Improving Timely Sepsis Care through Staff Education within the Emergency Department

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Improving Timely Sepsis Care through Staff Education within the Emergency Department

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NURS 653: Internship

Dr. Robert Patterson

May 9, 2023
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Abstract

**Problem:** A sepsis protocol and bundle has been implemented in an urban Emergency Department to help screen patients and treat sepsis efficiently and effectively. The benchmarks from the bundle are not being met consistently every month and are below the targeted 90%.

**Context:** A microsystem assessment and a gap survey sent out to nurses, helped determine that there is room to improve nurses’ knowledge and confidence about sepsis and the sepsis bundle workflow. Sepsis is one of the most expensive and burdensome conditions in U.S. hospitals. Literature supports staff education to improve sepsis bundle compliance.

**Intervention:** A video was created and was sent out via the nurse manager to all the nurses in the unit. The video is a slide deck that was recorded with a voice over, including information about signs and symptoms of sepsis and the sepsis protocol. In addition, information posted in the staff break room was updated about sepsis, the protocol, and current compliance.

**Measures:** Data from the first quarter of 2023 and the last quarter of 2022 was obtained for first vital to lactic acid results within 60 minutes, lactic acid results to antibiotic administration within 60 minutes, and antibiotic order to administration within 35 minutes.

**Results:** The Post-Intervention results have not been obtained for this project due to time constraint. The recommendation is to obtain and analyze the 2023 second quarter data, and then compare it to the 2023 first quarter data and the 2022 last quarter data to determine if the benchmarks have been met consistently by 90% for each month in the 2023 second quarter.

**Conclusions:** Providing nurses with the knowledge to help identify sepsis rapidly, as well as becoming more familiar with the sepsis protocol, helps them confidently enact the bundle. Second quarter data will evaluate if this project has improved the workflow and has saved time.
Section II: Introduction

Sepsis is responsible for 35% of in-hospital deaths (Rhee et al., 2017). In a cohort study in 2014 looking at 2,901,019 adult sepsis cases in 409 hospitals, about 87% of the patients had sepsis upon admission (Rhee et al., 2017). When sepsis is promptly detected and antibiotics are administered promptly, within three hours, patients have better health outcomes (Majid et al., 2019). In another study, when antibiotics were administered after three hours, patients had 14% higher odds of dying in the hospital (Seymour et al., 2017).

Sepsis is one of the most expensive and burdensome conditions in U.S. hospitals (Paoli et al., 2018). It is important to address this problem now because sepsis is one of the highest hospital expenses (Paoli et al., 2018). Reducing sepsis will significantly reduce costs (Paoli et al., 2018). Reducing the severity of sepsis cases will also significantly reduce costs (Paoli et al., 2018). This project aims to identify and treat sepsis quickly and effectively. By treating sepsis efficiently, the severity of sepsis can be prevented from progressing which is important to reduce mortality and prevent a significant increase in cost (Paoli et al., 2018). Identifying and treating sepsis promptly can improve patient outcomes, reduce mortality, and save the organization a significant amount of money (Paoli et al., 2018; Rhee et al., 2017; Majid et al., 2019; Seymour et al., 2017).

Problem Description

This quality improvement project takes place in an urban San Francisco Bay Area hospital, in a 16 bed Emergency Department. The hospital has implemented a sepsis protocol and bundle to help screen patients and treat sepsis efficiently. The benchmarks from the sepsis
bundle are not being met consistently every month. The hospital’s goal is to meet each benchmark by 90% every month.

Currently during triage, each patient is screened for sepsis using a standardized Triage Sepsis Screen in the Electronic Health Record (EHR) (see Appendix A). The organization has created a standardized workflow to enact when a patient screens positive for sepsis. See Appendix B for the hospital’s workflow and the protocol for enacting the sepsis protocol. Within three hours, an initial lactate level must be obtained; blood cultures, before antibiotics are administered, must be obtained; antibiotics must be completely administered; and bolus intravenous fluids must be administered if the patient has hypotension or a lactate result of greater or equal to 4.0. Within six hours, a repeat lactate result must be obtained if the initial lactate was greater than 2.0; vasopressors must be administered if the patient has hypotension after the bolus intravenous fluid has been administered; and the patient’s fluid status must be reassessed.

The department has benchmarks to meet and aims to reach each benchmark by at least 90% each month. These include obtaining the patient’s lactic acid result within 60 minutes from when the first vital sign was obtained, administering antibiotics within 60 minutes from when the lactic acid result is available, and administrating the prescribed antibiotics within 35 minutes from when the antibiotic order is placed. See Appendix C for the hospital’s current performance data from the last two quarters, first quarter 2023 and fourth quarter 2022.

The organization’s goal is to reach each benchmark by at least 90% compliance every month and quarter. As seen in Appendix C, the benchmarks are inconsistently met; compliance ranges from 57% to 100%. During the last quarter of 2022, all three benchmarks were met once during the quarter. During the first quarter 2023, the only benchmark that was met was
administering antibiotics within 60 minutes of the lactic acid results. For the first quarter of 2023, the average compliance for first vital to lactic acid result within 60 minutes was 62% and the average for antibiotic order to administration within 35 minutes was 72% compliant. This indicates that there is a problem and that there is room for improvement to consistently reach these benchmarks.

**Literature Review**

The keywords used for the literature search were sepsis, emergency department, quality improvement, sepsis bundle, sepsis screening, and sepsis protocol, utilizing the PubMed database. There is a plethora of information about sepsis but many of the articles were reviews. Following the review’s references, many of the articles were older than five years old. With more time relevant studies were found that are helpful for the PICO. Overall there was a reasonable amount of evidence in the literature. Many of the studies utilized are retrospective cohort studies. Using the John Hopkins Research Evidence Appraisal Tool, the studies are determined to be Level III studies (Johns Hopkins Health System/Johns Hopkins School of Nursing, 2022). Most are determined to be high or good quality because of the large sample sizes and consistent results with good quality quantitative and qualitative components (Johns Hopkins Health System/Johns Hopkins School of Nursing, 2022). See Appendix D for the Annotated Bibliography on current literature.

**PICO Question**

In patients who have a positive sepsis screen in an emergency department (P), how does educating staff about sepsis and the sepsis protocol (I), compared to no additional staff education (C), affect reaching each sepsis bundle benchmark by at least 90% (O)?
The PICO question was modified when the intervention to implement staff education to improve sepsis bundle compliance was identified. The original PICO question was, “In patients who have a positive sepsis screen in an emergency department (P), how does enacting a standardized sepsis bundle within three hours (I), compared to no standardized bundle (C), affect patient fallout (O)?”

**Conceptual Framework**

For this quality improvement project, Lewin’s Change Model is being used as the basis of the intervention. This theory suggests that there are three steps to creating change: unfreezing, changing, and refreezing (Wojciechowski et al., 2016). The unfreezing stage focuses on bringing awareness to the problem in order to convince people to be willing to change their ways. In this project, staff will be educated about the inconsistent protocol compliance shown by low benchmark scores (Wojciechowski et al., 2016). The changing stage focuses on demonstrating the benefits of changing (Wojciechowski et al., 2016). In this project, a video was created which educates staff about current best practices, how to identify sepsis promptly, and how to improve communication between the nurse and the provider. The refreezing stage focuses on maintaining the change that has been implemented and integrating it into everyday practice (Wojciechowski et al., 2016). For this project, the video that was created can be shown to new staff and can periodically be shown to current staff. This will work to keep the information fresh in the staff’s minds so they can quickly work through the bundle protocol. In addition, the next quarter benchmark data can be incorporated to determine if the refreezing is effective. If the benchmark compliance improves, celebrating this success will be part of refreezing to help make this part of everyday practice and reduce resistance to further change.

