CBA). The 5P's Assessment tool aided in the microsystem assessment. A Plan, Do, Study, Act (PDSA) cycle identifies vital components of the entire QI project and tests the effectiveness of change (see Appendix C). A Root Cause Analysis (RCA) was conducted to identify contributing barriers to timely sepsis management (see Appendix D), and a SWOT Analysis (see Appendix E) revealed the current state in the ED. Potential savings for Hospital A are projected in a CBA (see Appendix G), and a timeline of the project and all its objectives are illustrated using a Gantt Chart (see Appendix H).

### **Microsystem Assessment**

CNL students assessed Hospital A's microsystem (ED) utilizing the 5P's Assessment tool, encompassing purpose, patients, professionals, process, and patterns. The purpose aims to optimize nursing staff sepsis bundle compliance and early sepsis management. If achieved, this will result in improved patient health outcomes, bridged knowledge gaps among staff, standardizing the nursing process for sepsis management, and progressive monetary gains for Hospital A. The patient population are the septic patients in the ED at Hospital A. It was noted and discussed that patients with certain comorbidities, resulting in fluid restrictions, would lead to cautious treatment and potential difficulties in sepsis care. This would include patients with end-stage renal disease (ESRD) and congestive heart failure (CHF). The professionals are the interdisciplinary team in sepsis management which involves registered nurses, respiratory therapists, physicians, phlebotomists, laboratory staff, respiratory therapists, and the rapid response team (RRT). The processes and duties of the team include a process in which screening is conducted for Systemic Inflammatory Response Syndrome (SIRS) and Sequential Organ Failure (SOF), proper electronic Cardiac Arrest Risk Triage (eCART) documentation, and sepsis

bundle compliance. Patterns identified in the ED include routine shift huddles, staff reporting, and charting in patients' electronic health records (EHR). Doing so enhances communication among the interdisciplinary team of professionals.

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

The PDSA cycle, a four-part change model, provides a cohesive method to identify, examine, and adapt to change (see Appendix C). The results of this QI project may then be analyzed and manipulated if the desired outcomes are not reached. In the first phase, the plan phase, CNL students developed a PICOT question and a specific aim statement to guide the QI project's objectives and desired outcomes.

The do phase consists of reviewing the current sepsis bundle and an evaluation of nurse compliance in the ED. The 5P's assessment tool led to the development of an RCA. Also, the organization's strengths, weaknesses, opportunities, and threats were explored and discussed. A pre-intervention questionnaire was administered to obtain a firm understanding of the current sepsis management and policies. The data served as a guide for evidence-based recommended interventions. These recommendations were then proposed to Hospital A's leadership team on December 4th, 2023, for final approval to pursue.

A review of the latest sepsis bundle compliance rate in Hospital A's ED and national evidence-based practices and benchmarks on sepsis bundle protocol in the ED was conducted in the study phase. Additionally, pre-intervention questionnaire responses were collected, categorized, analyzed for trends and interpreted by CNL students. The last phase, or the act phase, which consists of implementing evidence-based action plans, was not completed due to limited time. However, CNL students anticipate increased frequency of sepsis training, hands-on simulations, badge buddy cards, debriefings, and IV ultrasound-guided training. Continuous

observations may be conducted by stakeholders, and changes to the PDSA may be made as needed.

### **Root Cause Analysis (RCA)**

Key stakeholders of Hospital A informed CNL students of an observed problem with sepsis management in the ED, and the information sparked an inquiry to reveal potential causes. In conducting this RCA, a fishbone diagram was utilized as it aids in organizing root causes into general, broader categories (see Appendix D). Hospital A's ED has experienced a recent influx in sepsis cases correlated to a lack of compliant, early sepsis management. The RCA revealed four significant areas: people involved, materials or resources, policy and procedures, and monitoring. People, or lack of, consists greatly on the need for a respected sepsis champion in the ED. Previous sepsis champions were described by nursing staff to have an insignificant impact as the role was minimal. Notable factors in the materials or resources include the need for refined intravenous placement skills and the lack of resources for IV support. Other aspects include a lack of standardized sepsis training. The participants noted that educational modules are provided annually; however, the staff reported that some nurses were yet to complete any additional sepsis training.

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

To identify and examine the organization's current state of sepsis bundle compliance, a SWOT analysis was conducted in the ED at Hospital A (see Appendix E). Strengths, or notable hallmarks, identified include a readily available sepsis bundle. Nurses in the ED do have access to the organization's sepsis bundle and receive online module training annually. Furthermore, nurses have the ability to place standing orders when specific Systemic Inflammatory Response Syndrome (SIRS) criteria have been met. However, lack of collaboration and standardization

portrays certain aspects of the identified strengths as weaknesses. While Hospital A does provide a sepsis bundle, there is a need to standardize a comprehensive sepsis screening policy. Though online modules are available, annual training suggests, as noted by the ED registered nurses, that the current frequency is insufficient, while other nursing staff report not receiving any form of additional sepsis training at all. Other weaknesses include minimal use of a sepsis champion and lack of intravenous (IV) access training and resources, as nursing staff identified IV access as a barrier to timely implementation. Such factors aid in identifying opportunities in which the organization may prosper. Identified opportunities include enhanced skills and education among nursing staff, reduced length of stay, improved patient outcomes, mitigated financial burden, and increased sepsis bundle compliance. Threats to Hospital A, or obstacles, consist of time and costs for training nursing staff, unpredictable workflow, current charting, and staff reluctance to change.

### **Cost-Benefit Analysis (CBA)**

To evaluate and compare Hospital A's sepsis-related costs within the ED to the associated benefits of the recommended interventions, CNL students conducted a CBA (see Appendix G). Estimated costs for ultrasound-guided IV training are \$2,400 per individual (Vascular Wellness, n.d.). CNL students suggest having at least three nurses trained in three different shifts for a total cost of \$21,600. Sepsis badge reel cards, or badge buddies, cost around \$7 (Etsy, n.d.), and for 115 nurses in the ED roster, that multiplies to a total of \$805. As recommended, standardization and increased sepsis bundle training prove to be beneficial. Providing sepsis bundle training to all 115 nurses twice a year, with an average wage of \$90 an hour at Hospital A's ED, will cost \$41,400 annually. The estimated costs for year one's materials and labor add up to \$63,805. However, yearly costs for septic care and associated complications

for just fifteen patients average \$1,030,000 (Paoli et al., 2018). Thus, Hospital A can anticipate a net profit of \$966,695 in year one and \$988,600 in year two (see Appendix G).

