Closing the Gap: Improving Early Sepsis Management Compliance and Reducing Fallouts Through Nurse Education in the Emergency Department

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Closing the Gap: Improving Early Sepsis Management Compliance and Reducing Fallouts

Through Nurse Education in the Emergency Department

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Abstract

**Problem:** An emergency department (ED) has experienced inconsistency in achieving full compliance with elements of its ‘Sepsis in the ED Standard Work’. The project aims to increase initiation of the RN ‘Suspected Sepsis in Triage Standardized Procedures’ order set, utilization of the smart-phrase handoff tool, and Severe Sepsis and Septic Shock Management Bundle (SEP-1) bundle compliance.

**Context:** The project is implemented in a 38-bed emergency department that provides 24-hour care to patients facing emergent and life-threatening medical emergencies. The organization employs a sepsis coordinator who oversees sepsis response efforts. The project reveals several areas in which inconsistencies occur, such as nurse initiation of the order set as the first step in the sepsis triage protocol, and proper completion and documentation of bundle elements, specifically the repeat lactate and intravenous fluids.

**Intervention:** Education was delivered to ED nurses and sepsis educational materials, including a one-page handout and sepsis cards, were designed and distributed throughout the unit and at each computer workstation. The in-person education was delivered at ten shift change meetings, and the educational materials were developed by the team with input from the sepsis coordinator. A “sepsis corner” posted to the staff bulletin board also housed the educational materials as well as ED-specific benchmarks and additional information on how to access the order set and smart-phrase handoff in the electronic health record (EHR).

**Measures:** The primary outcome measure was overall RN ‘Suspected Sepsis in Triage Standardized Procedure’ order set usage in patient cases where a positive sepsis screen is determined. Secondary measures included the sepsis handoff smart-phrase usage among ED RNs and overall SEP-1 bundle compliance rate for the hospital.
**Results:** RN standardized procedure order set usage increased from 43% in January 2023 to 50% in April 2023. ED handoff smart-phrase usage increased from 0 uses in the month of January 2023 to 3 uses in the month of April 2023. SEP-1 bundle compliance for the entire hospital was measured at 71.4% in March prior to education but case extraction for the month of April was still incomplete. SEP-1 compliance is expected to rise after case extraction.

**Conclusions:** The project revealed that nurses at the clinical site are highly skilled and knowledgeable about early sepsis recognition, treatment, and components of the bundles. Therefore, the intervention focused on reinforcing the sepsis standard work, offering clarification on the order set protocols, and encouraging usage of smart-phrase to promote efficiency and continuity of care. Results demonstrate that elements of the project were successful in achieving improvement in two out of three outcome measures. The implementation of targeted education represents a low-cost, high-return model that can be applied to other microsystems that seek to further refine sepsis management response and help improve patient outcomes. The project serves as a first step toward addressing inconsistencies and closing some gaps within this clinical site’s sepsis response, and demonstrates that small actions can make meaningful change.
Closing the Gap: Improving Sepsis Protocol Adherence and Reducing Fallouts Through Nurse Education in the Emergency Department

Sepsis is a life-threatening condition caused by a dysregulated host response to infection that can lead to organ dysfunction and organ failure (Singer et al., 2016). Sepsis remains one of the leading causes of death in the United States, and one of the most expensive medical conditions to treat (Prest et al., 2022). In the emergency department, sepsis is a common presentation among patients. Evidence strongly supports early prevention, recognition and management of sepsis to save lives. It is estimated that each hour delay in treatment from the time of triage is associated with a 4%-9% increased risk of death (Rajan et al., 2020; Liu et al., 2017). As such, nurses play a pivotal role in recognizing early signs of sepsis and initiating next steps in the plan of care to promote the best possible patient outcomes.

Nurses are uniquely positioned to make the initial assessment of a patient and recognize signs that require timely intervention. The ‘Sepsis in the ED Standard Work’ protocol begins with a triage nurse identifying a patient through a positive sepsis screen, notification of the charge nurse, and initiation of the RN ‘Suspected Sepsis in Triage Standardized Procedures’ order set, followed by initiation of an ED “sepsis alert” (see Appendix A for the ED Sepsis Standard Work). Next, a team including the physician, primary registered nurse (RN), pharmacist, and ED tech convene in the room for evaluation and next steps. Upon evaluation, the medical doctor (MD) initiates the MD order set as appropriate.

In addition to the utilization of nurse order sets, the sepsis standard work includes completing elements of the Severe Sepsis and Septic Shock Management Bundle, also known as SEP-1, core measures. SEP-1 is an all-or-none performance measure instituted by the Centers for Medicare and Medicaid Services (CMS) that is currently widely used across healthcare
organizations. Elements of the 3-hour bundle include initial serum lactate, blood cultures prior to antibiotics administration, antibiotics administration, and intravenous fluids (IVF) administration. The 6-hour bundle includes the administration of vasopressors, a repeat lactate measurement, and a reassessment of fluid status.

The role of the nurse and physician to respond and care for a patient who screened positive for sepsis involves collaboration and communication, and patient health outcomes are directly influenced by the efficiency of the clinicians' sepsis response. Inconsistencies in elements of the sepsis standard work, such as order set usage or bundle element completion, can lead to delays in life-saving care. This project aims to address inconsistencies in sepsis protocols and improve adherence to the RN sepsis standard work through an evidence-based quality improvement initiative focusing on ED nurse education.

**Statement of the Problem**

An emergency department of a large not-for-profit hospital providing tertiary care to the greater San Francisco-Bay Area has experienced inconsistency in achieving full compliance with its sepsis standard work. The organization employs a sepsis coordinator who oversees its multihospital effort to improve compliance with SEP-1 core measures.

Timely initiation of the RN sepsis triage order set triggers subsequent steps of the standard work after a patient screens positive for sepsis. As one of the initial steps in the protocol, it promotes proper documentation of time-sensitive patient care needed by all members of the interdisciplinary team. Evidence shows that when a sepsis order set is not properly initiated, there is a significant increase in patient mortality versus when the order set is properly initiated (Goldszer et al., 2027). However, currently, RN sepsis order set usage is at 41% compliance.
In addition to order set usage, SEP-1 compliance is a relevant metric. Currently, the hospital’s compliance rate with SEP-1 core measures is 71.4% as of March 2023. When a component of the sepsis bundles is missed or performed late by a clinician, it is considered a case “fallout.” Root-cause analysis of sepsis fallouts conducted by the sepsis coordinator shows that the majority of fallouts in the subject hospital are due to improper documentation of intravenous fluids or missing the repeat lactate within the required timeframe, which is to be completed as part of the 6-hour bundle. While a relatively low percentage of fallouts occur each month at this hospital, the project focuses on room for improvement in compliance with the various elements of the RN sepsis standard work.

Assessment data for this project revealed that the nursing staff are extremely competent in identifying signs of early sepsis and knowledgeable about the various SEP-1 bundle elements. However, inconsistencies in adherence to the sepsis standard work persist. The project will explore these inconsistencies and aims to address them through evidence-based interventions.

Available Knowledge

**PICO Question**

Upon conducting a literature search and data analysis on nurse compliance with sepsis bundles in the emergency department, the following question was posed: Among emergency department nurses treating patients with/at risk for sepsis (P), how does nurse/peer-driven education (I), compared to no intervention (C), affect overall compliance with sepsis bundle protocols (O)?

**Literature Review**

A comprehensive literature search was conducted using the following databases: CINAHL, PubMed, and Scopus. Keywords used for the literature search included *nurse, sepsis,*
bundle, protocol, education, training, compliance, adherence, and triage. Articles were limited to English-only and published no earlier than 2017. Based on relevance to the proposed PICO question, 11 peer-reviewed articles were selected for a literature synthesis and review. See Appendix B for the evidence evaluation table.

