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Sepsis Inservice and Video at an Urban Hospital in California

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NURS-653 Internship

Mallory Manuel

December 4, 2022

Abstract

The emergency department at an urban hospital in California was performing below institutional goals related to sepsis protocols over the past few months. This intervention was targeted at nurses and was composed of a PowerPoint in-service on compliance to SEP-1 protocols and follow-along video on using the correct sepsis order set and documentation in the electronic health record (EHR). Goals included increased compliance to the SEP-1 protocol and documentation, (2) reduced time between the onset of symptoms, recognition, and intervention, (3) decline in sepsis rates and mortality rates, and (4) lower cost of care. Data was collected from the EHR to assess for correct documentation and treatment of septic patients. After the intervention, the following metrics reached 100%: (1) First vital to lactic acid result in 60 minutes, (2) lactic acid result to antibiotic administration within 60 minutes, and (3) antibiotic order to administration within 35 minutes. These results suggest that an in-service on SEP-1 protocols and follow-along video on documentation can improve SEP-1 compliance, documentation, and metrics.

Keywords: sepsis, timely, antibiotic, intervention, septic shock, severe sepsis, timing, emergency medicine, SEP-1, bundle, compliance, educational, quality improvement, emergency department

Sepsis Inservice and Video at an Urban Hospital in California

According to the Joint Commission (n.d.), sepsis is the leading cause of death in hospital patients. Sepsis costs hospitals \$17 billion annually and has a mortality rate of 25 to 50 percent causing 220,000 deaths annually (The Joint Commission, n.d.). The Severe Sepsis and Septic Shock Management Bundle, also known as SEP-1, is a standardized protocol that prioritizes timely screening and intervention for septic patients (Sepsis Alliance, 2021). SEP-1 has shown to improve patient outcomes, including reducing sepsis mortality rate, yet compliance remains low in reporting hospitals (Barbash et al., 2019; Townsend et al., 2022). The aim is to improve sepsis recognition and early intervention in the emergency department at an urban hospital in California by increasing SEP-1 compliance. The process began with an in-service using a PowerPoint presentation to educate nurses on complying to the SEP-1 order set and a follow-along video demonstrating correct documentation. The process ends with efficient screening and treatment of septic patients and correct documentation. By working on the process, we expect (1) increased compliance to the SEP-1 protocol and documentation, (2) reduced time between the onset of symptoms, recognition, and intervention, (3) decline in sepsis rates and mortality rates, and (4) lower cost of care.

Statement of the Problem

This emergency department provides 24-hour emergency room care to a diverse patient population and includes 16 treatment rooms. Unfortunately, performance in sepsis protocol compliance had fallen below baseline on all sepsis protocol measures including: (1) the first vital to lactic acid result within 60 minutes, (2) the lactic acid result to antibiotic administration within 60 minutes, and (3) the antibiotic order to administration within 35 minutes. These results may

also be partially caused by incorrect documentation (i.e., documenting lab collection after sending it to the lab rather than before).

These statistics are far from optimal and can lead to detrimental outcomes. For example, in a study based in Northern California, delaying antibiotic administration was associated with an increase in mortality rate with every hour (Liu et al., 2017). Additionally, an observational retrospective study used electronic health records from 22 Sutter Health emergency departments and found that early intravenous fluid and antibiotic administration, as well as sepsis screening within 30 minutes were associated with reduced mortality, length of stay, and intensive care unit (ICU) hours (Sudat, 2021). Although this study is in the process of being peer-reviewed, it provides promising data as it is generalizable to Californian emergency department patients. Extending length of stay in the emergency department is costly and should be avoided.

Literature Review

Earlier studies on SEP-1 were controversial, but recent studies are showing positive results. Rhee et al. (2018) conducted a retrospective cohort study that compared outcomes in cases that passed SEP-1 to cases that failed. The researchers expressed concerns about the “all-or-nothing approach,” which can be overly rigid and not significantly beneficial for patient outcomes. The conclusion states that “crude mortality rates were higher in sepsis cases that failed versus passed SEP-1 but there was no difference after adjusting for clinical characteristics and severity-of-illness.” Higher mortality rates due to later antibiotic administration accounted for only a fraction of hospitals that failed SEP-1 (Rhee et al., 2018). Another study by Rhee et al. (2020) acknowledged how sepsis is still a major cause of death and disability despite progress in protocols. The article identified concerns including over prescription of antibiotics and unreliable existing studies. Researchers suggest that hospitals should measure the time from antibiotic order

to infusion for patients with septic shock, further evaluation on broad spectrum antibiotic administration, and utilization of automated analysis of SEP-1 through electronic health records (Rhee et al., 2020). Rhee et al. (2020) make valid points that this emergency department can implement. For example, because SEP-1 has an “all-or-nothing approach,” it is important for staff to correctly document actions performed when caring for sepsis patients to provide accurate metrics that can be evaluated for quality improvement.