### **Timeline**

A Gantt Chart is a time management tool that provides a visual aid in which the entire course of a project may be observed. For this QI project, a Gantt Chart was designed to cover and exhibit the timeline (see Appendix H). Objectives defined within the PDSA cycle were utilized, and a course was run from September 2023 to December 2023; the objectives may be pinpointed through the Gantt Chart.

### **Intervention**

The CNL students were unable to implement interventions due to time constraints. However, the proposed interventions were provided to key stakeholders at Hospital A for implementation, monitoring, and reevaluation. The responses from the pre-intervention questionnaire revealed barriers to sepsis bundle compliance and timely rollout, as well as proposed nursing staff suggestions. This questionnaire consisted of nine open-ended questions and guided CNL students to understand components of Hospital A and its ED's barriers to sepsis treatment, nursing staff suggestions, and frequency of training and follow-up debriefings. Printed copies were distributed to staff and QR codes, directed to Google Forms, were placed throughout the ED staff room.

Identifying the gap in the standardization of protocols, analyzing trends in nursing staff responses, and following evidence-based practice guidelines, CNL students provided recommendations so that stakeholders of Hospital A may further pursue and implement. These recommended interventions include standardization of, and increased frequency, of online sepsis module training, refinement of IV placement skills via ultrasound-guided technology, providing

hands-on simulations, providing feedback post-training, case reviews on near misses, establishing a comprehensive sepsis screening policy, design of badge buddies with visual aids that detail sepsis guidelines, and standardization of the escalation pathway.

Future steps for this QI project include implementation of the proposed recommendations, evaluation of the outcomes, and overall success of this project. Conducting a post-intervention survey would provide qualitative data, revealing the perceived change from the ED nursing staff. Stakeholders may compare the data to the specific aim statement once the data is collected and interpreted. If the desired outcomes are met, changed behaviors and interventions will be reinforced, whereas if outcomes fall short of the goal, the PDSA may be reexamined to aid in further tailoring the ED's barriers and needs.

### **Study of Interventions**

Following the implementation of recommended interventions, key stakeholders may evaluate their impact on increasing sepsis bundle compliance, reducing sepsis mortality, and mitigating the associated LOS. Additionally, a follow-up survey or post-intervention questionnaire may prove to be insightful, as did the pre-intervention questionnaire. This would provide data that may be interpreted, revealing how nursing staff compliance has changed, confidence in refined IV placement skills, having access to resources, and any new, unforeseen barriers.

### **Measures**

The pre-intervention questionnaire consisted of nine open-ended questions, with one question following up with asking the participant to place their responses in order. Responses to the question revealed a lack of standardization in sepsis protocol and the escalation process. Additionally, questions explored participants' recommendations for sepsis protocol

improvement, frequency of training, clarification on any debriefing, and protocol on doctor's orders. The questionnaires were available in hard copies, Google Forms, and QR codes. All responses were collected and documented anonymously.

### **Ethical Considerations**

This project is compliant with the federal guidelines for an evidence-based quality improvement project, rather than a research project, within a microsystem. However, it does not meet the institutional review board's (IRB's) approval criteria.

### **Results**

Hospital A's ED consists of 115 nurses, four of whom were unavailable for this QI project. CNL students received responses to the pre-intervention questionnaire from 41 ED nurses, or 35.7% of the entire ED roster. The results were insightful (see Appendix F: Figures 2 - 10); 42% of ED nursing staff respondents recommend protocol revision. Trends in staff recommendations include "more staff," "sepsis champion(s)," and "more education." Notably, 24.4% of nurses claim not to have attended any sepsis training with another 4.9% reporting rarely attending, despite the availability of the annual online module training. These findings align with the trend of requesting more education or increased frequency in training. When asked about any debriefing or follow-up to sepsis bundle noncompliance, 46.3% of nurses reported no debriefing or follow-up remedial training. However, some nurses did report some form of debriefing, but inconsistencies in responses highlights the discrepancy. Nurses claimed debriefing is conducted via: "email," "sepsis champion," "charge nurse," or "manager." Such findings exhibit a lack of standardization and collaboration. Another question, focusing on sepsis care prioritization, asked the ED nursing staff to list what they deemed essential for sepsis management within the first hour of diagnosis. It was revealed that 80.5% of nurses know the

importance of the sepsis timeline, and 20% prioritize labs and fluids over antibiotic administration. The participants identified barriers to timely sepsis implementation, including 27.4% identifying difficulty to IV access on “hard stick” patients and 15% claiming a shortage of available beds.

### **Discussion**

A recent surge in sepsis cases in the ED, identified by Hospital A, revealed a lack of standardization with sepsis bundle compliance. The research, extracted from the literature review, is consistent in that increased frequency of sepsis education and training increases overall sepsis bundle compliance. This QI project faced limitations, thus confining it to the pre-intervention questionnaire. Though the CNL students did not implement the proposed interventions, they are optimistic and anticipate Hospital A’s nurse leadership team implementing the recommended interventions and thoroughly evaluating the outcomes compared to the specific aim statement.

### **Limitations**

Limitations were present in various phases of this QI project. Of the 115 nurses working in the ED, 41 participated in this project for a 35.6% response rate. Thus, the sample size does not reflect the opinion of the majority of the nursing staff. While the vast majority of nursing staff could have been potential participants in the pre-intervention questionnaire, all nursing staff are responsible for being compliant with Hospital A’s sepsis policies and protocol, thus excluding insightful qualitative data. The CNL students made several trips to the ED in an effort to increase the nurses’ participation and response rate, contributing to time constraints. Additionally, the CNL students had difficulty accessing some of the internal data needed for this QI project.

**Summary**

Stakeholders of Hospital A discovered an increased incidence rate of septic patients in one of their microsystems, the ED. After being presented with the problem, observing leadership debriefings, and provided some internal statistics, CNL students developed a PICOT question. A thorough microsystem assessment was conducted on the ED using QI tools, such as the 5P's Assessment, a PDSA cycle, a SWOT analysis, a RCA, and a CBA. A change model, ADKAR, was also applied to identify the need for change and aid in revealing project objectives. While this QI project was limited to the pre-questionnaire stage, responses gathered from 41 ED nurses were enlightening. 42% of participating ED nursing staff expressed the need to revise the current sepsis bundle protocol. The data provided needed insight, revealing a lack of standardization and the need for increased frequency of sepsis training. Also, nursing staff reported facing various barriers when implementing sepsis care. The need for more education, training, and resources has the potential to optimize sepsis bundle compliance and timely implementation.