Existing literature strongly supports early sepsis recognition as a way to improve patient outcomes in the hospital setting. Recent data also supports implementation of educational interventions to achieve improved compliance with sepsis protocols, including sepsis bundles and order sets. The studies most relevant to this initiative include level II studies according to the Johns Hopkins Nursing Evidence-Based Practice Research Evidence Appraisal tool (Dang & Dearholt, 2018).

In a retrospective chart review study, Goldzer et al. (2017) determined that the use of a disease-specific alert and order set in the EHR led to a progressive decrease in mortality for patients diagnosed with sepsis, compared to patients who did not have the order set used by the physician. Although the study focuses on physician order set usage, findings support efforts to encourage order set usage among nurses with the goal of reducing fallouts and improving patient outcomes.

Several recent studies also discuss educational interventions to improve nurse compliance with sepsis protocols in the emergency setting. A study by Leon et al. (2018) demonstrated that implementation of sepsis cards on all workstation computers and daily email correspondence with “sepsis facts” significantly improved sepsis bundle compliance rates. Similarly, Delawder et al. (2020) showed significant improvement in adherence to obtaining the repeat lactate bundle element within the required timeframe per protocol after implementing education via electronic
communication, in-services, and quick tip sheets. Both studies suggest that small and simple interventions to improve awareness and increase nurse knowledge can yield meaningful results.

Evidence further suggests that nurse-driven staff education can be successful as an intervention to improve early sepsis management. A study by Laux et al. (2022) concluded that an ED pilot program that delivered education via PowerPoint presentations, key elements emphasized at morning and evening huddles, and collection of nurse feedback resulted in an increase in core measure compliance. Chimielewski et al. (2019) found that staff education, daily reports that listed bundle fallouts, and weekly compliance statistics provided by a sepsis “floor champion” were received well by peers. This led to increased compliance of the lactate measurement, blood cultures drawn before antibiotics, and antibiotic administration within the 3-hour bundle (Chimielewski et al., 2019). Both studies suggest that peer-driven education can improve awareness and management of sepsis in the ED.

Other forms of education have proven successful in improving knowledge and compliance. In a 2020 study, Rajan et al. concluded that fifteen-minute sessions of structured education about order set usage decreased the mean time to identify sepsis by 33 minutes. Additionally, studies by Ramsdell et al. (2017) and Warstadt et al. (2022) found that the implementation of staff training and education, and optimization of EHR tools helped increase SEP-1 bundle measures. These studies suggest that an educational approach can be successful in changing nurse behavior, thus improving compliance with protocols.

Finally, a retrospective population-based study by Khowaja et al. (2022) in British Columbia implemented clinical education to reduce sepsis occurrence and mortality. A return on investment analysis determined that an estimated 981 sepsis cases and 172 deaths were averted in a four-year period, leading to a return of $112.50 for every dollar invested (Khowaja et al.,
in 2022). These findings further strengthen the argument for quality improvement initiatives that improve early management and recognition of sepsis in the hospital setting.

The body of evidence reveals that targeted education, including in-person training, educational materials such as sepsis cards, and use of a floor champion can positively impact the sepsis triage process and improve adherence to the hospital’s sepsis protocols. Specifically, improving order set usage and the time-sensitivity of bundle elements can lead to better patient outcomes. While literature exists supporting the use of education as an intervention, there remains a need for more literature that discusses specific educational methods and material that can be used to improve these outcomes.

**Rationale**

John Kotter’s model for creating major change serves as the conceptual framework that will guide this quality improvement initiative. Kotter’s eight-stage process aims to address fundamental errors that can undermine transformation efforts within an organization (Kotter, 2012). This framework was selected because it provides a step-by-step blueprint for preparing for change and empowering action in a sustainable way.

Elements of this framework include: (1) establishing a sense of urgency; (2) creating the guiding coalition; (3) developing a vision and strategy; (4) communicating the change vision; (5) empowering broad-based action; (6) generating short-term wins; (7) consolidating gains and producing more change; and (8) anchoring new approaches in the culture (Kotter, 2012). The first steps in the process are aimed at understanding the current opportunities and working as a team to build a vision that will drive the change. The next several steps are aimed at removing obstacles and introducing new practices. And finally, the eighth step focuses on grounding the changes into the microsystem’s culture as the new status quo (Kotter, 2012).
Specific Project Aim

The specific aim of this quality improvement project is to increase RN usage of the ‘Suspected Sepsis in Triage Standardized Procedure’ order set by 10%, increase awareness and usage of the sepsis handoff smart phrase by 10%, and increase overall compliance with the standardized SEP-1 bundle protocol by 10% and by May 1, 2023. By delivering education to increase compliance with sepsis triage protocols, additional expected outcomes can include improved continuity of care among healthcare team members, a decrease in core measure fallouts, a reduction in sepsis-related hospital mortality rates, improved health outcomes in patients with sepsis and septic shock, and a reduction in healthcare costs associated with decreased length of patient stay.
Section III: Methodology

Context

The Plan-Do-Study-Act (PDSA) cycle provides an organized method for implementing, testing, and studying the impacts of a change. The “Plan” phase involves obtaining and understanding the context of the microsystem needed to design subsequent steps and methods for testing the intervention. A microsystem assessment, strengths, weaknesses, opportunities and threats (SWOT) analysis, and root-cause analysis were conducted to obtain context for the intervention plan. Approximately 135 combined hours were spent in person to conduct observations and conversations with key stakeholders and frontline ED staff. The assessment data and observations were used to determine the microsystem’s existing strengths as well as potential gaps in practice and possible root causes. Both the PDSA cycle and project timeline can be referenced in Appendices C and D, respectively.

Microsystem Assessment

A clinical microsystem assessment was conducted as an early step to identify areas for improvement utilizing the Dartmouth Institute “Microsystem Self-Assessment, Diagnosis and Treatment Plan” workbook as a guide. The workbook tool assesses six key areas (purpose, patients, professionals, processes, patterns, and metrics that matter) to build common knowledge and insight into the microsystem (Trustees of Dartmouth College, 2001).

The hospital’s 38-bed emergency department provides 24-hour care to patients facing emergent and life-threatening medical emergencies, regardless of insurance or financial status. The purpose of the ED is to quickly triage, diagnose, and treat or refer patients to the next line of care through focused assessments, diagnostic workups, and collaboration with the healthcare team. The patient population includes adult and pediatric patients from communities within the
greater San Francisco-Bay area. Patients who receive care from the ED represent diverse racial and ethnic backgrounds and span across socioeconomic status. Patients received care for a variety of emergent and acute health conditions and comorbidities. Patients who lack access to primary healthcare services, such as those who are uninsured or face housing insecurity, may visit the ED for their non-emergent health needs.

To serve the needs of its patient population, the department utilizes a comprehensive healthcare team consisting of registered nurses, ED technicians, physicians, social workers, security personnel, environmental services staff, and unit clerks. Leadership includes the interim manager and the director of nursing. Additionally, the organization’s sepsis coordinator oversees and monitors sepsis protocol compliance of all units at the hospital, including the ED. For the purpose of this quality improvement initiative, the intervention focuses on the unit’s staff of 30 registered nurses and their workflow in the ED.

The ED utilizes processes to conduct all aspects of patient care delivery, from triage to discharge. To quickly and efficiently respond to patients with medical emergencies, processes in the ED are streamlined, continuously measured by the organization, and driven by evidence-based practice. This project focuses on the process by which registered nurses screen a patient for sepsis and initiate the positive/suspected sepsis screen protocol, which triggers the first step of the SEP-1 bundle protocol. The SEP-1 protocol serves as a guideline treatment for patients diagnosed with either severe sepsis or septic shock, which includes both 3- and 6-hour bundle elements to achieve adequate perfusion of vital organs and maintain hemodynamic stability (Whitfield et al., 2020).