**Specific Project Aim**
The aim was to improve the amount of time it takes to reach each benchmark in the sepsis bundle in a 16 bed Emergency Department (ED) in San Francisco. The process began with assessing the microsystem. The process ended with all the benchmarks of the sepsis bundle being met by at least 90%. By working on the process, it was expected to improve patient outcomes, decrease fallout, and reduce patient mortality related to sepsis. It was important to work on this because benchmarks were not consistently being met, the time it took to enact all parts of the sepsis bundle was more than the targeted time, and fallout was occurring each month. See Appendix C for current benchmark data.

**Rationale**

In order to get better insight from the nursing staff about the sepsis protocol and gaps in practice, a survey was developed and sent out to all ED nursing staff via email through the ED Clinical Nurse Manager. See Appendix E for survey questions and responses. Eight nurses responded to the survey, which is a 23% response rate for the unit. Two nurses had worked in the unit for less than one year and six nurses had worked in the unit for one to four years. Five nurses work the AM shift and two nurses work PM shift. There were no responses from night shift nurses. One nurse works per diem, four work part-time, and one works full-time. Because no night shift nurses responded to the survey, the survey has bias toward the competencies of the AM and PM nurses and may have gaps from fully representing the unit accurately. The survey showed room for improvement for nurse’s expertise of sepsis, knowledge of early warning signs of sepsis, utilization of dot phrases when charting, and confidence with running the sepsis workflow. The survey results helped determine where the gaps are and target nurse education to help address the areas for improvement.
A root cause analysis was also conducted to justify the quality improvement project. See Appendix F for the Fishbone Diagram. The condition was consistent gaps in practice in the CMS SEP-1 Bundle. The benchmarks were not consistently being met by 90% each month or quarter. One cause of this was ineffective communication between departments, such as Emergency Department, Laboratory, and Pharmacy, and multidisciplinary teams such as Registered Nurses and Medical Doctors. Another cause was a delay in antibiotic administration due to a challenging needle stick or the inability to obtain IV access on the patient. Additionally if the antibiotics ordered were not available on the unit then that caused a delay. Staffing was another cause: the unpredictability of the ED increasee staff patient load and occupied staff with other patients, negatively affecting the compliance of the sepsis bundle protocol timeline. Gaps in knowledge create low confidence with identifying the signs and symptoms of sepsis and enacting the protocol quickly. Fallout contributed to be consistent gaps in practice. This included antibiotics or fluids not being present on the unit. Additionally deviation from the sepsis bundle order sets created gaps in practice because the orders differ from the CMS SEP-1 bundle.

Section III: Methods

Context

Microsystem Assessment

This 16 bed Emergency Department provides care to individuals who need emergency medical attention 24-hours a day. It is an accredited Level 2 Geriatric Emergency Department. Its purpose is to supports patients who suffer injuries, accidents, other serious medical conditions, and those with multiple chronic conditions. Many of the patients this Emergency
Department treats live in San Francisco. There are multidisciplinary professionals working in this Emergency Department including; providers, nurses, sepsis coordinator, ED nurse manager and technicians. There are 25 registered nurses employed for the unit, including both part time and full time nurses. For the evening and night shift, 14% of the staff are travel nurses. Six percent of employees work per Diem.

In this urban Bay Area Emergency Department, there is a “Lead Team” that is composed of professionals of multiple disciplines. They meet monthly for “RFI”, Room for Improvement, meetings. This team includes the Emergency Department’s (ED) sepsis coordinator, the ED nurse manager, physicians, and others. They continuously evaluate outcomes of the unit and work to find additional ways to promote sepsis protocol compliance and reduce fallout.

This ED has two triage zones. One is for patients who walk into the ED. These patients are usually triaged by a Registered Nurse. The other triage zone is for patients who arrive by ambulance. These patients are usually triaged by the charge nurse. Once patients go through triage they are assigned a nurse when they are admitted into the Emergency Department. Patients are treated then discharged or admitted to the hospital and transferred to an inpatient department. Information is disseminated by the ED nurse manager to the nurses via email or in person. A charge nurses is a leader during the shifts. Communication and the relationship between nurses and the physicians are hierarchical. See Appendix G for 5 P’s Assessment.

**SWOT Analysis**

There were internal and external favorable factors driving this quality improvement project. Internal strengths that helped drive this project forward included the sepsis quality improvement team, collaboration and support from the ED Nurse Manager and Sepsis Coordinator, and the hospital’s quality dashboard that tracks sepsis rates and compares them to
the California and national averages. External opportunities included an aim to reducing the risk of sepsis, improving patient safety and care, a hospital-wide commitment for quality improvement, the ability to accurately track sepsis outcomes and the success of the improvement project, and strong literature support for evidence-based practices on nurse education and sepsis reduction.

There were also internal and external factors acting against this quality improvement project. Internal weaknesses included a lack of knowledge from the nursing staff to identify changes needed to prevent sepsis, a lack of emphasis and reinforcement for standardized practices, and noncompliance by physicians for following the bundle protocol. External threats included low retention of information with too much staff education, limited resources to carry out the change, and a fast-paced environment where the workflow of the ED changes depending on patient influx which can interrupt bundle compliance time. See Appendix H.

Cost Benefit Analysis

Sepsis is one of the most expensive and burdensome conditions in U.S. hospitals (Paoli et al., 2018). It is important that this problem was addressed because sepsis is one of the highest hospital expenses (Paoli et al., 2018). Reducing sepsis significantly reduced costs as well as reducing the severity of sepsis cases (Paoli et al., 2018). This project aimed to identify and treat sepsis quickly and effectively. By treating sepsis efficiently, the severity of sepsis was prevented from progressing, which is important because there is a significant increase in cost depending on the severity of the sepsis (Paoli et al., 2018) (see Appendix I).

Poali et al. (2018) performed a retrospective observational study from January 2010 to September 2016 using the Premier Healthcare Database to analyze the cost of sepsis in U.S. hospitals (Paoli et al., 2018). This study found that in 2013 $24 billion was spent on sepsis
related expenses (Paoli et al., 2018). This cost approximately $18,244 per hospital stay per patient (Paoli et al., 2018). In addition, depending on the severity of the sepsis, the daily costs increased significantly (Paoli et al., 2018). The daily cost for patients with sepsis was $1,830, patients with severe sepsis $2,193, and patients with septic shock cost additional $3,087 per day (Paoli et al., 2018).

The length of stay for patients with sepsis is significantly higher than patients with most other conditions (Paoli et al., 2018). In addition, the severity of sepsis has a huge impact on the length of stay as well (Paoli et al., 2018). Septic shock increases a patient’s length of stay on average of 16.5 days (Paoli et al., 2018). Patients with sepsis had an increase of 4.5 days and patients with severe sepsis 6.5 days (Paoli et al., 2018). The increased length of stay for patients with sepsis puts a burden on the hospital and increases the cost significantly (Paoli et al., 2018).