**Conclusion**

CNL students, working jointly with key stakeholders at Hospital A's ED, analyzed the recent problem of sepsis influx. Recommendations were identified and supported with evidence-based practice through observations, questionnaire responses, and evaluations. Optimizing sepsis bundle compliance at Hospital A's ED can be feasible through standardization of the escalation process and sepsis screening, increased training frequency, readily available IV resources, and badge buddy cards. Analysis of this QI project and the recommendations can be implemented to make a microsystem change within a healthcare organization to optimize timely sepsis bundle management and ultimately reduce sepsis-related hospital length of stay, financial burden, and mortality.

## References

- Bahl, A., Pandurangadu, A. V., Tucker, J., & Bagan, M. (2016). A randomized controlled trial assessing the use of ultrasound for nurse-performed IV placement in difficult access ED patients. *The American Journal of Emergency Medicine*, *34*(10), 1950–1954.  
<https://doi.org/10.1016/j.ajem.2016.06.098>
- Centers for Disease Control and Prevention. (2023, August 24). *What is sepsis?*  
<https://www.cdc.gov/sepsis/what-is-sepsis.html>
- Chua, W. L., Ooi, S. L., Chan, G. W. H., Lau, T. C., & Liaw, S. Y. (2022). The effect of a sepsis interprofessional education using virtual patient telesimulation on sepsis team care in clinical practice: Mixed methods study. *Journal of Medical Internet Research*, *24*(4), e35058. <https://doi.org/10.2196/35058>
- Dang, D., Dearholt, S., Bissett, K., Ascenzi, J., & Whalen, M. (2022). *Johns Hopkins evidence-based practice for nurses and healthcare professionals: Model and guidelines. (4th ed.)*. Sigma Theta Tau International.
- Etsy. (n.d.). *Sepsis badge buddy for nurses*. <https://www.etsy.com/listing/1337351753/sepsis-badge-buddy-for-nurses-in>
- Gripp L, Raffoul M, & Milner, K. A. (2021). Implementation of the surviving sepsis campaign one-hour bundle in a short stay unit: A quality improvement project. *Intensive & Critical Care Nursing*, *55*(1), 1-5. <https://doi:10.1016/j.iccn.2020.103004>
- Im, Y., Kang, D., Ko, R. E., Lee, Y. J., Lim, S. Y., Park, S., Na, S. J., Chung, C. R., Park, M. H., Oh, D. K., Lim, C. M., Suh, G. Y., & Korean Sepsis Alliance (KSA) investigators. (2022). Time-to-antibiotics and clinical outcomes in patients with sepsis and septic

- shock: A prospective nationwide multicenter cohort study. *Critical care (London, England)*, 26(1), 19. <https://doi.org/10.1186/s13054-021-03883-0>
- Levy, M. M., Evans, L. E., & Rhodes, A. (2018). The surviving sepsis campaign bundle. *Critical Care Medicine*, 46(6), 997–1000. <https://doi.org/10.1097/ccm.0000000000003119>
- MindTools. (n.d.) *The ADKAR change management model*.  
<https://www.mindtools.com/aou2mjr/the-adkar-change-management-model>
- Moore, W. R., Vermuelen, A., Taylor, R., Kihara, D., & Wahome, E. (2019). Improving 3-Hour sepsis bundled care outcomes: Implementation of a nurse-driven sepsis protocol in the emergency department. *Journal of Emergency Nursing*, 45(6), 690–698.  
<https://doi.org/10.1016/j.jen.2019.05.005>
- Paoli, C. J., Reynolds, M. A., Sinha, M., Gitlin, M., & Crouser, E. (2018). Epidemiology and costs of sepsis in the united states-an analysis based on timing of diagnosis and severity Level. *Critical care medicine*, 46(12), 1889–1897.  
<https://doi.org/10.1097/CCM.0000000000003342>
- Rababa, M., Bani-Hamad, D., & Hayajneh, A. A. (2022). The effectiveness of branching simulations in improving nurses' knowledge, attitudes, practice, and decision-making related to sepsis assessment and management. *Nurse Education Today*, 110, 105270.  
<https://doi.org/10.1016/j.nedt.2022.105270>
- Vascular Wellness. (n.d.). *Ultrasound guided PIV insertion training*.  
<https://www.vascularwellness.com/ultrasound-guided-piv-insertion-training/#:~:text=Course%20Fee%3A%20%242%2C400%20per%20participant,days%20available%20for%20additional%20fees>

**Appendix A**

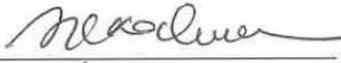
**Statement of Determination**

<p><b>Title of Project:</b></p> <p>Optimizing Sepsis Management Through Enhanced Protocol Compliance in the Emergency Department</p>
<p><b>Brief Description of Project:</b></p> <p>This quality improvement project aims to optimize early sepsis management and sepsis bundle compliance among Emergency Department registered nurses in order to reduce the risk of sepsis related deaths and associated hospital length of stays.</p>