Compliance rates among staff triage order set usage, handoff smart-phrase usage, and SEP-1 bundle elements among nurses are patterns relevant to this initiative. Patterns also include
the broader ED sepsis standard work that involves all members of the interdisciplinary ED team. Historically, the organization’s sepsis coordinator is responsible for monitoring department-wide and hospital-wide trends while helping inform ED staff of strengths and opportunities for improvement.

**SWOT Analysis**

To assess internal and external factors that may impact the success of the proposed initiative, the team conducted a SWOT analysis (see Appendix E). Key strengths of the microsystem include existing support and buy-in of the organization staff to improve awareness and compliance with sepsis bundle protocols and the existence of a sepsis coordinator to reinforce these efforts. The microsystem also maintains the existing infrastructure and electronic health record tools necessary for this project. Weaknesses include the fast-paced, challenging work environment that may allow for room for error, as well as a potential disconnect between the work and goals of the organization’s sepsis task force and frontline ED staff, which can lead to lack of staff awareness and understanding of the project’s relevance. Additionally, the ED physician workflow may not always follow the standard of work (i.e. RNs may wait to initiate the order set per MD instructions), and nurses may not feel like they can speak up to the ED physician regarding following the proper steps of the protocol.

Opportunities include potential funding sources that rely on specific patient safety core measures and benchmarks, as well as the opportunity to demonstrate a commitment to a culture of excellence, safety, and evidence-based practice. Finally, external threats to the organization could include changes to healthcare policy that may change how hospitals deliver sepsis care, or rising costs that make it more difficult to hire and train nurses which can lead to further inconsistency and gaps in staff training to achieve core measures.
**Root-Cause Analysis**

To explore possible root causes of inconsistency in adherence to the sepsis standard work resulting in sepsis fallouts, qualitative data was obtained from a combination of the organization’s monthly sepsis task force meetings, the sepsis coordinator, and in-person observation and discussion with RNs. These sources revealed possible causes, including: environmental factors like workload, high census and acuity, and fast-paced environment; organizational factors such as lack of consistent triage training for new/traveling staff, and disconnect between sepsis task force and frontline ED staff; staff factors such as lack of awareness of ED standard work protocol or uncertainty of when to drop the initial order set; patient factors such as lack of venous access or patients screening positive for sepsis due to other underlying causes; and factors involving methods and equipment such as lack of RN desire to use the handoff smart-phrase in the EHR or the need for a more effective EHR alert to remind RNs about the second lactate. See the fishbone diagram in Appendix F.

**Return on Investment**

The cost of sepsis management in United States hospitals ranks highest among admissions for all other diseases (Paoli, et al., 2018). It was estimated in the 2022 study by Khowaja et al. that hospitals saved approximately $49,000 per sepsis case and $18,000 per sepsis death averted. For the purpose of this project, the average hourly wage for a registered nurse or Clinical Nurse Leader (CNL) is $75.00 per hour. The Bureau of Labor Standards (2023) estimates that employee benefits account for approximately 31% of an employee’s wages.

Using these values, a cost-benefit analysis was conducted to compare cost of investment in monthly staff education with cost associated with care for a patient with sepsis. The cost of ten educational sessions per month during shift change huddles for a duration of ten minutes each,
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plus an estimated additional five hours of preparation or resource delivery equates to $7860 per year. Cost savings of averting just a single case per month equates to $588,000 in hospital savings per year. The return on investment (ROI) in this case is $48,345 per month, or $580,140 per year. This strengthens the cause for implementing small, lower-cost educational interventions that can lead to significant cost savings, long term.

**Intervention**

The intervention studied for this project was the delivery of education directed toward ED triage nurses responsible for screening patients for sepsis. The team implemented peer-to-peer education sessions, sepsis cards, and handouts to disseminate information about the bundle elements and protocol, which are all methods supported in literature. The team designed the handout and sepsis card as a tool for education delivery and obtained final approval from hospital leadership.

Specifically, the education was aimed at improving compliance with ‘Sepsis in the ED Standard Work’ to reduce fallouts by addressing three goals: 1) increasing RN usage of the ‘Suspected Sepsis in Triage Standardized Procedure’ order set, 2) increasing usage of the sepsis handoff smart-phrase to improve continuity of care and reduce the likelihood of forgetting bundle elements throughout a patient’s hospital stay, and 3) improving SEP-1 bundle compliance, with special attention on the second lactate and IV fluid bolus administration and documentation.

Over the course of two weeks and ten shift changes, the team educated approximately 12 registered nurses per huddle (which included some overlap among staff) on the appropriate use of the triage order set, use of the handoff smart-phrase, and 3- and 6-hour bundle elements. The team distributed handouts throughout the unit and posted sepsis cards on each computer
workstation (see Appendices G and H). The presentation to nursing staff focused on educating nurses about their role in early sepsis recognition, effective handoff and transfer of patients, and proper EPIC documentation, while the laminated sepsis cards posted to workstations served as a reminder of each element of the 3- and 6-hour bundles. Additionally, the team obtained permission from management to design and post a “sepsis corner” on the staff bulletin board. The poster provided a dedicated space for the educational materials, specific microsystem metrics to help nurses understand big-picture sepsis goals, and instructions on how to access the order set and smart-phrase nursing note in EPIC. Furthermore, in-person education allowed for questions and instant feedback regarding the materials.

Finally, the team delivered electronic versions of all educational materials to the ED manager to be sent out to the ED nursing staff. The sepsis corner and delivery of electronic materials to staff served as an opportunity to reach any nurses who may have been missed during the ten in-person educational sessions during shift change.

**Study of the Intervention**

The “Study” phase of the PDSA cycle guides the testing and studying of a process change. To study the intervention, the team requested and analyzed microsystem-specific EHR indicators requested from the organization as well as pre- and post-intervention survey responses. A pre-intervention survey was designed and conducted to obtain data for the microsystem assessment as well as provide a baseline for measurement of the effect of the education on overall sepsis order set usage and bundle compliance within a one-month time frame. A post-intervention survey was conducted to compare to pre-intervention responses. The team attended the shift-change huddle meetings to provide pre- and post-intervention surveys in both QR code and hard copy form (see Appendix I).
Measures

The primary outcome measure was RN sepsis order set usage. Order set usage was selected as the primary measure because use of the RN sepsis order set plays an important role in initiating the sepsis bundle protocols and allowing subsequent steps in the sepsis standard work to unfold. Secondary measures included the sepsis handoff smart-phrase usage among ED RNs and overall SEP-1 bundle compliance rate for the hospital. It is important to note SEP-1 compliance represents overall hospital compliance and is not specific to RNs or the ED. However, the team chose to include this measure as it still provides insight into the overall performance related to sepsis bundle adherence and can be extracted by leadership to understand possible causes for case fallouts that occur. The team expects that the educational intervention will result in an increase in all three measures.

Additionally, the pre- and post-surveys captured helpful data including familiarity with the sepsis bundle elements and their required timeframes for completion, awareness and usage of the nurse handoff smart-phrase, and level of education or training received regarding organization-specific protocols in the ED. Although these were not used as primary or secondary data points for the purpose of measuring the change, they provided additional data that can be considered when developing recommendations for next steps.

The PDSA cycle guided each stage of the implementation process and was utilized to test the effectiveness of the intervention. Upon obtaining various data points and RN survey responses, results were compared to the team’s predicted results as well as pre-intervention baseline data. The project timeline allowed for one PDSA cycle, which serves as the first of additional cycles that can be conducted to tweak the intervention and data collection methods.