When the increased cost of septic patients is considered with the increased length of stay then adds in extra cost and extra length of stay depending on their severity level, we see just how easily sepsis burdens the hospital. By reducing sepsis and the severity of sepsis by intervening early through this quality improvement project, the amount of money saved will be significant.

If a patient has sepsis, it can increase the length of stay by 4.5 days (Paoli et al., 2018). In a study by Davey et al., 2017, the length of stay can be reduced by 1.12 with good antibiotic stewardship. With the daily cost of sepsis $1830, reducing the length of stay by 1.12 days could save $2050. Severe sepsis increased a patient’s stay an average of 6.5 days with a daily cost of $2193 per patient (Paoli et al., 2018). By preventing sepsis from advancing to severe sepsis by early screening and intervention, it could save $4386 per patient (Paoli et al., 2018). Septic shock increases patient stay on average 16.5 days and costs $3087 (Paoli et al., 2018). By screening for sepsis and intervening early severe sepsis can be prevented from progressing to septic shock and
can save $30,870 per patient (Paoli et al., 2018). This intervention did not cost any money and utilized the resources the unit already has available.

**Intervention**

The desired change was that timely sepsis care would improve and that staff would consistently reach all of the benchmarks in the sepsis screening and protocol at least 90% of the time. This project educated nursing staff about sepsis and the sepsis protocol to increase compliance to the CMS SEP-1 bundle. See Appendix J for the process map for this quality improvement project. The nurse education was administered via a slide deck video that was recorded with a voice over (see Appendices K and L). In addition to the video, the information in the staff break room was updated about sepsis and the protocol. The video was administered to the nurses through the unit nurse manager. This video educated staff who do not know a lot about sepsis or the signs and symptoms of sepsis and reeducated staff who feel confident about their sepsis knowledge.

**Study of the Intervention**

In order to determine if this education has been effective, the data from the second quarter will be evaluated and compared to the first quarter of 2023 and the last quarter of 2022. This data is compiled and evaluated quarterly, analyzing all the information for each month. This information will look at each benchmark and determine what percent of compliance was achieved. The data analysis will also determine if there was fallout that occurred.

**Measures**

This project started the Plan-Do-Study-Act (PDSA) cycle. Data from the first quarter of 2023 and the last quarter of 2022 was obtained for first vital to lactic acid results within 60 minutes, lactic acid results to antibiotic administration within 60 minutes, and antibiotic order to
administration within 35 minutes. This data helped the Plan phase of the PDSA cycle.

Additionally the staff survey helped the Plan phase. The next phase is the Do phase. This phase includes sending out the video for staff to watch and updating the break room sepsis information wall with current information. The Study phase will come next once second quarter data from 2023 is obtained. This will compare results to the improvements that were anticipated and determine if this intervention has been successful. In the Act phase it will be determined if this quality improvement project was successful at reaching benchmarks or if the problem still exists. If compliance is still below 90% then the PDSA cycle should start over again to try to find another way to increase compliance.

**Ethical Considerations**

This project has been approved as a quality improvement project by University of San Francisco faculty using Quality Improvement review guidelines and does not require IRB approval. This project relates to University of San Francisco’s Jesuit values and American Nurses Association Ethical Standards because it promotes the best care possible for every patient to ensure that every patient is able to receive the care they deserve.

**Section IV: Results**

**Barriers**

Barriers to this project include poor buy in from physicians and poor MD-RN coordination. Without physician compliance to the sepsis bundle protocol, there will continue to be fallout and low compliance percentages. Another barrier is the environment. Being a fast paced Emergency Department where the amount of patients and their needs can change rapidly, it can be barrier for complying with all the order sets on time.

**Outcome Measure**
The Post-Intervention results have not been obtained yet for this project due to time constraint. The recommendation is to obtain and analyze the 2023 second quarter data. Once this data is collected then it can be compared to the 2023 first quarter data and the 2022 last quarter data to determine if the benchmarks have been met consistently by 90% for each month in the 2023 second quarter.

**Section V: Discussion**

**Summary**

The recommendation is to collect and analyze the data from the second quarter of 2023 and compare it to the two previous quarters. Once this data is collected and analyzed, then a better conclusion can be determined about the effectiveness of this quality improvement project. If the second quarter data shows an improvement in bundle compliance and consistency for reaching each benchmark by 90%, then it can be concluded that this teaching has been effective.

An increase in benchmark scores will also shows that this project has been successful in closing the gaps in knowledge that were revealed from the Gap Survey. It could be concluded that the nurses obtained more knowledge in early warning signs of sepsis and improved their expertise of sepsis and confidence in running the sepsis workflow.

This project utilizes the PDSA Cycle. The Plan and Do portion have been completed for the first cycle of this PDSA. Once data from the second quarter of 2023 is obtained then the Study phase can take place to determine if this intervention is effective. After the Study phase comes the Act phase, where the education can be implemented long term if it determined to be effective. If this project has not improved benchmark compliance then modifications can be made, and a new cycle of the PDSA process can be begin.

**Conclusion**
If this quality improvement project is successful then it would be useful not only to this hospital unit, but could be implemented in other hospitals as well to help improve compliance to their sepsis protocol. Since this education video was recorded, it can be reused in the microsystem in the future for new staff and to refresh the knowledge of existing staff. The poster in the nurse break room will be posted so that it can be referenced at the discretion of the nursing staff; however, there should be updates for each new quarter so that staff can see how they are doing with the most recent data.

This project is sustainable as it does not utilize any additional resources that do not already exist within the microsystem. Additionally, if it does improve outcomes, nurses will see the success and will likely buy in to the project, increasing compliance further. It has a great cost saving potential by treating sepsis effectively and efficiently, in addition to reducing morbidity and mortality among patients.

This quality improvement project focused on providing nurses with the knowledge to help identify sepsis rapidly as well as become more familiar with the sepsis protocol so that they confidently enact the bundle. Second quarter data will evaluate if this has improved the workflow and has saved time for nurses. Overall, there is a lot of potential for this quality improvement project to make a lasting impact not only in this microsystem, but in similar microsystems in other hospitals.
Section VI: References


http://jamanetwork.com/journals/jama/fullarticle/2654187


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

Section VII: Appendices

Appendix A

Triage Sepsis Screen

Suspected or known infection?

☐ Yes
☐ No

2 or More SIRS?

☐ None
☐ Temp over 100.4 F or under 96.8 F
☐ Recent measured fever (ED Only)
☐ Pulse over 90 bpm
☐ Resp over 20
☐ Chills/ Rigors/ Weakness
☐ Change in Mentation
☐ WBC > 12k or < 4K (Bands > 10%)
☐ Blood glucose > than 140 and non-diabetic

RISK Factors:

☐ NONE
☐ Currently admitted or recently discharged
☐ Age > 60
☐ Recent Chemotherapy/Cancer
☐ Diabetic
☐ Chronic Kidney Disease
☐ Chronic Liver Disease
☐ Recent Surgery
☐ Presence of invasive line (excludes PIV)
☐ ETOH/IV Drug Abuse
☐ Presence of catheter (Urinary)

New or Worsening signs of organ dysfunction:
☐ None
☐ Altered Mental Status
☐ Increase O2 requirements to maintain SPO2 > 90% or Pa02/FIO2 ratio < 300
☐ SBP < 90 mmHg or > 40 mmHg drop from baseline
☐ MAP < 65 mmHg
☐ Urine output < 0.5 mL/kg/hour for more than 2 hours
☐ Lactate >2.0
☐ Creatine > 2.0 mmol/L
☐ Platelet Count < 100,000
☐ INR > 1.5 pt
☐ PTT > 60 secs
☐ Elevated Total Bilirubin > 2 mg/dL Vasopressor support to maintain adequate BP