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) 11/22/2023

Signature of Student  (date) 11/20/2023

## Appendix B

## Literature Synthesis Table

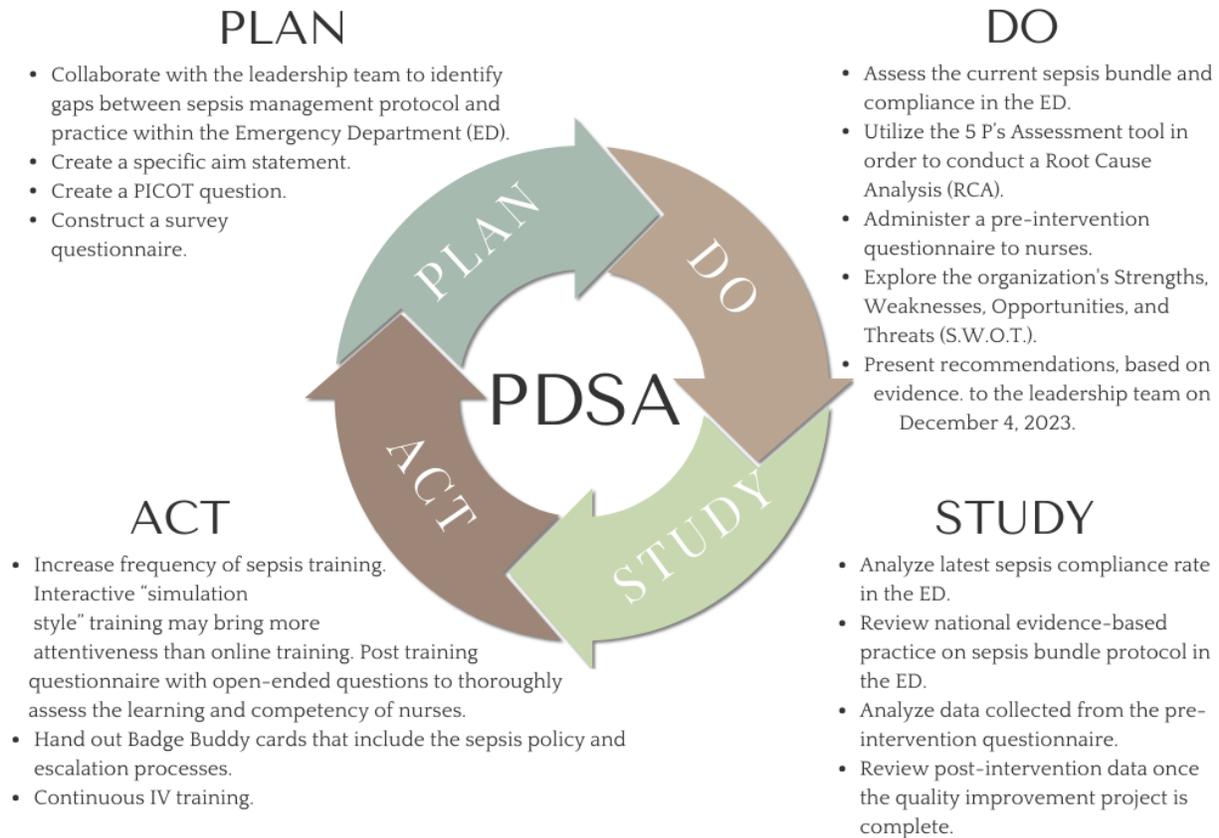
Literature Review Table				
Study Author(s)	Study Objective & Design	Sample & Setting	Results	Level of Evidence
Bahl, A., Pandurangadu, A. V., Tucker, J., & Bagan, M.	A randomized, prospective single-site study that aimed to compare ultrasound-guided (US) intravenous placement to standard (SOC) intravenous access, for patients with poor vascular access.	124 subjects; 63 were randomized to the US-guided arm, and 61 were randomized into the SOC arm; 2 patients were excluded, leaving 59 patients.	76% of US-guided arm IVs were successful compared to 56% of the SOC arm IVs. SOC IVs were also found to be more time consuming.	Level II (Dang et al., 2022)
Chua, W. L., Ooi, S. L., Chan, G. W. H., Lau, T. C., & Liaw, S. Y.	To Assess how interprofessional education on sepsis affects medical and nursing students' knowledge, communication, and clinical practice using a mixed method design	The sample involved over 400 undergraduate medical and nursing students from a university in Singapore.	Medical and nursing students showed improvement in sepsis knowledge and communication skills. However, only the nursing students continued to improve after two months, while the medical students showed no change.	Level III (Dang et al., 2022)
Gripp, L., Raffoul, M., & Milner, K. A.	Ten-month prospective quality improvement project aiming to improve sepsis care with implementation of the 2018 Surviving	32 septic patients from a 38-bed short stay unit within an 800-bed hospital.	Sepsis implementation tool was used and sepsis champions educated staff on early recognition, treatment, and management. 100%	Level V (Dang et al., 2022)

	Sepsis Campaign 1-hour bundle.		of patients' sepsis care was met with bundle compliance and timely treatment of 1 hour of diagnosis.	
Im, Y., Kang, D., Ko, R.-E., Lee, Y. J., Lim, S. Y., Park, S., Na, S. J., Chung, C. R., Park, M. H., Oh, D. K., Lim, C.-M., Suh, G. Y., Lim, C.-M., Hong, S.-B., Oh, D. K., Suh, G. Y., Jeon, K., Ko, R.-E., Cho, Y.-J., & Lee, Y. J.	Prospectively collected data from multicenter cohort.	Total of 3,035 patients from 19 different Emergency Departments.	Timely antibiotic administration, within an hour, showed to have improved patient health outcomes. Patients with delayed antibiotic administration, passed 3 hours, had an increased mortality rate of 35% per hour delayed.	Level II (Dang et al., 2022)
Levy, M. M., Evans, L. E., & Rhodes A.	Update of 2018 Surviving Sepsis Campaign guidelines.	N/A	Report of the 2018 Surviving Sepsis Campaign guidelines, highlighting key changes.	Level IV (Dang et al., 2022)
Moore, W. R., Vermuelen, A., Taylor, R., Kihara, D., & Wahome, E.	Quality improvement project	Within an Emergency Department	Sepsis compliance increased from 30% to 80%, also average length of stay decreased by 2.5 days	Level V (Dang et al., 2022)
Paoli, C. J., Reynolds, M. A., Sinha, M., Gitlin, M., & Crouser, E.	Retrospective observational study	Cohort of 2,566,689 septic adults at least 18 years old with a hospital discharge diagnosis of	Average mortality rate was 12.5%, but varied by severity (5.6%, 14.9%, and 34.2%) for sepsis without organ dysfunction, severe sepsis, and septic shock, respectively.	Level III (Dang et al., 2022)

		sepsis between January 1, 2010, and September 30, 2016.	Costs also increased by severity level: \$16,324, \$24,638, and \$38,298 and varied widely by sepsis present at admission (\$18,023) and not present at admission (\$51,022).	
Rababa, M., Bani Hamad, D., & Hayajneh, A. A.	Assess the effectiveness of branching simulations to improve sepsis assessment and management, as well as nursing processes, knowledge, attitudes, and decision-making. This was an experimental study	70 nurses with at least one year of experience working in an emergency room at a university hospital.	After the branching simulations intervention, nursing practices, decision-making, and knowledge showed significant improvement compared to the control group.	Level I (Dang et al., 2022).