Ethical Considerations
The American Nurses Association (ANA) Code of Ethics for Nurses with Interpretive Statements establishes an ethical standard for the nursing profession and serves as a guide for ethical decision-making in quality improvement processes (ANA, 2015). Provision 3 aligns with this project's objectives, stating that nurses are responsible for the development, implementation, and review of and adherence to policies that promote patient health and safety, reduce errors and waste, and establish and sustain a culture of safety (ANA, 2015). As such, nurses have an ethical responsibility to study and identify causes of fallouts, which can include failure to adhere to protocols and standards of work, and determine ways to prevent future errors. Additionally, provision 4 states that nurses are responsible and accountable for the quality of their practice, such as care coordination, evaluation of interventions, and other responsibilities such as teaching, research, and administration (ANA, 2015). Specifically, the project is driven by the ethical obligation to improve patient safety and quality of care through evidence-based research and education of nursing professionals.

This project has been approved as a quality improvement project by faculty using QI review guidelines and does not require IRB approval.
Section IV: Results

The intervention to improve nurse knowledge of and compliance with the order sets and sepsis protocols in the ED demonstrated some success. Since the project began, several key indicators improved. RN standardized procedure order set usage increased from 43% in January 2023 to 50% in April 2023. It is reasonable to expect order set usage to continue to rise in subsequent months as a result of order set usage clarification among triage nurses. Next, ED handoff smart-phrase usage increased from 0 uses in the month of January 2023 to 3 uses in the month of April 2023, representing significant success. Finally, SEP-1 bundle compliance for the entire hospital was measured at 71.4% in March prior to education, but incomplete case extraction for the month of April prevents analysis of final results at the conclusion of the project. However, it can be reasonably expected for final SEP-1 compliance to increase after case extraction. It is important to note that SEP-1 compliance rates represent overall hospital compliance and are not specific to the microsystem or ED nursing staff.

The pre- and post-survey results also demonstrate progress in other areas. Pre-survey participants included 22 ED nurses, 13 staff nurses (59.1%), and 9 travel nurses (40.9%). Post-survey participants included 23 nurses, 17 staff nurses (73.9%), and 6 travel nurses (26.1%). Of survey participants, a slight improvement was seen in awareness of the smart-phrase which increased from 52.4% to 56.5%. However, only 7 respondents (30.4%) reported that they often or sometimes use the smart-phrase, compared to a pre-survey response of 7 nurses (31.8%), demonstrating a slight negative change. Additionally, a post-survey question asked respondents whether they believed the education initiative (including education at huddles, sepsis handouts, and sepsis cards) increased available information on the unit that could, in turn, help promote protocol adherence. Of 23 respondents, 22 nurses (95.7%) said yes.
The survey also captured qualitative responses to help the team continue to explore barriers that may prevent nurses from utilizing RN ‘Suspected Sepsis in Triage Procedures’ order set. Of 23 respondents, 7 nurses (30.4%) stated that ED providers prefer to place the first order set in a case of sepsis; 7 nurses (30.4%) stated that a barrier to placing the order set is due to low suspicion of a patient actually being at risk for sepsis despite a positive sepsis screen; 1 nurse (4.3%) reported a barrier due to believing that initiating the order set is out of their scope of practice; and 5 respondents (21.7%) felt that there is a need for more education and clarification on when to drop the order set.

The pre- and post-survey responses yielded additional qualitative data that can be used to adjust implementation in future PDSA cycles. In response to a post-survey question about additional interventions or actions to improve compliance with the bundles and ED standard work, nurses asked for additional education on the handoff smart-phrase and why nurses should be using it. Another participant recommended a pop-up notification in the EHR upon a positive sepsis screen that immediately prompts initiation of the nurse order set. These suggestions, along with the other survey results will be synthesized and presented to the sepsis coordinator as recommendations and considerations for next steps.
Section V: Discussion

Summary

The quality improvement process revealed that an evidence-based educational intervention can have positive impacts on adherence to sepsis protocols within the emergency department. While not every objective was met, the team saw an increase in both the order set usage and smart-phrase usage during the month of intervention. Although the SEP-1 compliance rate was unable to be analyzed, the team realized this indicator was less directly useful than the order set and smart-phrase usage metrics to change.

Key Findings

Early recognition and management of sepsis is a complex process that requires risk anticipation, clinical skill, and critical thinking. Improving adherence to sepsis protocols in the ED is dependent upon a multitude of processes and actions of different team members, therefore understanding gaps in care delivery requires a thorough look at all involved. The project revealed that the nursing staff is highly skilled and knowledgeable about early sepsis recognition, treatment, and components of the bundles. The project also revealed that physicians, like nurses, initiate their own order set upon identification of a positive sepsis screen. It was discovered that one reason for inconsistencies in RN order set usage was due to an inconsistent understanding of who drops the first order set and when it is initiated. Therefore, the intervention focused on ensuring that the sepsis standard work was followed, offering clarification on the order set protocols, and encouraging usage of the handoff smart-phrase to promote efficiency and continuity of care.

The project also revealed that raising awareness of organizational efforts to reduce sepsis fallouts and providing relevant metrics with context helped nursing staff better understand how
their participation fits into a bigger picture of sepsis management at the organization level. While ED staff were initially unaware of the efforts of the sepsis task force, the team took the opportunity to demonstrate a relationship between the project’s objectives and the overarching sepsis core measure goals of the organization. Establishing this understanding helped staff understand the “why” behind the change and promoted synergy within the organization.

**Lessons Learned**

Lessons learned throughout the implementation process can inform future efforts to improve sepsis care in the ED. First, gaining support and building rapport with staff played a key role in the success of this project. Members of the team spent over 135 hours on-site observing the workflow and establishing connections with staff. In doing so, staff became familiar with team members and more receptive to conversation and sharing of ideas. Through these conversations, the team learned that this particular staff prefers open communication and knowing the reason behind a particular protocol or process (such as why using a smart-phrase is beneficial for staff and patients). Team members spending time on-site made them accessible for nurses to check in and ask questions that arose regarding certain aspects of the protocol. In turn, this communication helped the team customize in-person education during morning and evening shift change to meet staff preferences.

The fast-paced, intense environment of the ED also played a factor in project implementation. With regard to data collection, it was revealed that staff preferred to complete the paper survey questionnaires over using the QR code despite the QR code being a higher-tech option because it took less time to complete. Additionally, educating staff in the conference room when they were already present for huddles was the most effective, compared to having individual conversations on the unit.
Recommendations

The team’s overall experience and staff feedback influenced recommendations for next steps. Future recommendations for this clinical site include implementing consistent sepsis response training for new staff prior to starting on the unit, as well as extending triage training to all staff, not just those who wish to work as a triage nurse. Another recommendation is to include frontline staff in the organization’s sepsis task force efforts so that those who are most likely to encounter positive sepsis screens in daily work feel more connected to the organizational goals, can actively participate in the conversation, and can help identify solutions. A final recommendation is to explore EHR tool optimization, such as an alert that prompts the immediate initiation of the order set, or a timed pop-up reminder prompting a repeat lactate.

CNL Relevance

Sepsis recognition and management is a complex, interdisciplinary process that benefits from collaboration and lateral integration across the care team. Therefore, the role of the Clinical Nurse Leader, which was developed to use evidence-based practice to enhance the efficiency with which care is delivered, can play an important role to design and drive meaningful change to improve RN adherence to sepsis standard work, achieve core measures, and ultimately improve quality care and patient safety (Bender et al., 2019). The CNL, as educator, lateral integrator, advocate, risk anticipator, and outcomes manager, is uniquely trained and positioned to help bring about the necessary training, systems reform, and culture change that can lead to quality and safety improvement.