Is this person a positive sepsis screen?
☐ YES
☐ NO
## Appendix B

### Workflow for Positive Sepsis Screen

<table>
<thead>
<tr>
<th>Task #</th>
<th>Responsible Operator</th>
<th>Task Description</th>
<th>Task Cycle Time</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ED Triage Nurse</td>
<td>1-1. Trigles patient per “ED Triage Standard Work” and identifies patient through positive sepsis screen</td>
<td>5 min</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1-2. Notify Charge RN of Positive Sepsis Screen, let Charge RN know if patient is PUI</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1-3. Document evaluation in “RN Sepsis Flowsheet”</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>1-4. Initiate RN “Suspected Sepsis in Triage Standardized Procedures [7740]” in EPIC (type “Sepsis” in search bar, scroll to bottom, click “Sign”)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Charge RN</td>
<td>2-1. Identify room number and calls <strong>ED Sepsis Alert</strong></td>
<td>1 min</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- VNC/MBC: Vocoder: Push Button and say “Broadcast to ED” + “sepsis alert, room number” → local broadcast in ED</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- DAW: Dial “44444” for the Operator; Inform operator to overhead “sepsis alert, room number” → local broadcast in ED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Triage Tech/</td>
<td>3-1. Room Patient</td>
<td>1 min</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ED Triage RN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td><strong>ED Sepsis Alert</strong></td>
<td>4-1. Respond to Sepsis Alert (Response Team includes the following):</td>
<td>4 min</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Response Team</td>
<td>- MD</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>- Primary RN</td>
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<td></td>
<td></td>
<td>- Pharmacist (only 12-12:30pm at VNC, if patient is PUI, Pharmacy will not enter the room)</td>
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<tr>
<td></td>
<td></td>
<td>- RN Tech (if available)</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 2nd RN (if available)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>MD</td>
<td>5-1. Evaluate patient, determine need for antibiotics and fluids.</td>
<td>15 min</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-2. Use the MD Orderset: <strong>ED SIRS Suspected Sepsis [10027] or ED Septic Shock [10060]</strong>, as appropriate.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-3. <strong>if patient has a non-infectious process, document/confirm that “sepsis diagnosis is ruled out”, i.e. cardiogenic shock, renal failure.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>ED Primary Nurse</strong></td>
<td>5-4. Follow “Suspected Sepsis in Triage Standardized Procedures [7740]”, concurrent with MD Evaluation and order:</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>- Establish IV x 2</td>
<td></td>
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<td></td>
<td></td>
<td>- Draw labs (blood culture, chem panel)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>- Administer 1L Lactate Ringer bolus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td><strong>ED Primary Nurse</strong></td>
<td>6-1. Run the lactate in the Point of Care Testing device if available and notify MD of results verbally.</td>
<td>4 min</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6-2. Confirm that there is a 3-hour repeat order for lactate, if the initial result is greater than 1.9.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6-3. <strong>If no order, contact the MD for an order, and document the following in EPIC Nursing:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- MD notified (name)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Time MD notified</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task #</td>
<td>Responsible Operator</td>
<td>Task Description</td>
<td>Task Cycle Time</td>
<td>Notes</td>
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<tr>
<td>7</td>
<td>ED MD</td>
<td>7-1. Re-evaluate decision to order antibiotics and/or change fluid bolus. 7-2. Document contraindications for antibiotics and/or fluids as appropriate using standard language from <strong>Smart Phrase “SEPSISBOLUSCONTRAINDICATIONS”</strong>. 7-3. If patient has a non-infectious process, document/confirm that “sepsis diagnosis is ruled out”, i.e. cardiogenic shock, renal failure.</td>
<td>1 min</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>ED Primary Nurse</td>
<td>8-1. If antibiotics ordered, notify Pharmacist of high priority ANTIBIOTIC order for SEPSIS patient requiring quick verification.</td>
<td>3 min</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Pharmacy</td>
<td>9-1. Verification of antibiotics (if ordered).</td>
<td>5 min</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Primary Nurse</td>
<td>10-1. Administer broad spectrum antibiotics first (if ordered). 10-2. Notify MD of the 2nd Lactate Result (From Lab). 10-3. Evaluate fluid responsiveness (consider NICOM assessment). 10-4. Ensure contingent fluids had been administered, and administer additional fluids ordered by MD as appropriate. 10-5. Fill out nursing handoff (<strong>Smart Phrase “NURSINGSEPSISHANDOFF”</strong>) in Epic if a decision was made to transfer patient to other units.</td>
<td>15 min</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>ED MD</td>
<td>11-1. Disposition patient as appropriate given clinical state. 11-2. REASSESS fluid status (based on VS, lactic acid and/or bedside ultrasound, NICOM, urine output) and adds/orders Antibiotics as needed, AND DOCUMENT using <strong>Smart Phrase “SEPSISSASSESSMENT”</strong>.</td>
<td>5 min</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>MD</td>
<td>12-1. ICU Consult or ED/ICU MD to MD discussion recommended for transient or persistent hypotension and initial lactate &gt;4 mmol/L. (<strong>Smart Phrase “SEPSISSASSESSMENT”</strong>). 12-2. Disposition for admitted patients to the floor or telemetry per hospitalist and ED MD discussion.</td>
<td>as appropriate</td>
<td></td>
</tr>
</tbody>
</table>
## Appendix C

### Benchmark Data for Sepsis Protocol

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Month</th>
<th>First Vital to Lactic Acid Result within 60 minutes</th>
<th>Lactic Acid Result to Antibiotic Administration within 60 minutes</th>
<th>Antibiotic Order to Administration Within 35 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last Quarter 2022</td>
<td>October</td>
<td>100%</td>
<td>86%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>November</td>
<td>60%</td>
<td>90%</td>
<td>70%</td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>71%</td>
<td>85%</td>
<td>75%</td>
</tr>
<tr>
<td>First Quarter 2023</td>
<td>January</td>
<td>59%</td>
<td>94%</td>
<td>83%</td>
</tr>
<tr>
<td></td>
<td>February</td>
<td>60%</td>
<td>92%</td>
<td>77%</td>
</tr>
<tr>
<td></td>
<td>March</td>
<td>68%</td>
<td>100%</td>
<td>57%</td>
</tr>
</tbody>
</table>
Appendix D

Improving Timely Sepsis Care through Staff Education: Annotated Bibliography


This retrospective cohort study examined Emergency Department patients in an urban medical center who triggered alerts for sepsis. It examines data to determine if sepsis advisory alerts help to improve patient outcomes. This study found that the sepsis alert system did not help improve patient outcomes. This may be because of alert fatigue, ultimately leading to alerts being ignored. This relates to my sepsis improvement project because when deciding which intervention to implement, it is important to evaluate multiple evidence based practices to ensure I am implementing one that fits the microsystem with the strongest evidence to support it.