## Appendix C

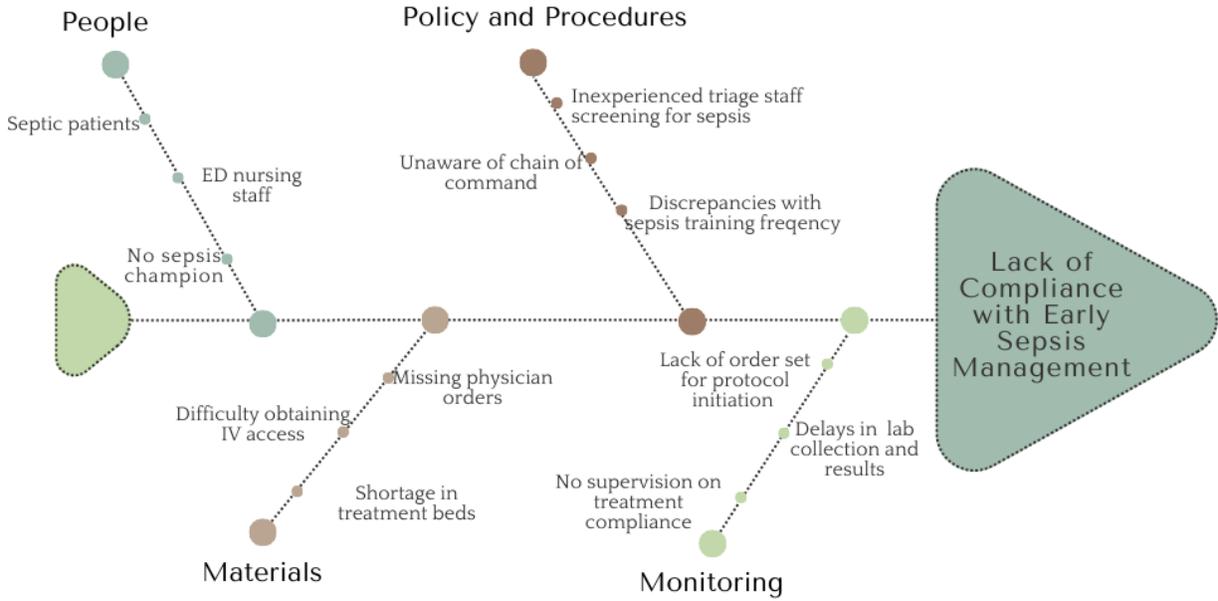
### Plan, Do, Study, Act (PDSA) Cycle

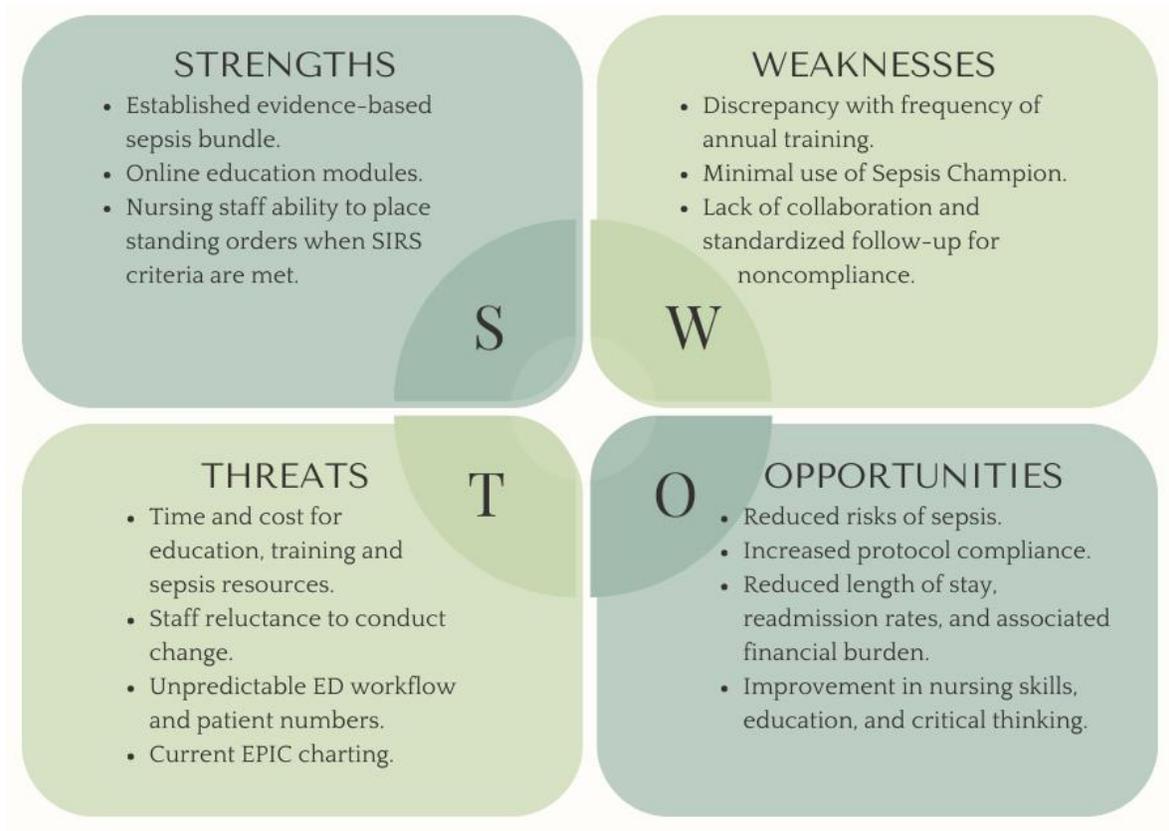


Appendix D

Root Cause Analysis

Root Cause Analysis: Fishbone Diagram



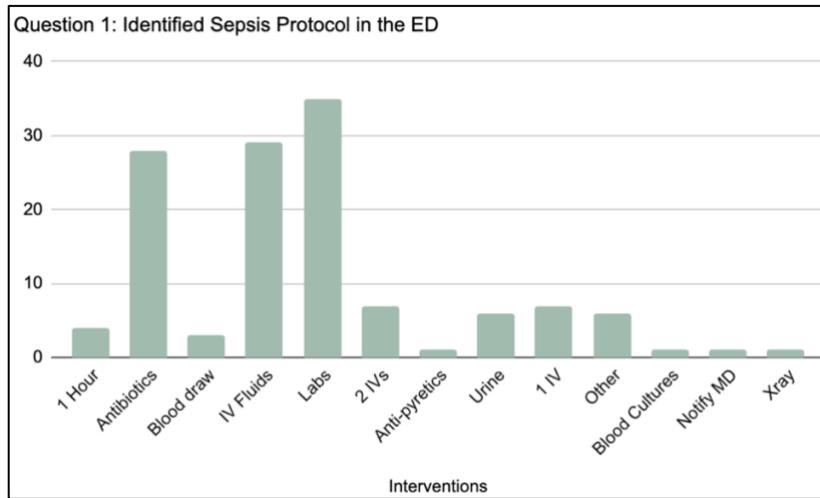
**Appendix E****Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis**