Conclusion

Sepsis remains one of the most deadly and expensive medical conditions in the U.S. (Singer et al., 2016). This project offers insight to peer-driven nurse education as an
evidence-based approach to improve compliance with sepsis standard work in the ED. Educational elements of this project represent a low-cost, high-return intervention that can be applied to other Microsystems that seek to further refine sepsis management response and help improve patient outcomes. For future PDSA cycles, narrowing down specific measurables from overall SEP-1 hospital compliance to pin-pointed data (such as time from first vitals to initial lactate or time from triage to antibiotic administration) may produce more meaningful insight into inconsistencies in protocol at this clinical site. However, this process served as a first step toward addressing inconsistencies and closing some gaps within this clinical site’s sepsis response, and demonstrates that small actions can make meaningful change.
Section VII: References


https://doi.org/10.51894/001c.37707


https://doi.org/10.1016/j.jen.2014.12.007


https://10.1016/j.mnl.2018.08.005


Improving sepsis management compliance in the ED

American Journal of Respiratory and Critical Care Medicine, 196(7), 856-863.
https://doi.org/10.1164/rccm.201609-1848OC

https://doi.org/10.1016/j.jen.2019.05.005

https://doi.org/10.1097/CCM.0000000000003342


https://doi.org/10.3928/00220124-20201215-10


Section VIII: Appendices
## Appendix A. ED Sepsis Standard Work

<table>
<thead>
<tr>
<th>Task</th>
<th>Responsible Staff</th>
<th>Task Description</th>
<th>Time</th>
</tr>
</thead>
</table>
| 1    | ED Triage RN      | - Triage patient per ED Standard Work, ID patient through positive sepsis screen  
- Notify Charge RN  
- Document in sepsis flow sheet  
- Initiate RN ‘Suspected Sepsis in Triage Standardized Procedures’, sign | 5 min |
| 2    | Charge RN         | - ID room number and initiate ED Sepsis Alert | 1 min |
| 3    | Triage Tech/ED Triage RN | - Room patient | 1 min |
| 4    | ED Sepsis Alert Response Team | - Respond to ED Sepsis Alert  
- MD, Primary RN, Pharmacist, RN tech, 2nd RN if available | 4 min |
| 5    | ED Primary RN     | - Evaluate patient, determine needs and fluids  
- Use MD order set  
- Determine if SIRS Suspected Sepsis or Septic Shock  
- Follow RN ‘Suspected Sepsis in Triage Standardized Procedures, concurrent with MD  
- Evaluate patient and order  
- IV access x2  
- Draw labs (cultures, chem panel)  
- Administer 1L LR bolus | 15 min |
| 6    | ED Primary RN     | - Send lactate on ice to lab  
- Confirm 3-hour repeat lactate if indicated  
- If no order, contact MD for order and document | 4 min |
| 7    | MD                | - Reevaluate decision to order antibiotics and/or change fluid bolus  
- Document contraindications for antibiotics and/or fluids as appropriate using “.SepsisBolusContraindications” smart-phase  
- If patient has a non-infectious process, document and confirm that sepsis is ruled out | 1 min |
<p>| 8    | ED Primary RN     | - If antibiotics ordered, notify Pharmacist of high priority antibiotics order for sepsis patient, requiring urgent verification | 3 min |
| 9    | Pharmacy          | - Verification of antibiotics | 5 min |</p>
<table>
<thead>
<tr>
<th>Time</th>
<th>Role</th>
<th>Tasks</th>
<th>Duration</th>
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<tbody>
<tr>
<td>10</td>
<td>ED Primary RN</td>
<td>- Administer antibiotics&lt;br&gt;- Notify MD of second lactate result&lt;br&gt;- Evaluate fluid responsiveness&lt;br&gt;- Ensure contingent fluids has been administered, and administer additional fluids ordered by MD as appropriate&lt;br&gt;- Use “.NursingSepsisHandoff” smart-phrase if decision was made to transfer patient to other units</td>
<td>15 min</td>
</tr>
<tr>
<td>11</td>
<td>MD</td>
<td>- Disposition patient as appropriate&lt;br&gt;- Reassess fluid status, document using “.SepsisAssessment” smart-phrase</td>
<td>5 min</td>
</tr>
<tr>
<td>12</td>
<td>MD</td>
<td>- ICU consult if patient is hypotensive and initial lactate is ≥4&lt;br&gt;- Disposition for admitted patients to the floor or telemetry per hospitalist and MD discussion</td>
<td>5 min</td>
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</table>
### Appendix B. Literature Review Evaluation Table