This prospective and historical cohort study evaluated how successful a two step machine-human interface approach is for screening patients in the emergency department for sepsis. This protocol uses a machine algorithm and the physician’s discretion to initial the sepsis protocol. The goal was to screen effectively and efficiency with enough sensitivity and
specificity to where only people with sepsis would enact the bundle protocol. This study found that using computer algorithm screening in addition to clinical decision making, sepsis was accurately screened. This is similar to the protocol we use in our microsystem. This relates to our project because this study shows the effectiveness of the screening protocol and the need for continued education to implement quality improvement.


This quality improvement project was implemented in a 54 bed emergency department of a community hospital. The aim of this project was to improve compliance with the sepsis protocol and reduce sepsis mortality. An interdisciplinary team was created, a sepsis alert algorithm and protocol were developed, and education was implemented. Education for this project included handouts, computer-based education, and didactic training during staff meetings. This project showed an increase in compliance to the sepsis bundle and a decrease in patient mortality. In our microsystem there currently is an interdisciplinary team working to help reduce sepsis and a sepsis alert protocol. Implementing education regarding sepsis and the sepsis protocol could help improve compliance in the emergency department, similar to this quality improvement project.

In this retrospective cohort study, adult patients who presented to the emergency department (ED) with sepsis were evaluated to determine how often a delay with the second dose of antibiotics occurred and what the outcomes when a delay occurred. This study found that many patients who remained in the ED at the time the second dose of antibiotics was due, had major delays. Additionally those who had major delays in receiving their second dose of antibiotics had increased rates of mortality, need for mechanical ventilation, and a longer stay in the hospital. This relates to my sepsis education improvement because it shows the association between patient outcomes and a delay in antibiotics among patients with sepsis.


This retrospective study, assesses the effectiveness of multiple interventions that a single health system implemented. The institution hired a sepsis coordinator, implemented real-time physician feedback, adjusted their electronic health record to include a sepsis early warning system, updated new sepsis orders and alerts, and carried out a sepsis education campaign. This study found that these interventions reduced antibiotic administration times, improved patient outcomes, and decreased sepsis related in-hospital deaths. These implementations are similar to what our organization has implemented, except for the robust sepsis education campaign. This evidence suggests that if we implement sepsis education regarding adherence to the sepsis protocol, we can improve compliance and patient outcomes.

This prospective observational study evaluated 193 patients at a tertiary care teaching hospital who presented to the emergency department (ED) with sepsis, severe sepsis, or septic shock. Clinical Impression Score (CIS), a PIRO score (predisposition, infection type, response to treatment, and organ failure indications), and a qSOFA score (altered mental status, respiratory frequency, and systolic blood pressure) were calculated and recorded for these patients. These measurements along with clinical judgment, helped predict the severity of illness among the patients and if ICU admission was required or if mortality was likely to occur. This pertains to my project because these tools help indicate the importance of prompt interventions. It is pertinent that patients who screen high with these tools receive treatment as quickly as possible. These screenings can help staff realize the importance of rapid intervention to reduce ICU stays and mortality.


This sepsis education program took place in a tertiary care, level II trauma center. Education was provided for nurses and providers in inpatient medical surgical units and
intensive care units. To determine if the education was effective, before and after the education, a retrospective descriptive evaluation was performed. This took place in the units listed before. Two nurses went to each unit and provided educational sessions to the staff that were about 10 minutes. They educated staff about sepsis, the sepsis protocol, the urgency of enacting the protocol and how to improve communication regarding sepsis. This project resulted in a reduction in the amount of time from a patient screening positively for sepsis to antibiotic administration. This relates to my project because it shows that education about the sepsis protocol can help reduce the time to antibiotics and can help improve patient outcomes.


This retrospective cohort study obtained data of all patients who presented to the emergency department (ED) with suspected sepsis in 12 hospitals. A delay in sepsis recognition during the triage process was a large contributor to a delay in antibiotic administration. This study found that hospital mortality or discharge to hospice was significantly associated with a delay in sepsis recognition. Interestingly, this study suggests that the target for antibiotics should be within in hour from when sepsis is suspected rather than an hour from initial triage. This is important for patients with multiple underlying or alternative conditions who may benefit from additional diagnostic evaluation. This study is relevant because it shows the association between delays in sepsis recognition with increased hospital mortality.
This retrospective cohort analysis examined adult patients who screened positively for sepsis in the emergency department of a New York academic hospital. A multidisciplinary team was implemented to improve sepsis bundle compliance through education. The education focused on nurses and utilizing the electronic health record sepsis tool to recognize and manage patients who screen positively for sepsis and on nurses and providers to use the bundle set protocol. By increasing education, the use of the electronic health record tool increased by 63.9% and the compliance of the sepsis bundle was 98.6% for patients where the electronic health record tool was used. This related to my quality improvement project because it shows that increasing education about the electronic health record screening and the sepsis bundle increases staff compliance.


This observational cohort study analyzed septic patients in a private hospital in Brazil. Its aim was to improve the amount of time it takes to identify patients with sepsis based on early warning signs in order to administer antibiotics faster and reduce mortality. This study shows that the manual surveillance system improved patient outcomes regarding sepsis.

Once an electronic alert system was implemented the triage to diagnosis time was reduced
which resulted in patients receiving treatment faster and improved outcomes. This relates to the quality improvement project because it shows the importance of reducing time from the moment the patient screens positively for sepsis to the time the antibiotics is administered.


This study assessed 867 physicians, advanced practice providers, and nurses from 9 institution with pediatric emergency departments. A pre and post test assessed the providers knowledge of pediatric sepsis and sepsis protocols. The providers performed eLearning to learn more about sepsis in particular among the pediatric population. The post tests showed that there was an increase in the pediatric sepsis test scores for all of the providers. This shows that eLearning can be an effective way to increase sepsis knowledge among hospital staff. This pertains to my project because it shows eLearning can be an effective way to promote sepsis knowledge and we will implement sepsis education via a video.
Appendix E

Survey for Sepsis Protocols Improvement

1. What is your highest degree?
   - ADN: 0
   - BSN: 4
   - MSN: 4
   - DNP: 0

2. How long have you been working at CPMC Mission Bernal, Emergency Department?
   - <1 year: 2
   - 1-4 years: 6
   - 5-10 years: 0
   - 10+ years: 0

3. What is your Primary Shift & employment status?
   - AM: 5
   - PM: 2
   - NOC: 0
   - Per Diem: 1
   - Part-time: 4
   - Full-time: 1
   - Traveler or Temporary: 0
4. How many years have you been an RN?

- <1 year: 1
- 1-4 years: 1
- 5-10 years: 4
- 10+ years: 2

5. Please rate your expertise of sepsis.

- Average Rating: 4.13

6. Please rate your knowledge of early warning signs of sepsis.

- Average Rating: 4.25
7. When triaging I am able to;

- Complete entirety of screening: 7
- Identify infection appropriately: 8
- Call sepsis alert when needed: 8
- Use dot phrase when charting: 3
- Ensure timely and appropriate o: 7

8. What is the average time it takes you to complete the sepsis screening section in epic?

- <5 minutes: 8
- 5-10 minutes: 0
- 10-25 minutes: 0
- 25-35 minutes: 0

9. Based on your knowledge of sepsis, how confident do you feel in running the sepsis workflow?

Average Rating: 4.13
10. Do you feel supported by the team when using the sepsis workflow?