**Appendix F****Figure F1: Pre-Intervention Questionnaire**

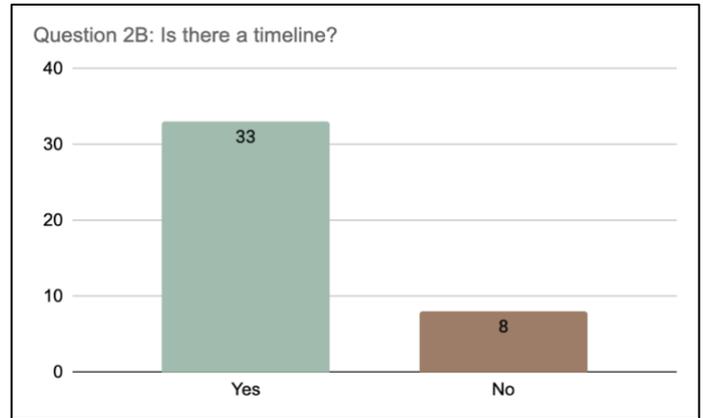
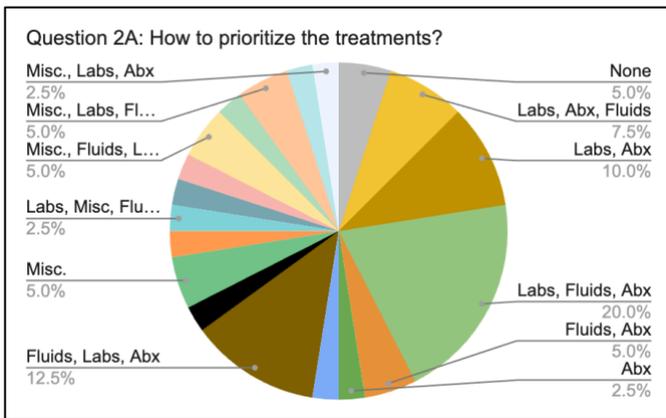
1. What is your protocol when treating a patient in the emergency room who is identified with sepsis?
2. How do you prioritize the treatments listed above? Is there a timeline?
3. What barriers prevent you from meeting sepsis bundle timelines?
4. What is your escalation process if you had questions or 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 order set before initiating the sepsis protocol?
9. What changes do you feel can be made to sepsis protocol in order to improve patient outcomes?

**Results: Figure F2 – F10**

**Figure F2**



**Figure F3**



**Legend:**

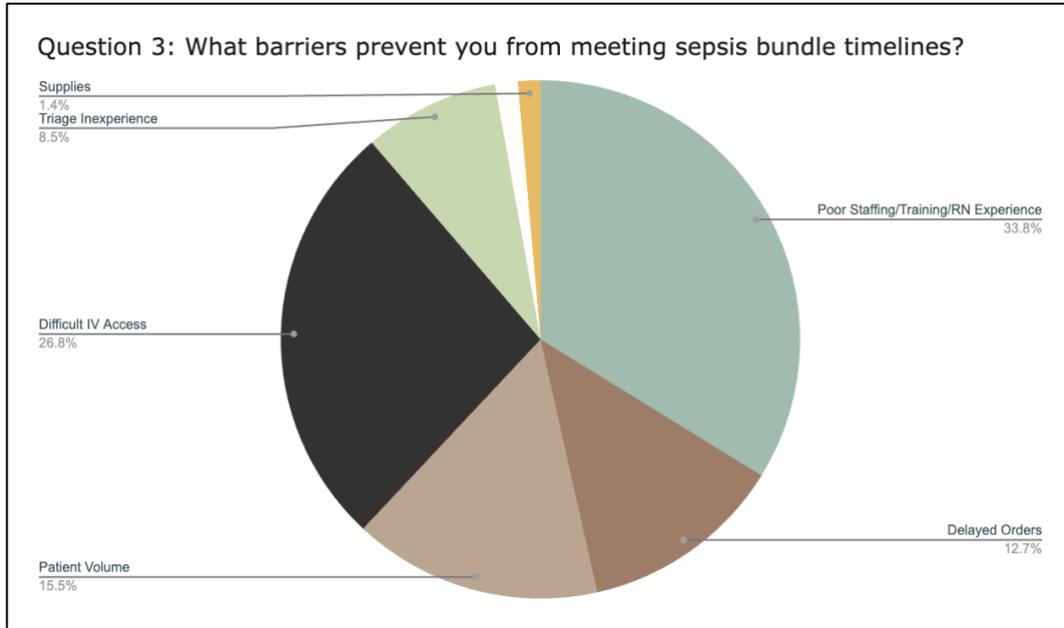
*Abx:* Antibiotics

*Fluids:* Includes IV Line

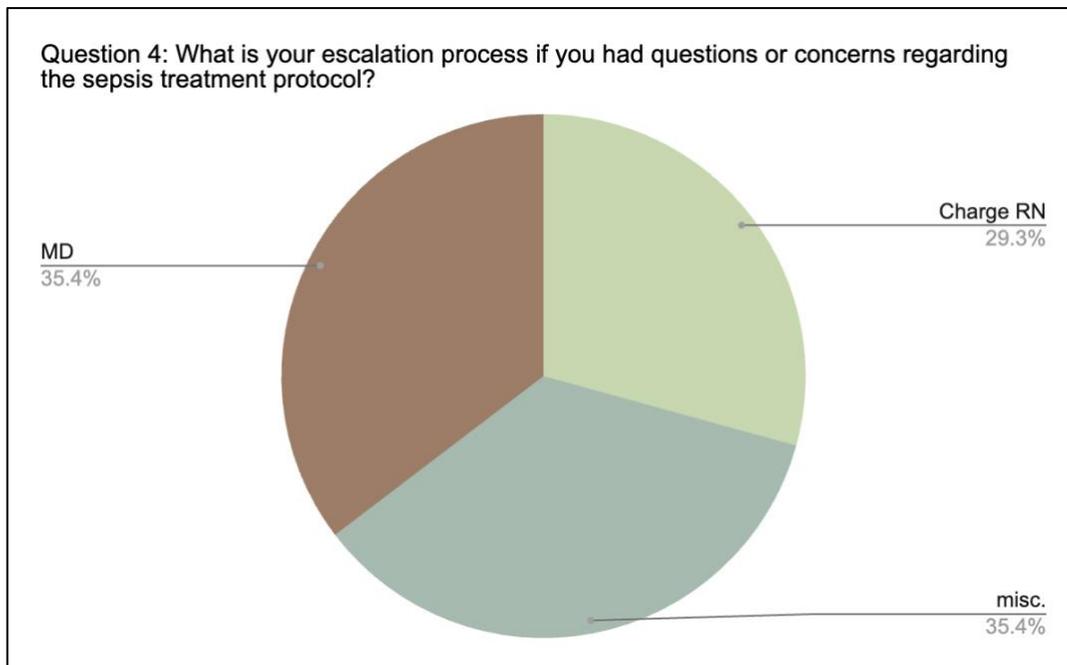
*Labs:* Lactate, Cultures, Urine, Bloodwork