Townsend et al. (2022) stated that the controversy surrounding SEP-1 efficacy could be a factor in poor SEP-1 compliance. Because of this, Townsend et al. (2022) conducted a study on “the association between compliance with SEP-1 and 30-day mortality”. This study used Medicare data reported by 3,241 hospitals. Compliance to SEP-1 decreased sepsis mortality rates from 27.48% to 21.81%. Additionally, the median length of stay was shorter in patients at compliant hospitals. The researchers conclude that SEP-1 may be able to reduce incidence of avoidable deaths. Furthermore, Barbash et al. (2021) conducted a longitudinal study and used repeated cross-sectional cohorts of patients from 11 hospitals that utilize SEP-1. After two years of SEP-1 implementation, lactate measurement within three hours of sepsis onset increased and there were small increases in antibiotic administration and fluid administration within three hours. These improvements are important because early lactate measurement and antibiotic administration has shown to improve patient outcomes (Gauer et al., 2020).

A cross-sectional study found that better SEP-1 compliance was associated with timely head computed tomography (CT) evaluation for stroke patients, increased aspirin administration, and shorter time for electrocardiograms for patients with angina, but despite the benefits of SEP-1, compliance among reporting hospitals was generally low (Barbash et al., 2019). To improve SEP-1 compliance, a project team at an emergency department in a community-based teaching

hospital created a sepsis order set in the electronic medical record system and implemented an educational initiative to improve SEP-1 compliance and use of the sepsis order set (Alexander et al., 2022). Before the intervention, the hospital was not achieving target expectations, but after the implementation of the program, SEP-1 compliance increased from 57% to 62%, which is above national averages (Alexander et al., 2022). It is important to note that these results are not statistically significant, however, it is promising that simple and cost-effective interventions like these can lead to improvements, although small. Another study by Sonis et al. (2020) utilized an interdisciplinary Sepsis Huddle to discuss blood culture collection and antibiotic and crystalloid fluid administration according to SEP-1. This resulted in the creation of a sepsis huddle checklist that correlated with the electronic medical record. The retrospective cohort analysis found that the Sepsis Huddle was associated with antibiotics being administered 41 minutes earlier compared to the administration time before the Sepsis Huddle was implemented (Sonis et al., 2020).

Rationale

This project will be guided by Lewin's Change Theory, a model that identifies the processes and variables involved in change on an individual to organizational level (Schein, 1996, p. 28). The model comprises of three stages, including unfreezing, change, and refreezing and is a process that involves "painful unlearning without loss of ego identity and difficult relearning as one cognitively attempted to restructure one's thoughts, perceptions, feelings, and attitudes" (Schein, 1996, p. 28).

During the unfreezing phase, the individual experiences an alteration of driving or restraining factors (Harris, 2018). There are driving factors towards change and restraining factors that resist change. These two factors affect the "force-field equilibrium" (Lewin, 1951). A

restraining factor may include loss of self-esteem if change occurs because it involves an acceptance that there are flaws that exist (Schein, 1996, p. 29). This feeling of inadequacy leads individuals to be defensive and experience “learning anxiety” (Schein, 1996, p. 29). To reduce the risk of anxiety and low self-esteem, the emphasis in the presentation and video was on how the change will create a positive impact on sepsis metrics rather than focusing on criticism and punishment. The presentation provided general objective data and goals so that no nurses were isolated in the process. Lewin himself addressed this when helping assembly line workers and housewives by encouraging them to identify their insecurities and reframing the norms (Schein, 1996). Once individuals can accept the identified imperfections, change can occur. Like Lewin, the managers facilitated open communication with nurses and welcomed feedback on the obstacles that interfere with timely lactate measurement, antibiotic administration, and accurate documentation.