<table>
<thead>
<tr>
<th>APA Citation</th>
<th>Study</th>
<th>Methods</th>
<th>Outcome &amp; Implications</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alexander, M., Sydney, M., Gotlib, A., Knuth, M., Santiago-Rivera, O., &amp; Butki, N. (2021). Improving Compliance with the CMS SEP-1 Sepsis Bundle at a Community-Based Teaching Hospital Emergency Department. Spartan Medical Research Journal, 7(2). <a href="https://doi.org/10.51894/001c.37707">https://doi.org/10.51894/001c.37707</a></td>
<td>The aim of the project was to improve compliance with sepsis CMS HQI metrics for adult patients in a community based hospital.</td>
<td>The project team designed a Sepsis Macro and a Sepsis Order Set in the electronic medical record system. The team implemented an educational initiative targeted at emergency medicine residents and attending physicians. The educational initiative instructed emergency medicine residents and attending physicians in the metrics measured in the SEP-1 bundle as well as how to properly use the newly designed Sepsis Macro and Sepsis Order Set.</td>
<td>After program implementation the SEP-1 compliance rate was met in 82% of the months in comparison with 50% of the months in the pre-intervention. Education on quality metrics and standardization in documentation and order entry can improve compliance to CMS HQI metrics in community-based teaching institutions. Although this study focused on physician order sets, findings can be applied to education and standardization of nurse order sets in the emergency setting.</td>
<td>Level II</td>
</tr>
<tr>
<td>Chmielewski, N. A., Faulkner, L. D., &amp; Drone, M. (2019). Using Floor Champions to Improve Sepsis Quality Outcomes in Community Hospitals. Nurse Leader, 17(2), 151-154. <a href="https://10.1016/j.mnl.2018.08.005">https://10.1016/j.mnl.2018.08.005</a></td>
<td>The project sought to improve sepsis bundle compliance among nurses by implementing a sepsis floor champion.</td>
<td>The study compared pre- and post-intervention data. The intervention included staff education, as well as daily reports that listed fallouts of bundle compliance for rapid review, weekly month to date compliance stats, and monthly compliance stats for trending overall performance. The team also created a sepsis indicator on the ED EHR tracker, which was linked to the order set. The team implemented 1:1 conversations from peers vs. from leadership.</td>
<td>Staff responded well to the peer-to-peer conversations. When comparing year-over-year performance improvement results of July 2016 to July 2017: •Lactate measurement within 3 hours of severe sepsis criteria improved from 98% compliance to 100% compliance. •Blood cultures prior to antibiotic administration improved from 90% compliance to 100% compliance. •Antibiotic administration within 3 hours of severe sepsis criteria improved from 60% compliance to 97% compliance. Utilizing the floor champion method may be effective for other hospitals where dedicated resources are not available 24/7. The study suggests that nurse education can be associated with improved bundle compliance.</td>
<td>Level II</td>
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<td>Reference</td>
<td>Description</td>
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<td>Delawder, J. M. &amp; Hulton, L. (2020). An Interdisciplinary Code Sepsis-Bundle Compliance: A Quality Improvement Project. Journal of Emergency Nursing, (1):91-98. <a href="http://doi.org/10.1016/j.jen.2019.07.001">http://doi.org/10.1016/j.jen.2019.07.001</a></td>
<td>The aims of this project were to develop and implement an interdisciplinary team to address early implementation of sepsis bundles in the emergency department and to compare sepsis bundle compliance 3 months pre- and 3 months post intervention implementation. The education phase included inservices, quick tip sheets, and electronic communication. Training was provided by bedside sepsis champions. An article was placed in the monthly electronic newsletter. A mock sepsis alert drill occurred to ensure equipment was functioning. Results suggest that although timing for abx did not improve, abx were provided to more patients who met sepsis criteria. A shortage of minibags was identified as a limitation. There was no significant change in time to blood culture collection. The most frequent missed opportunity pre intervention (22% compliance second lactate), had noteworthy improvement (73%). The study suggests an interdisciplinary team approach to sepsis can be applied to inpatient medical teams. Use of electronic alerts, nurse-driven protocols, and order sets to improve bundle compliance and patient outcomes show promise.</td>
<td>Level II</td>
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<td>Goldszer, R. C., Ratzan, K., Csete, M., Nanes, N., Love, C., Cubeddu, L. X., Farley, D., Shrestha, A., &amp; Gillette, T. (2017). Impact of order set use on outcome of patients with sepsis. Applied Informatics, 4(1), 1-6. <a href="https://doi.org/10.1186/s40535-016-0033-y">https://doi.org/10.1186/s40535-016-0033-y</a></td>
<td>The study aimed to assess whether design and use of a sepsis order set is associated with decreased mortality in patients who had the order set used, versus patients who did not have the order set used. The EHR was used to measure incidence and mortality. Patients who were coded as a principal or secondary diagnosis of sepsis were included. LOS was also a quality metric. After implementation, there was a significant decrease in mortality for patients who had the sepsis order set used compared to those who did not have the order set used. The study supports use and compliance of a standardized order set to decrease mortality in patients with sepsis. Although this study focused on physician order sets, findings can be applied to nurse order set usage and patient outcomes.</td>
<td>Level II</td>
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<tr>
<td>Khawaja, A. R., Willms, A. J., Krause, C., Carriere, S., Ridout, B., Kennedy, C., Young, E., Mitton, C., Kissoon, N., &amp; Sweet, D. D. (2022). The Return on Investment of a Province-Wide Quality Improvement Initiative for Reducing In-Hospital Sepsis Rates and Mortality in British Columbia, Canada. Critical Care Medicine, 50(4), e340. <a href="https://doi.org/10.1097/CCM.0000000000005353">https://doi.org/10.1097/CCM.0000000000005353</a></td>
<td>This study aimed to assess the outcomes and economic impact of a province-wide quality improvement initiative in Canada to educate clinical staff and reduce sepsis mortality. In 2012, the British Columbia Sepsis Network was formed to reduce sepsis occurrence and mortality through education, knowledge translation, and quality improvement. An estimated 981 sepsis cases and 172 deaths were averted in the post-British Columbia Sepsis Network period (2014–2018). The total cost, including the development and implementation of British Columbia Sepsis Network, was $449,962. Net savings due to cases averted after program costs were considered were $50.6 million in 2018. This translates into a return of $112.5 for every dollar invested. Findings strengthen the argument for targeted QI initiatives for sepsis care and provide a model of care elsewhere.</td>
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<td>Reference</td>
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<td>Laux, L., Campbell, T., Latouf, K. M., Saunders, K., Schultz, J., &amp; Schwartzmier, M. (2022). Emergency Department Initiative to Improve Sepsis Core Measure Compliance: A Hospital Network Approach. Critical Care Nursing Quarterly, 45(1), 25-34. <a href="https://doi.org/10.1097/CNQ.000000000000385">https://doi.org/10.1097/CNQ.000000000000385</a></td>
<td>The study aims to improve compliance with the ED's sepsis core measures. The team created a sepsis protocol pilot for ED providers and staff. 2 hospitals were chosen to complete the trial. Interventions included: powerpoint presentations to staff, key elements emphasized at morning and evening huddles led by charge nurse or manager, and collection of feedback. Education was reinforced to nursing staff through huddles. Data was tracked so it could be shared with the team.</td>
<td>Level II</td>
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<td>Leon, L., Kramer, N., Ganti, L., Amico, K., Dub, L., Lebowitz, D., Rosario, J., &amp; Ballinger. (2018). Sepsis Cards and Facts: A Simple Way to Increase Sepsis Bundle Compliance. Cureus, 10(9). <a href="https://doi.org/10.7759/cureus.3245">https://doi.org/10.7759/cureus.3245</a></td>
<td>The objective of this study was to improve sepsis bundle compliance via an educational intervention in our emergency department (ED). Historical data on sepsis bundle compliance was obtained from the quality officer. Data were collected for 30 consecutive days to compare sepsis bundle compliance rates before and after the intervention. The intervention included a bright yellow card with sepsis criteria listed that was posted on all ED workstation computers and a daily email blast for one month with “sepsis facts.” The sepsis bundle compliance rates in the month prior to the intervention was 38%. In the month during the targeted intervention, the compliance rate increased to 56%. There was a statistically significant increase in bundle compliance rates during the intervention (p=0.0399). Sepsis criteria reminders and email blasts highlighting the importance of treating and recognizing sepsis can improve compliance with sepsis bundle ordering within the emergency department.</td>
<td>Level II</td>
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<td>Rajan, J. J. and Rodzevik, T. (2020). Sepsis awareness to enhance early identification of sepsis in emergency departments. Journal of Continuing Education in Nursing, 52(1), 39-42. <a href="https://doi.org/10.3928/00220124-20201215-10">https://doi.org/10.3928/00220124-20201215-10</a></td>
<td>This project explored the differences between emergency department nurses who received education on the early identification and treatment of sepsis and emergency department nurses who did not receive this education. A pilot study with a sample of ED nurses willing to participate were included in the project. The intervention was providing 15 minutes of structured education to emergency department nurses on systemic inflammatory response syndrome criteria, sepsis, policies, standing orders on sepsis, and the sepsis screening tool. Pre- and post-implementation data were analyzed. The p value was .018, which was statistically significant. The mean time to identify sepsis was decreased by 33 minutes. Using a sepsis standing order set combined with education helped to identify and elevate the care of sepsis patients. Resources such as the Surviving Sepsis Campaign screening tool to identify sepsis helped emergency department nurses to identify sepsis in a timely manner.</td>
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<tr>
<td>Reference</td>
<td>Aim of the Study</td>
<td>Description of the Study</td>
<td>Result or Conclusion</td>
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<td>Ramsdell, T. H., Smith, A. N., &amp; Kerkhove, E. (2017). Compliance with Updated Sepsis Bundles to Meet New Sepsis Core Measure in a Tertiary Care Hospital. Hospital Pharmacy, 52(3), 177-186. <a href="https://doi.org/10.1310/hpj5203-177">https://doi.org/10.1310/hpj5203-177</a></td>
<td>The aim of this study was to assess bundle compliance, length of stay (LOS), and in-hospital mortality before and after introduction of the new sepsis core measure.</td>
<td>A study was conducted of 158 patients diagnosed with severe sepsis between April 2015 to February 2016 to compare adherence to the 3- and 6-hour sepsis care bundles and sepsis-related patient outcomes prior to and following the introduction of the SEP-1 core measure. This institution implemented BPA messages and provided staff education on recognition and tx of sepsis.</td>
<td>The organization saw a significant increase in compliance with sepsis care bundles since the implementation of the SEP-1 measure by CMS. Hospitals can use similar interventions to improve compliance with the 3 and 6 hour bundles among nursing staff in the emergency department.</td>
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<tr>
<td>Warstadt, N. M., Caldwell, J. R., Tang, N., Mandola, S., Jamin, C., &amp; Dahn, C. (2022). Quality initiative to improve emergency department sepsis bundle compliance through utilization of an electronic health record tool. BMJ Open Quality, 11(1), e001624. <a href="https://doi.org/10.1136/bmjooj-2021-001624">https://doi.org/10.1136/bmjooj-2021-001624</a></td>
<td>The study aimed to study targeted education intervention regarding use of an electronic health record (EHR) tool for identification and management of sepsis and its impact on increasing EHR tool utilization and sepsis bundle compliance.</td>
<td>A prospective evaluation of the rate of EHR tool utilization was monitored from June through December 2020. A retrospective cohort study compared overall sepsis bundle compliance for patients when EHR tool was used versus not used. The first cohort was patients with intention-to-treat for any sepsis severity. The second cohort included patients with time of recognition of sepsis in the ED admitted with a diagnosis of severe sepsis or shock.</td>
<td>EHR tool utilization increased from 23.3% baseline prior to intervention to 87.2% during the study. In the intention-to-treat cohort, there was a significant difference in compliance between EHR tool utilization versus no utilization in bundle compliance and for several individual components: initial lactate, repeat lactate, timely antibiotics, blood cultures before antibiotics, initial fluid bolus and fluid reassessment. In the severe sepsis and septic shock cohort, EHR tool use increased from 71.2% pre-intervention to 85.0% post-intervention. With training, feedback and EHR optimization, an EHR tool can be successfully integrated into current workflows and appears to increase sepsis bundle compliance.</td>
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</table>
Appendix C. Project Timeline (Gantt Chart)