More Details

4.00
Average Rating

11. When I am not able to meet sepsis workflow milestones, it is because:

8 Responses

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>anonymous</td>
<td>MD dispute</td>
</tr>
<tr>
<td>2</td>
<td>anonymous</td>
<td>MD discretion, simply not enough time/resources/manpower.</td>
</tr>
<tr>
<td>3</td>
<td>anonymous</td>
<td>Confounding factor such as difficult IV start, pt won't hold still for a clean 12 lead, etc.</td>
</tr>
<tr>
<td>4</td>
<td>anonymous</td>
<td>The use of the orderset is not helpful.</td>
</tr>
<tr>
<td>5</td>
<td>anonymous</td>
<td>the patient is a hard stick, the fluids are not infusing quickly, the physician did not order the antibiotics</td>
</tr>
<tr>
<td>6</td>
<td>anonymous</td>
<td>Poor coordination/recognition by attending</td>
</tr>
<tr>
<td>7</td>
<td>anonymous</td>
<td>When busy with other sick patients</td>
</tr>
<tr>
<td>8</td>
<td>anonymous</td>
<td>staffing</td>
</tr>
</tbody>
</table>
12. If you do not feel comfortable with the sepsis workflow, explain below.

4 Responses

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>anonymous</td>
<td>n/a</td>
</tr>
<tr>
<td>2</td>
<td>anonymous</td>
<td>n/a</td>
</tr>
<tr>
<td>3</td>
<td>anonymous</td>
<td>Using order set is not helpful if MD can see the patient promptly.</td>
</tr>
<tr>
<td>4</td>
<td>anonymous</td>
<td>n/a, the workflow is easy to complete</td>
</tr>
</tbody>
</table>

13. I feel like improvements can be made to these protocols to decrease fallouts.

More Details

![Average Rating](image)

2.88
Average Rating

14. If you feel there is room for improvement, what would yours be?

6 Responses

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>anonymous</td>
<td>n/a</td>
</tr>
<tr>
<td>2</td>
<td>anonymous</td>
<td>Running the protocol efficiently requires staff to do so, especially during busier times in the ER.</td>
</tr>
<tr>
<td>3</td>
<td>anonymous</td>
<td>Stop the order set unless provider is unable to place orders within 15 minutes.</td>
</tr>
<tr>
<td>4</td>
<td>anonymous</td>
<td>Physicians ordering the correct order set, all staff entering the correct sepsis screening and re-screening appropriately</td>
</tr>
<tr>
<td>5</td>
<td>anonymous</td>
<td>MD’s to use protocols, physically respond to bedside on all sepsis alerts</td>
</tr>
<tr>
<td>6</td>
<td>anonymous</td>
<td>more staff</td>
</tr>
</tbody>
</table>
15. Thank you so much for your time! Please add any other comments here!

2. Responses

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>anonymous</td>
<td>the dot phrase does not get entered during triage, it gets entered hours later after the entire workup is completed. Also, the sepsis screening takes about 30-60 seconds, never 25-35 minutes, and rarely more than 1 minute. It should never take a nurse more than 1 minute to complete the sepsis screening. There are also many other documentation points for sepsis not mentioned in the survey that I'm not sure if you want to include.</td>
</tr>
<tr>
<td>2</td>
<td>anonymous</td>
<td>LR or plasmalyte should be the standard fluid stocked and used in the ED</td>
</tr>
</tbody>
</table>
Appendix F

Fishbone Diagram

- Communication
  - Ineffective communication between MD, RN, AD
    - Pharmacy, ED, Lab
    - Delay in enacting sepsis protocol

- Antibiotics
  - Delay in antibiotic administration due to hard needle stick or inability to obtain IV access
  - Ordered antibiotics not available on the unit

- Staffing
  - Unpredictability of ED can increase staff
    - Patient load, occupying
    - Staff with other patients

- Gaps in Knowledge
  - Low confidence in identifying the signs and symptoms of sepsis
    - Low confidence in enacting the sepsis protocol

- Fallout
  - Antibiotics or fluids not present on the unit

- Deviation from the bundle order sets
  - MD orders differ from the CMS SEP-1 bundle

- Consistent gaps in practice in the CMS SEP-1 Bundle
Appendix G

5 P’s Assessment

Purpose

Timely and high quality sepsis screening, treatment, and management for patients in the Emergency Department

Patients

ED patients who suffered accidents, injuries, or other serious medical conditions, such as difficulty breathing, unconsciousness, severe bleeding, poisoning, chest pain, severe allergic reactions, moderate to severe burns or wounds, seizures, and more.

Professionals

- Nurses
- Sepsis coordinator
- ED nurse manager
- Doctors

Processes

- Triage patient and perform sepsis screening
- If screen positive, notify RRT RN or charge nurse who will repeat screen and notify MD.
- Initiate the standardized RN sepsis order set
- Document appropriately of interventions

Patterns

- Inconsistent compliance with meeting CMS SEP-1 bundle goal of 90% across all benchmarks
- Feedback that nurses were not completing sepsis screening tool
- Ineffective MD-RN communication
Appendix H

SWOT Analysis

<table>
<thead>
<tr>
<th></th>
<th>Favorable/Helpful</th>
<th>Unfavorable/Harmful</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Internal</strong></td>
<td><strong>Strengths</strong></td>
<td><strong>Weaknesses</strong></td>
</tr>
<tr>
<td></td>
<td>● Sepsis quality improvement team</td>
<td>● Lack of awareness from the nursing staff to identify necessary changes in sepsis prevention.</td>
</tr>
<tr>
<td></td>
<td>● Collaborative participation from the ED sepsis coordinator and manager</td>
<td>● Lack of emphasis and reinforcement for standardized practices.</td>
</tr>
<tr>
<td></td>
<td>● Hospital Quality Dashboard in place that tracks rates of Sepsis in the ED and select wards, comparing them to CA and USA averages.</td>
<td>● Poor Physician support of current best practices (incorrect bundle order sets)</td>
</tr>
<tr>
<td><strong>External</strong></td>
<td><strong>Opportunities</strong></td>
<td><strong>Threats</strong></td>
</tr>
<tr>
<td></td>
<td>● Reduce the risk of Sepsis</td>
<td>● Lack of education retention of proposed changes among staff</td>
</tr>
<tr>
<td></td>
<td>● Improvement of patient care and safety</td>
<td>● Limited time, staff, and resources to conduct change.</td>
</tr>
<tr>
<td></td>
<td>● A hospital-wide commitment to quality improvement</td>
<td>● Fast-paced busy ED workflow that may interrupt bundle administration times.</td>
</tr>
<tr>
<td></td>
<td>● Tracking metrics on quality improvement indicators</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Evidence-based practice on Sepsis reduction, patient and nurse education</td>
<td></td>
</tr>
</tbody>
</table>
# Appendix I

## Cost Benefit Analysis: Cost of Sepsis per Patient Varying by Severity

<table>
<thead>
<tr>
<th></th>
<th>Sepsis</th>
<th>Severe Sepsis</th>
<th>Septic Shock</th>
</tr>
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<tbody>
<tr>
<td><strong>Daily Cost</strong></td>
<td>$1,830</td>
<td>$2,193</td>
<td>$3,087</td>
</tr>
<tr>
<td><strong>Additional Length of Stay (days)</strong></td>
<td>4.5</td>
<td>6.5</td>
<td>16.5</td>
</tr>
<tr>
<td><strong>Total Cost Per Patient</strong></td>
<td>$8,235</td>
<td>$14,254.50</td>
<td>$50,935.50</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Cost of Implementing this Project</th>
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</thead>
<tbody>
<tr>
<td><strong>Cost of Implementing this Project</strong></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Reduce Length of Stay (days)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reduce Length of Stay (days)</strong></td>
<td>1.12</td>
<td>2</td>
<td>10</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Total Savings Per Patient</th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Total Savings Per Patient</strong></td>
<td>$2050</td>
<td>$4386</td>
<td>$30,870</td>
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</table>
Appendix J