Individuals in the organization are more motivated towards change once driving forces overcome restraining forces. (Harris, 2018). Role models and attitude change within a supportive environment will further encourage change. In this case, a champion nurse who was also an educator, advocated for this quality improvement project within her unit. After the change stage, refreezing occurs. This stage includes the assimilation of new attitudes or behaviors in the existing system, leading to stability and a new equilibrium (Harris, 2018).

Methods

Context

After communicating with the sepsis coordinator, a nurse on the unit, clinical nurse manager, and physician, a fishbone diagram was created to assess the factors that contributed to sepsis metrics falling below baseline (see Appendix A). Causes included: (1) documentation of

incorrect lab collection times, screenings, and fluid stop times, (2) delayed vital sign and lactate measurements, (3) delayed antibiotic administration, (4) lack of communication through Vocera, and (5) using the incorrect order set. Purpose, patients, professionals, processes, and patterns, also known as the “5 P’s”, were identified to help prioritize factors to address (see Appendix B).

Budget Analysis and Return on Investment

According to Paoli et al. (2018), sepsis ranks the highest in costs in hospitals within the United States. The same study found that increasing severity correlated with higher mortality rates and costs. Paoli et al. (2018) reported that the average length of stay is 4.5 days for sepsis, 6.5 days for severe sepsis, and 16.5 days for septic shock. Specific sepsis cost data from the emergency department in this urban hospital could not be accessed. However, it is likely that the cost per day was even higher because according to the campus’ chargemaster, a level two visit costs over \$1,000, a level three visit costs over \$2,000, and a level four visit costs over \$4,000 (California Health and Human Services, 2022). A study by Townsend et al. (2022) found that compliance to the SEP-1 bundle decreased length of stay by approximately one day. Although one day may seem minimal, the cost savings are significant. Because the intervention was implemented by graduate student interns, the screen-recording program was already available in the computer at the hospital, and viewing the video was voluntary for nurses, there were no costs. See Appendix C for the cost savings chart.

Intervention

These interventions were implemented by Master's Entry Master of Science in Nursing student interns from the University of San Francisco and were targeted at nurses. The interventions included a PowerPoint in-service on compliance to SEP-1 protocols and follow-along video on using the correct sepsis order set and documentation in the electronic health

record (EHR) (see Appendix D for the PowerPoint slides and Appendix E for the video script). The follow-along video provided a screen recording of correct documentation on the EHR with a voiceover. The voice over provided education on screening patients for sepsis at triage, using Vocera to broadcast to the emergency department and notify the healthcare provider, ordering the standardized order set, and documenting correct lab collection times. The clinical nurse manager then emailed the video to nurses in the emergency department in the urban hospital and partnering hospitals. To increase participation and awareness, a champion nurse informed her coworkers about the video.

Study of the Intervention and Measures

Quantitative and qualitative data was recorded. Data was manually collected from the electronic health record (EHR) to assess for correct documentation, ordering of the sepsis order set, and compliance to SEP-1. Additionally, feedback was requested from the nurses, the clinical nurse manager, and sepsis coordinator.

Results

After the intervention, the following metrics reached 100% compliance: (1) First vital to lactic acid result in 60 minutes, (2) lactic acid result to antibiotic administration within 60 minutes, and (3) antibiotic order to administration within 35 minutes. Positive feedback was provided, and the clinical nurse manager expressed that he had noticed improvement since the release of the video.

Discussion

Summary

Simple interventions such as in-services and audio-visual media can be cost-effective and time-efficient ways to increase compliance, which has potential to create a significant impact.

After the interventions, compliance improved in certain elements of SEP-1 including timely lactic acid screening and antibiotic administration. This is meaningful data as delays in compliance to the 3-hour sepsis bundle and antibiotic administration has shown to increase mortality (Seymour et al., 2017). Given the positive results in SEP-1 compliance, and interventions with no expenses, the use of audiovisual education has shown to be cost-effective for this urban hospital.

Conclusion

SEP-1 is a protocol that emphasizes timely screening and antibiotic treatment (Sepsis Alliance, 2021). It has shown to reduce mortality and length of stay (Townsend et al., 2022). In other words, compliance can mean the difference between life and death. It is also important to understand that although two thirds of patients survive sepsis worldwide, they can suffer long-term effects, especially if sepsis was severe (Sepsis Alliance, 2022). Physical long-term effects include organ dysfunction, amputations, and higher risk of sepsis recurrence (Centers for Disease Control [CDC] and Prevention, 2022). In addition to physical impairment, sepsis can cause insomnia, decreased cognitive function, and post-traumatic stress disorder (CDC, 2022; Sepsis Alliance, 2022). It is imperative to prevent severe sepsis as it can be physically and psychologically detrimental for patients and their families.