<table>
<thead>
<tr>
<th>Task</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
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<tbody>
<tr>
<td>Establish team and define project</td>
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<td>Develop project aim</td>
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<td>Conduct microsystem assessment</td>
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<td>Perform in-person observation, build rapport</td>
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<td>Develop PICOT</td>
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<td>Conduct literature review</td>
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<tr>
<td>Identify evidence-based intervention</td>
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<td>Conduct pre-survey, study results</td>
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<td>Implement education intervention</td>
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<td>Conduct post-survey, study results</td>
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<td>Evaluation and ongoing performance improvement</td>
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<td>Provide recommendations to the organization</td>
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<td>Design professional project poster</td>
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<tr>
<td>Present findings during final project presentation</td>
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</table>
Appendix D. Plan-Do-Study-Act Cycle

**ACT**
- Provide recommendations to organization/leadership
- Establish next steps

**PLAN**
- Establish objectives
- Perform literature review and identify evidence-based practice
- Conduct microsystem assessment
- Collect benchmark data

**STUDY**
- Analyze survey results and organizational data
- Synthesize and present findings

**DO**
- Design education materials
- Deliver in-person RN education
- Collect post-survey data
# Appendix E. SWOT Analysis

<table>
<thead>
<tr>
<th><strong>Strengths</strong></th>
<th><strong>Weaknesses</strong></th>
</tr>
</thead>
</table>
| - Existing leadership support and buy-in (as evidenced by existing sepsis coordinator role and taskforce to reinforce project goals)  
- Strong organizational commitment to patient safety and quality of care  
- Existing EHR infrastructure and use of sepsis protocol / core measures  
- Skilled and competent frontline staff and strong existing knowledge of sepsis bundle protocols in the ED | - Challenging workload/high stress environment that may impact adherence to standard of work  
- Room for error across interdisciplinary team  
- Inconsistency between RN protocol and physician workflow  
- Inconsistent staff triage training to reinforce sepsis protocols  
- Lack of synergy between leadership/taskforce and frontline staff regarding organizational sepsis compliance goals |

<table>
<thead>
<tr>
<th><strong>Opportunities</strong></th>
<th><strong>Threats</strong></th>
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</thead>
</table>
| - Possible funding sources dependent upon sepsis core measure indicators and other patient safety benchmarks  
- Demonstration of commitment to a culture of excellence, safety, and high quality, evidence-based care  
- Opportunity to obtain recognition and reputation as a desirable facility for both patients and staff | - Rising costs that may result in difficulty to hire and train nurses to achieve health and safety benchmarks, as well as maintain institutional nursing knowledge  
- Changing healthcare environment that may lead to nurse turnover, increase in cost, and need for more resources for hiring/training new staff  
- Future policy changes that require additional resources or new protocols |
Appendix F. Fishbone Diagram

Root-Cause Analysis – Possible Causes for Sepsis Fallouts

Staff Factors
- Physicians prefer to use their own order set first
- Uncertainty about sepsis risk so order set is not dropped
- Inconsistent awareness of ED standard of work
- Difficulty tracking status of bundle elements after handoff or transfer
- Administration of abs before blood cultures
- Inconsistency in documenting IVF (type, rate, time, amount)

Patient Factors
- Lack of venous access
- Patient screens positive for sepsis due to other underlying cause
- Lack of Pt compliance with IV insertion or abs administration
- Lack of consistent usage training/no repeat training for travelers
- Turnover/frequent new staff
- Lack of synergy between sepsis workforce and frontline ED staff

Equipment
- Easy to click out of repeat lactate reminder in EHR
- Must send cultures/lactates to lab on ice
- Workload and time restraints
- High census and acuity

Methods

Organization

Environment
Appendix G. Educational Materials: Sepsis Handout

STOP SEPSIS
PREVENT FALLOUTS

What is SEP-1 and Why Do We Care?

- The Center for Medicare and Medicaid Services (CMS) launched The Severe Sepsis and Septic Shock Early Management Bundle (SEP-1) in 2015
- SEP-1 is a set of key steps and milestones focused on early intervention and timely recognition to be completed in a specific time frame while caring for septic patients
- A standard of work helps close gaps in sepsis care across race, socioeconomic status, geography, and insurance status
- Nurses play a fundamental role in triaging patients with/at risk for sepsis, identifying early signs of sepsis, and initiating treatment bundles that can save patients’ lives
- Each hour of delayed treatment for septic patients is associated with a 4% to 9% increased risk of mortality! (Liu et al., 2017)

Current CPMC VNC Performance

- CPMC VNC is currently reaching its SEP-1 core measures compliance goal!
- However, Suspected Sepsis in Triage Procedures’ order set usage among VNC RNs is only 41%, highlighting a need for improved RN compliance with placing this initial order set to initiate the bundles, prior to the physician placing their order set

Help Prevent Failouts

- Complete ALL rows in the sepsis screening tool for ALL patients
- Place the RN 'Suspected Sepsis in Triage Procedures’ order set to initiate the bundles
- Document ANY time a patient refuses a lab draw, an IV, antibiotics, or IVF
- If a patient has an Initial lactate >2.0 ensure the repeat lactate is ordered
- Administer the IVF bolus at a rate greater than 125 mL/hr and chart when bolus has infused/ended
- When transferring a patient with sepsis, use the handoff smart-phrase nursingsepsishandoff to improve communication and reduce documentation errors among care team members

STOP SEPSIS & SAVE A LIFE
# Appendix H. Educational Materials: Sepsis Card

## STOP SEPSIS & PREVENT FALLOUTS

The clock begins when your patient receives a positive sepsis screen (time zero). Broadcast to the ED with “Sepsis Alert, Room #”. Drop the RN ‘Suspected Sepsis in Triage Procedures’ order set to initiate the bundle.