*Miscellaneous:* Vital Signs, Golden Hour, Order set, Room, EKG, EXR, VBG, X-Ray, Nasal Swab

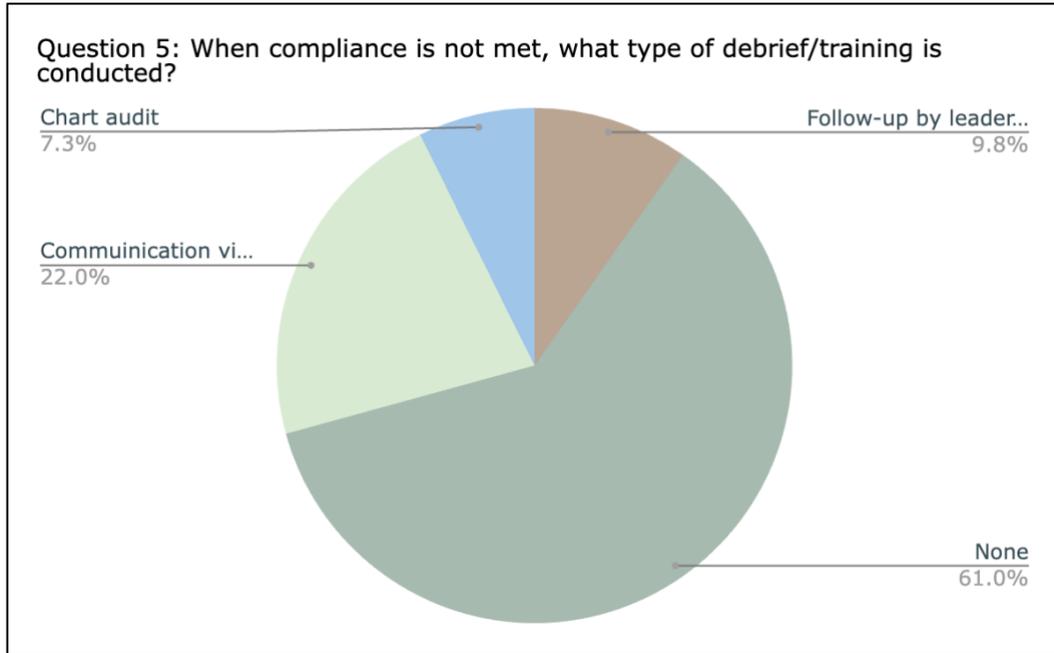
**Figure F4**



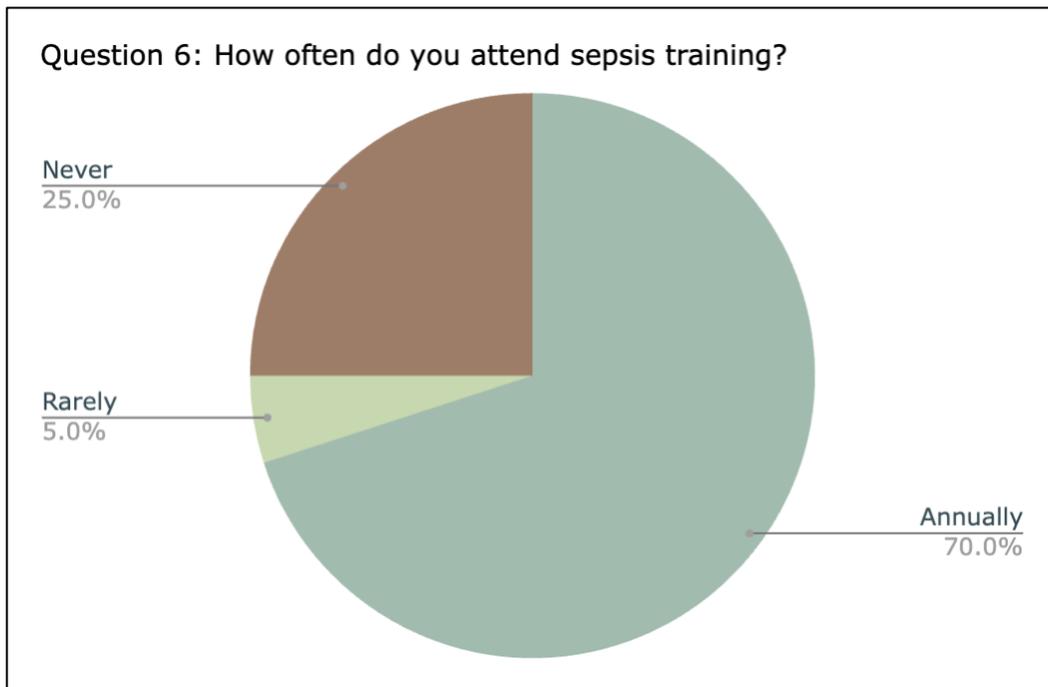
**Figure F5**



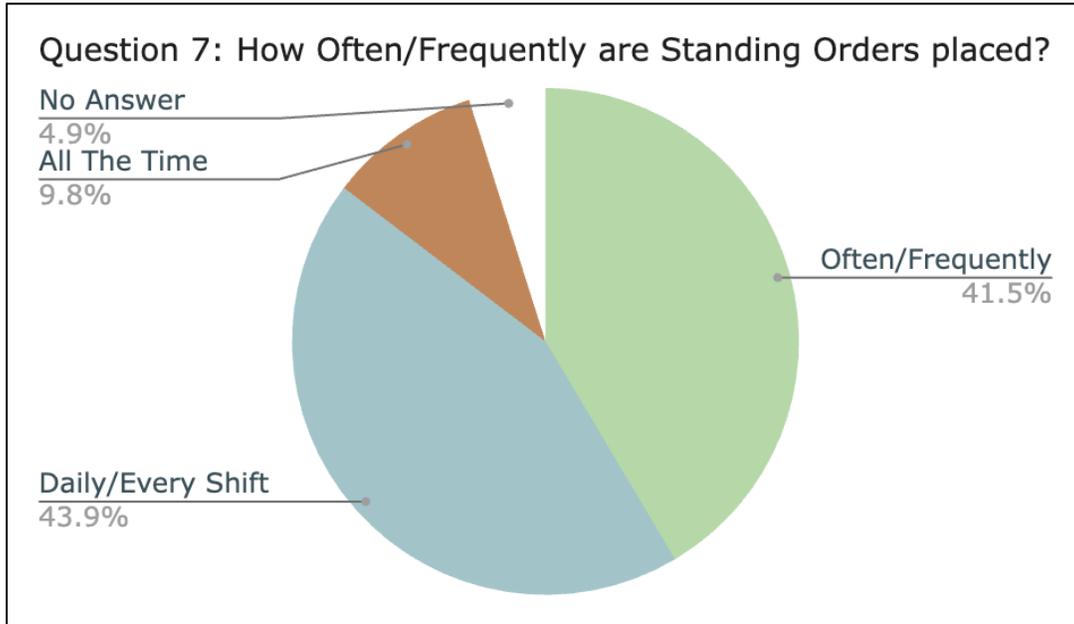
**Figure F6**



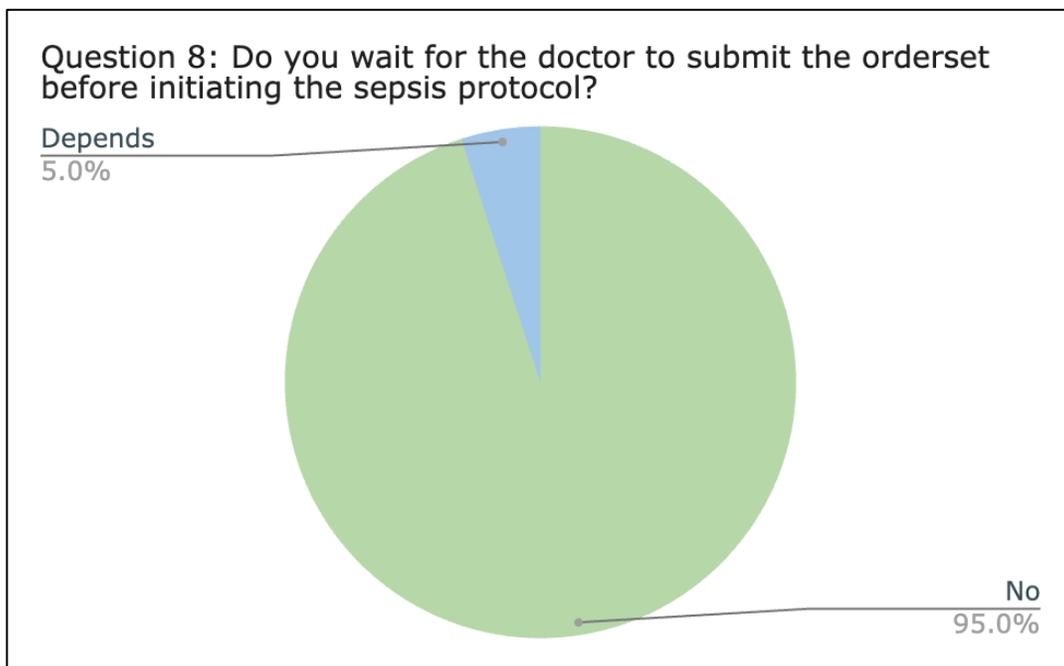
**Figure F7**



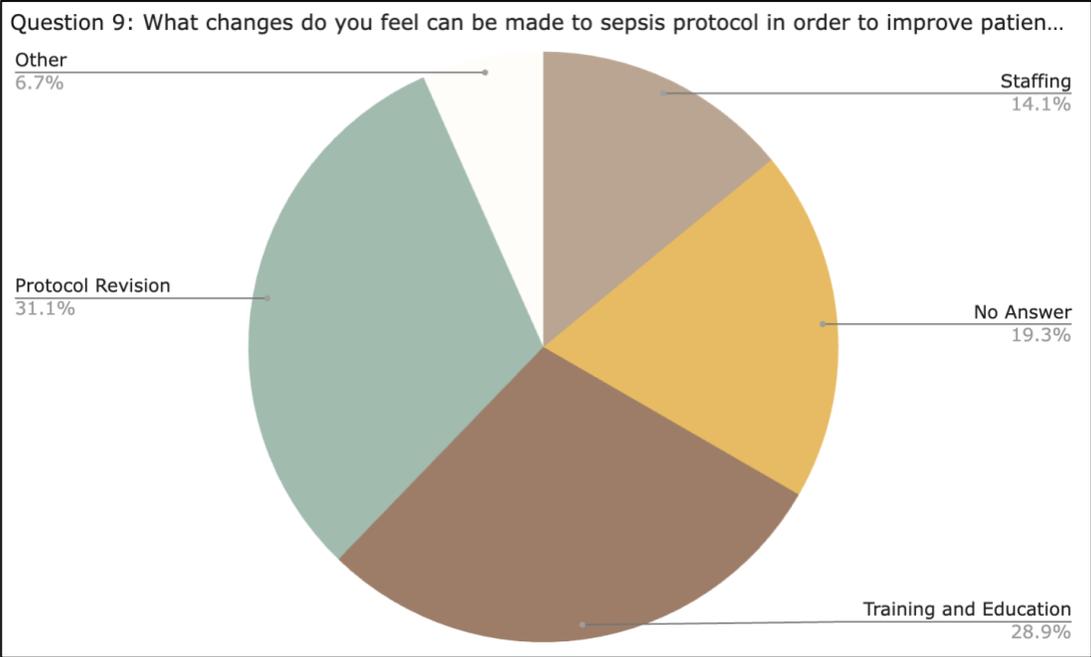
**Figure F8**



**Figure F9**



**Figure F10**



## Appendix G

## Cost-Benefit Analysis

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

Costs for Ultrasound Guided IV Training

**IV training:** \$2,400

**Train 3 RNs/shift:** 9 nurses

$\$2,400 \times 9 = \mathbf{\$21,600}$

Costs for Sepsis Badge Cards

**Price of cards:** \$7

**ED RN staff:** 115

$\$7 \times 115 = \mathbf{\$805/year}$

Costs for Sepsis Bundle Training (2x/year)

**ED RN wage at Hospital A:** \$90 x 2hrs of training = \$180

**Frequency 2x/year:** \$180 x 2 = \$360/year

**Staff:** 115 ED RNs

$\$360 \times 115 = \mathbf{\$41,400/year}$

Compared to average yearly costs of septic and related complications for 15 patients: **\$1,030,000 per year.**