Process Map
Appendix K

Sepsis PowerPoint Script

Slide 2 Identifying Sepsis

- Early sepsis identification and prompt intervention is crucial in lowering sepsis related mortality. With that, let’s review how to identify sepsis when triaging. Sepsis can be identified when a patient exhibits 2 or more SIRS criteria and either has or is suspected to have an infection. SIRS symptoms include: temperature >38.3°C or <36°C, HR >90 beats/min, RR >20 breaths/min, WBC >12k or <4k, Blood glucose >140 in Non diabetic patient, and change in mentation. Possible signs and symptoms of infections to look out for includes fever, rigors, coughs, sore throat, SOB, pain/urgency in urination, skin changes, diarrhea or vomiting.

Slide 3 CPMC Mission Bernal Data

- Looking back at the data from the Mission Bernal ED, we can see the areas in which there are consistent gaps in practice in the CMS SEP-1 bundle. These areas are First Vital to Lactic Acid Result within 60 minutes, Lactic Acid Result to Antibiotic Administration within 60 minutes, and Antibiotic Order to Administration Within 35 minutes. In the last quarter of 2022, this unit was able to meet the 90% threshold on their instances all in different categories. In the first quarter of 2023 the unit was able to meet the 90% threshold on three instances, but all in the same category. Overall, the last quarter of 2022 averaged higher in all categories, and in 2023 the first quarter averaged lower. So how can we close the gaps in the next quarter of 2023?

Slide 4 Survey Summary
- A pre-intervention survey was sent to nurses to fill out with the purpose to gather information on demographics and their opinion on the current sepsis workflow and barriers. We had a 23% response. Most of the responses were from AM shift nurses who are either working full-time or part-time. Unfortunately, we were unable to obtain any responses from travel nurses or staff from the night shift. Looking at the years of RN experience, only 1 participant had less than one year of nursing experience. Evaluating the graphs on the right, 88% of the nurses have greater than average knowledge and confidence in the sepsis workflow. The biggest barriers to the timely compliance to the sepsis workflow was identified to be MD-RN communication, difficulty starting IVs, and staffing. Interestingly, the participants only felt moderately confident that improvement projects can help decrease patient fallout.

**Slide 5 Current Best Practices**

- According to the Agency for Healthcare Research and Quality (AHRQ) the best practices for sepsis management in the emergency department is as follows.
- First nurses must screen patients for sepsis using a screening tool within the electronic health record system.
- Next is to identify patients quickly using a standardized set of physiological triggers including sweating, abnormal temperature, rigors, confusion, tachycardia, and tachypnea.
- Next is the implementation of the sepsis resuscitation bundle which includes: obtaining blood cultures, administering antibiotics, measuring serum lactate, managing fluid status for hypotension and lactate greater than or equal to 4 mmol/L all within the first three hours of sepsis diagnosis.
Lastly is to be consistent and diligent when executing the sepsis resuscitation bundle—which is to be during the 3-hour and 6-hour phases. With all elements completed within the 6-hour timeframe.

**Slide 6 First Vital to Lactic Acid**

- Data was collected for “vitals to lactic acid results within 60 minutes” for quarter 4 of year 2022 then again in quarter one of 2023.
- Quarter four, consisting of October, November and December of 2022 had a 100% compliance rate in October, a 60% compliance rate in November, and a 71% compliance rate in December.
- Quarter one, Consisting of January, February and March of 2023 resulted in a 59% compliance rate in January, 60% compliance rate in February and a 68% compliance rate in March.
- Average compliance rates for Q4 of 2022 was 77%, along with a 62% compliance rate for Q1 of 2023. That is a decrease in compliance rate of 19% for quarter one compared to quarter four of the previous year.

**Slide 7 Antibiotic Order to Administration**

- Of the data collected for “antibiotic order to administration” we saw a slight decrease in compliance from Q4 of 2022 to Q1 of this year (2023)
- In Q4 2022, compliance rates were at an all time high with 90% compliance then returning to baseline (71%) in November and December.
- The start of this quarter has kept above baseline with January showing an 83% rate and February at 77%. Although, the metrics for March are lower due to data still being collected at time of collection.
• Overall compliance rates for “antibiotic order to administration” has been at or slightly above baseline, but there is room for improvement to increase compliance rates to 90% (as seen in September and October of 2022).

**Slide 8 Advocating for Patients**

• Half of survey respondents mentioned MD-RN communication gaps in their open responses as reasons for why sepsis workflow milestones were not being met. When survey participants were asked to address the prompt “When I am not able to meet sepsis workflow milestones, it is because:”, the answers included “MD dispute”, “MD discretion”, “the physician did not order the antibiotics” and “poor coordination/recognition by attending.” As such, improving MD-RN communication was identified as a major goal to achieving timely sepsis care.

• One such study by Simon et al. carried out in the emergency department of a hospital in Chicago implemented scripted communication tools as part of a coordinated response team effort to improve time to sepsis treatment. The standardized communication consisted of scripting to ensure team alignment and RN communication regarding best practice alert fire, which utilizes clinical data available in Epic to provide real-time alerts to providers and nurses about the possibility of sepsis. Physician communication about pathway selection and time zero and reassessment time were also included. Clear MD-RN communication was noted in 88% of observations after implementation. Similar standardized communication guidelines could be implemented at the site to help facilitate improved communication between nurses and physicians and improve overall efficiency in delivering timely sepsis care.

**Slide 9 Recommended next steps**
• We recommend evaluating the data from the next quarter to determine if there is improvement with consistently reaching every benchmark. The data can be compared to the 2023 first quarter and 2022 last quarter data to see if benchmarks are being met. If the unit sees repeated incidences of sepsis fallout, we recommend returning to the Plan-Do-Study-Act cycle and further researching ways to reduce fallout. Check in the staff break room for updated data next quarter or reach out to your sepsis coordinator.

• Make sure new staff members are educated about sepsis and the sepsis protocol. It also is important to periodically review the sepsis protocol to make sure you are able to enact it quickly when needed. If you feel confident with identifying sepsis and the protocol, check in on newer staff and your coworkers to see if they have any questions so when the time comes they will feel confident identifying and addressing sepsis too. It could save someone’s life.

• Continue to advocate for your patients and work on communicating with your interdisciplinary team. Feel confident in the protocol CPMC has implemented.

• Keep up the great work screening every patient and enacting the sepsis bundle rapidly when needed.