### 3-HR BUNDLE

- **Initial lactate** – send to lab on ice  
- **Blood cultures** – prior to antibiotics  
- **Antibiotics**  
- **IVF bolus** – 30 mL/kg in presence of  
  - Hypotension (SBP<90 / MAP<65)  
  - OR lactate ≥4.0  
- **Correct documentation** of IVF bolus  
  - (fluid type, rate, start/end time, amount)

### 6-HR BUNDLE

- **Repeat lactate** – if initial lactate >2.0  
- **Vasopressors** – for persistent hypotension in the hour after IVF bolus  
- **Reassessment of fluid status**  
- **Correct documentation**

When transferring a patient, use the smartphrase *nursingsepsishandoff.*
Appendix I. Pre- and Post-Intervention Survey Questionnaires

Survey: ED Sepsis Protocols

Thank you for completing this anonymous survey created by USF graduate nursing students for their capstone project.

1. What is your role in the Emergency Department?
   - [ ] Staff Nurse
   - [ ] Travel Nurse
   - [ ] Nurse Manager
   - [ ] Other: __________________________

2. On a scale of 1-5, please rate your familiarity with each component of the Severe Sepsis/Septic Shock ED 3- and 6-Hr Bundles (1 = not familiar; 5 = very familiar)

<table>
<thead>
<tr>
<th>Component</th>
<th>1</th>
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<th>5</th>
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<tbody>
<tr>
<td>Initial Lactate/repeat lactate</td>
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<td></td>
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<tr>
<td>Blood cultures</td>
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<td></td>
</tr>
<tr>
<td>IVF bolus (30 ml/kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vasopressors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reassessment of fluid status</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

3. Are you familiar with the sepsis handoff smartphrase, “.nursingsepsishandoff”?  
   - [ ] Yes
   - [ ] No

4. How often do you use the “.nursingsepsishandoff” smartphrase when treating a patient with/suspected of sepsis?
   - [ ] Often
   - [ ] Sometimes
   - [ ] Rarely
   - [ ] Never

5. What method of education have you received regarding proper use of sepsis bundle protocols here in the ED? (Select all that apply)
   - [ ] Staff training
   - [ ] Staff emails/newsletters
   - [ ] Announcements at huddle
☐ Handouts/bulletin board
☐ I have not received any education on this topic in this ED
☐ Other: ________________________________

6. Do you experience any barriers that make it difficult to complete the 3- and 6-hour sepsis bundles?

Please describe:

__________________________________________________________________
Survey: ED Sepsis Protocols Part 2

Thank you for completing this anonymous survey created by USF graduate nursing students for their capstone project.

1. What is your role in the Emergency Department?
   - [ ] Staff Nurse
   - [ ] Travel Nurse
   - [ ] Nurse Manager
   - [ ] Other: __________________________

2. Have you attended a shift change huddle during the last few weeks that included education from a nursing student about the ED sepsis project?
   - [ ] Yes
   - [ ] No

3. Do you think this education initiative (shift change huddles, sepsis handouts, and sepsis cards) has increased the available information about the importance of sepsis bundle compliance, nursing handoff use, and use of the sepsis nursing orderset?
   - [ ] Yes
   - [ ] No

4. If no, what are some additional ways that would be helpful in increasing the availability of this information?
   Please Describe: ___________________________________________________________

5. How often do you use the RN ‘Suspected Sepsis in Triage Procedures’ orderset?
   - [ ] Often
   - [ ] Somewhat
   - [ ] Rarely
   - [ ] Never

6. What barriers prevent you from using the RN ‘Suspected Sepsis in Triage Procedures’ orderset?
   - [ ] ED provider prefers to put in their own orders
   - [ ] RN feels that putting in orderset is out of their scope of practice or is uncomfortable with putting in orders
   - [ ] A need for more education/clarification about when to drop the orderset
   - [ ] Pt has screened positive for sepsis but suspicion for sepsis is low because the patient has another cause of symptoms therefore no need for sepsis orders
   - [ ] None
   - [ ] Other: _______________________________________________________________.


7. Are you familiar with the sepsis handoff smartphrase, ".nursingsepsishandoff"?
☐ Yes
☐ Somewhat
☐ No

8. How often do you use the ".nursingsepsishandoff" smartphrase when treating a patient with/suspected of sepsis?
☐ Often
☐ Somewhat
☐ Rarely
☐ Never

9. What additional interventions/actions can we implement to help maintain the sepsis compliance rate, increase sepsis nursing orderset use, and increase the use of the "nursingsepsishandoff" smartphrase?

   Please Describe: ____________________________________________________
## Appendix J. Statement of Determination & Non-Research Determination Form

### EVIDENCE-BASED CHANGE OF PRACTICE PROJECT CHECKLIST

**Instructions:** Answer YES or NO to each of the following statements:

<table>
<thead>
<tr>
<th>Project Title: Closing the Gap: Improving Sepsis Bundle Compliance and Reducing Fallouts Through Nurse Education in the Emergency Department</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>The aim of the project is to improve the process or delivery of care with established/accepted standards, or to implement evidence-based change. There is no intention of using the data for research purposes.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>The specific aim is to improve performance on a specific service or program and is a part of usual care. ALL participants will receive standard of care.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>The project is NOT designed to follow a research design, e.g., hypothesis testing or group comparison, randomization, control groups, prospective comparison groups, cross-sectional, case control). The project does NOT follow a protocol that overrides clinical decision-making.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>The project involves implementation of established and tested quality standards and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does NOT develop paradigms or untested methods or new untested standards.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>The project involves implementation of care practices and interventions that are consensus-based or evidence-based. The project does NOT seek to test an intervention that is beyond current science and experience.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>The project is conducted by staff where the project will take place and involves staff who are working at an agency that has an agreement with USF SONHP.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>The project has NO funding from federal agencies or research-focused organizations and is not receiving funding for implementation research.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>The agency or clinical practice unit agrees that this is a project that will be implemented to improve the process or delivery of care, i.e., not a personal research project that is dependent upon the voluntary participation of colleagues, students and/or patients.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>If there is an intent to, or possibility of publishing your work, you and supervising faculty and the agency oversight committee are comfortable with the following statement in your methods section: “This project was undertaken as an Evidence-based change of practice project at X hospital or agency and as such was not formally supervised by the Institutional Review Board.”</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

**Answer Key:** If the answer to ALL of these items is yes, the project can be considered an Evidence-based activity that does NOT meet the definition of research. IRB review is not required. Keep a copy of this checklist in your files. If the answer to ANY of these questions is NO, you must submit for IRB approval.
**Statement of Determination and Non-Research Determination Form**

**Student Name:** Andrea Hyde  

**Title of Project:** Closing the Gap: Improving Early Sepsis Management Compliance and Reducing Fallouts Through Nurse Education in the Emergency Department

**Brief Description of Project**

- Data that Shows the Need for the Project  
- Aim Statement  
- Description of Intervention(s)  
- Desired Change in Practice  
- Outcome measurement(s)

A quality improvement project aims to address inconsistencies in compliance with elements of an emergency department’s (ED) early sepsis management protocol. Education was delivered to ED nurses and sepsis educational materials were designed and distributed throughout the unit, including handouts and a sepsis card posted to each computer workstation. A ‘sepsis corner’ was posted to the staff bulletin board which included ED-specific benchmarks and how to access the sepsis order set and handoff smart-phrase in the electronic health record. The primary outcome measure was overall RN sepsis triage order set usage. Secondary measures included handoff smart-phrase usage among ED nurses and overall SEP-1 bundle compliance rate for the hospital. After implementation, the unit experienced an increase in nurse order set and handoff smart-phrase usage.

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](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). Student may proceed with implementation.

( ) This project involves research with human subjects and must be submitted for IRB approval before project activity can commence.

Comments:
Student Name:

**Andrea Hyde**

Signature of Student:

[Signature]

DATE 5-9-2023

Supervising Faculty Member:

**Scout Hebinck**

Signature of Supervising Faculty Member:

[Signature]  

DATE 5-9-2023