• If you need help, ask for help. Reach out to your manager or sepsis coordinator if you have questions or concerns, they are here to support you!
Appendix L

PowerPoint Slides

Improving Timely Sepsis Care through Staff Education Within the Emergency Department
Jillian Abinader RN, Leman Bush RN, Kaylee Castro RN, Shirley Chen RN, Spencer Forest RN, Lian Radcliffe RN, and Gregory Trevino RN

Identifying Sepsis

Sepsis: ≥ 2 SIRS criteria + known or suspected infection

Systemic Inflammatory Response Syndrome
- Temperature >38.3°C or <36°C
- Heart Rate >90 beats/min
- Respiratory Rate >20 breaths/min
- White Cell Count >12k or <4k
- Blood Glucose >140 and non-diabetic
- Change in mentation

Possible Sign & Symptoms of Infections
- Fever/Chills/Rigors/Weakness
- Change in cough/New cough
- Sore throat/New mouth sore
- SOB/Nasal congestion/Stiff neck
- Burning/Pain/Increased in Urination
- Redness/Soreness/Swelling on skin
- Diarrhea/Vomiting/Pain in the abdomen

CPMC Mission Bernal Data

How has the microsystem been doing?

Last Quarter of 2022 at a Glimpse

<table>
<thead>
<tr>
<th></th>
<th>First Lactate Acid Result within 10 min</th>
<th>Lactate Acid Result within 60 minutes</th>
<th>Antibiotic Order to Administration Within 30 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>October</td>
<td>100%</td>
<td>84%</td>
<td>100%</td>
</tr>
<tr>
<td>November</td>
<td>60%</td>
<td>85%</td>
<td>70%</td>
</tr>
<tr>
<td>December</td>
<td>71%</td>
<td>85%</td>
<td>75%</td>
</tr>
</tbody>
</table>

First Quarter of 2023 at a Glimpse

<table>
<thead>
<tr>
<th></th>
<th>First Lactate Acid Result within 10 min</th>
<th>Lactate Acid Result within 60 minutes</th>
<th>Antibiotic Order to Administration Within 30 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>77%</td>
<td>94%</td>
<td>82%</td>
</tr>
<tr>
<td>February</td>
<td>66%</td>
<td>92%</td>
<td>77%</td>
</tr>
<tr>
<td>March</td>
<td>60%</td>
<td>100%</td>
<td>7%</td>
</tr>
</tbody>
</table>
Survey Summary

- 23% response rate (n = 8): (5 AM shift, 5 part-time/full-time)
- 0 response from travelers or night shift

Years of RN experience:
- <1 year: 1
- 1-3 years: 1
- 5-7 years: 4
- >8 years: 2

Barriers:
- MD-RN Communication
- Hard sticks
- Staffing

Can improvements to the Sepsis protocol decrease failouts?
- Average rating of 2.88/5

Knowledge in Early Warning Signs of Sepsis

Expertise of Sepsis & Confidence in Running the Sepsis Workflow

Current Best Practices

1. Screen patients for sepsis using a screening tool within the electronic health record system.
2. Identify patients quickly using a standardized set of physiological triggers including: sweating, abnormal temperature, rigors, confusion, tachycardia, tachypnea
3. Implement sepsis resuscitation bundle: obtain blood cultures, administer antibiotics, measure serum lactate, manage fluid status for hypotension (fluid shifting) and lactate greater than or equal to 4 mmol/L all within the first 3 hours of sepsis diagnosis.
4. Apply sepsis bundle during the 3hr phase and 6hr phase. All elements to be completed within the 6hr timeframe.

First Vitals to Lactic Acid Results Within 60 Minutes
Antibiotic Order to Administration Within 35 Minutes

- Q4 2022: 70% in October, 80% in November, and 75% in December
- Q1 2023: 65% in January, 77% in February, and 77% in March

Advocating for Patients

- Improving MD-RN communication was identified as a major goal to achieving timely sepsis care
- 50% of survey respondents cited MD-RN communication gaps as reasons for why sepsis workflow milestones were not being met
- One study by Simon et al. (2020) implemented scripted communication tools as part of a coordinated response team effort to improve time to sepsis treatment
- Clear MD-RN communication regarding "best practice alert fire and pathway selection was noted in 88% of observations after implementation"

Survey Open Responses:

- "Best Practice Alert is not a sufficient tool in itself but the lack of awareness"
- "Best Practice Alert is not a sufficient tool in itself but the lack of awareness"

Recommended Next Steps

- Evaluate Q2 2023 data
- Educate new staff on the sepsis protocol
- Periodically continue to educate staff about sepsis and the sepsis protocol, as well as annual competency
- Continue to improve communication regarding sepsis
- Keep up the great work screening every patient and enacting the sepsis bundle rapidly
- Ask for help when needed
Thank You!

References


Appendix M

Statement of Determination

Title of Project: Improving Timely Sepsis Care through Staff Education

A protocol is currently in place to screen every patient and enact a sepsis bundle when the patients screen positive for sepsis. Data shows that there is inconsistency with how often the benchmarks of this protocol are met and rarely meet the goal of 90% each month.

The aim is to improve the amount of time it takes to reach each benchmark in the sepsis bundle in a 16 bed emergency department (ED) in San Francisco. The process begins with assessing the microsystem. The process ends with all the benchmarks of the sepsis bundle being met by 90%. By working on the process, we expect to improve patient outcomes, decrease fallout, and reduce patient mortality related to sepsis. It is important to work on this now because benchmarks are not consistently being met, the time it takes to enact all parts of the sepsis bundle is more than the targeted time, and fallout is occurring each month.

The intervention is to provide education to the ED staff nurses via an educational video and update information about sepsis and the protocol in the staff break room.

The desired change is that timely sepsis care will improve and that staff with consistently reach all of the benchmarks in the sepsis screening and protocol 90% of the time.

Pre and post surveys will be completed by staff nurses before and after the education is implemented. These surveys will evaluate confidence levels regarding sepsis and enacting the sepsis bundle in a timely manner.

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 (Please print):

___ Jillian Abinader ___

Signature of Student:

___ Jillian Abinader ___ DATE 4/2/2023

SUPERVISING FACULTY MEMBER NAME (Please print):

___ Dr. Patterson ___

Signature of Supervising Faculty Member

___ DATE 4/17/2023 ___
### Appendix N

**Evidence-Based Change of Practice Project Checklist**

<table>
<thead>
<tr>
<th>Project Title:</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.

*Adapted with permission of Elizabeth L. Hohmann, MD, Director and Chair, Partners Human Research Committee, Partners Health System, Boston, MA.*
### Appendix O

**Research VS QI/Process Improvement**

This table provides an overview of the difference between research and quality or process improvement.

<table>
<thead>
<tr>
<th></th>
<th><strong>RESEARCH</strong></th>
<th><strong>QI/PROCESS IMPROVEMENT</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DEFINITION</strong></td>
<td>&quot;A systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge. Activities, which meet this definition, constitute research for purposes of this policy, whether or not they are conducted or supported under a program which is considered research for other purposes. For example, some demonstration and service programs may include research activities.&quot; <a href="http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.html#46.102">http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.html#46.102</a></td>
<td>Assess or improve a process, program or system to improve performance as judged by the evidence, i.e., established/accepted standards</td>
</tr>
<tr>
<td><strong>PURPOSE</strong></td>
<td>Answer a question or test a hypothesis</td>
<td>Improve performance/process or systems</td>
</tr>
<tr>
<td><strong>BENEFITS</strong></td>
<td>May or may not benefit current patients, but may benefit future patients</td>
<td>Directly benefits a process, program or system and may or may not directly benefit patients</td>
</tr>
<tr>
<td><strong>RISKS</strong></td>
<td>May put subjects at risk</td>
<td>Does not increase risk to patients with the exception of possible</td>
</tr>
</tbody>
</table>