Although these educational interventions require further evaluation, repetition, and improvement, they provide promising results. The outcome of this quality improvement project further supports the importance of education in improving SEP-1 compliance. Additionally, it has potential for spread in emergency departments as evidenced by sepsis accounting for 850,000 emergency room visits annually (Wang et al., 2018).

This quality improvement project is sustainable because the materials can easily be handed off to other interns and staff. In fact, this quality improvement project will be continued in 2023 by Master's Entry - Master of Science in Nursing interns from the University of San Francisco. Future interns and staff at this urban hospital can explore ways to increase nurse participation. Additional data the next cohort can measure include patient outcomes such as mortality rate, severity, and recovery. It is important to note that is this not a randomized-control trial (RCT) (See Appendix F). Researchers can repeat these interventions in a randomized-control trial and utilize that data for research purposes.

Although safety huddles and educational initiatives have shown to be effective in increasing SEP-1 compliance, the existing literature on SEP-1 quality improvement is insufficient (Alexander et al., 2022; Sonis et al., 2020). Research on audiovisual media and its connection to SEP-1 compliance is even more scarce. Because of this, it is important to continue this quality improvement initiative and disseminate results as it progresses.

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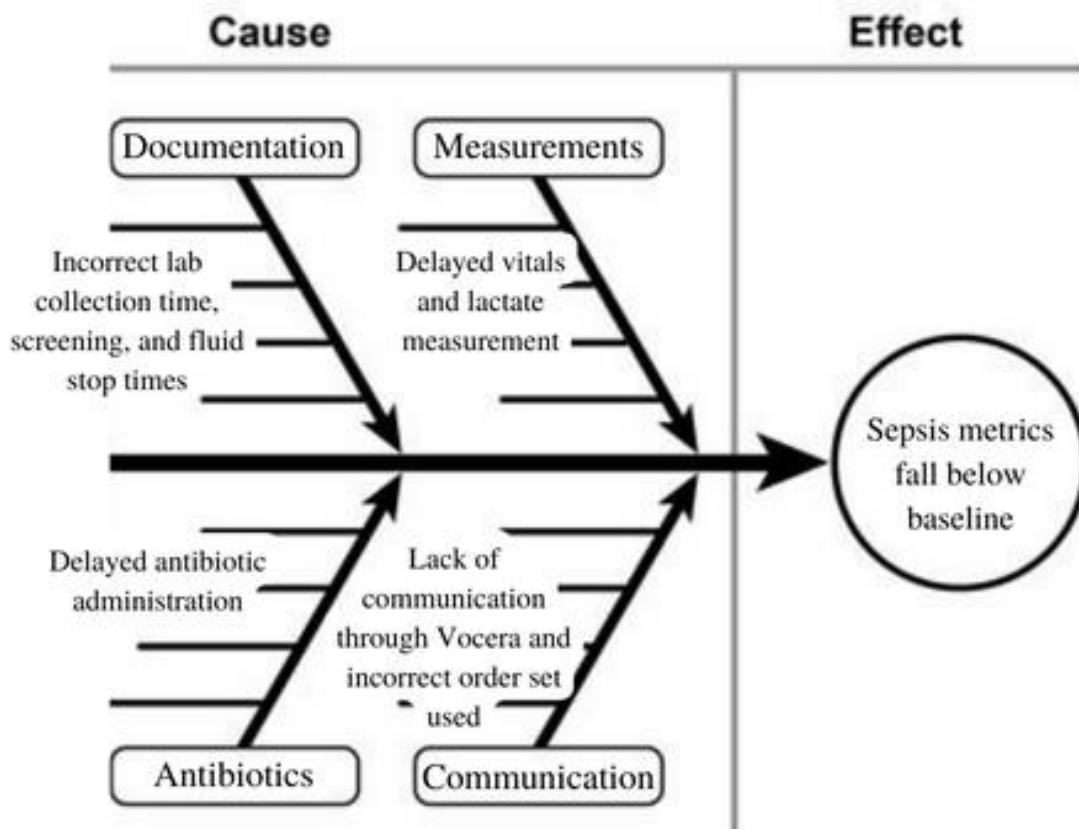
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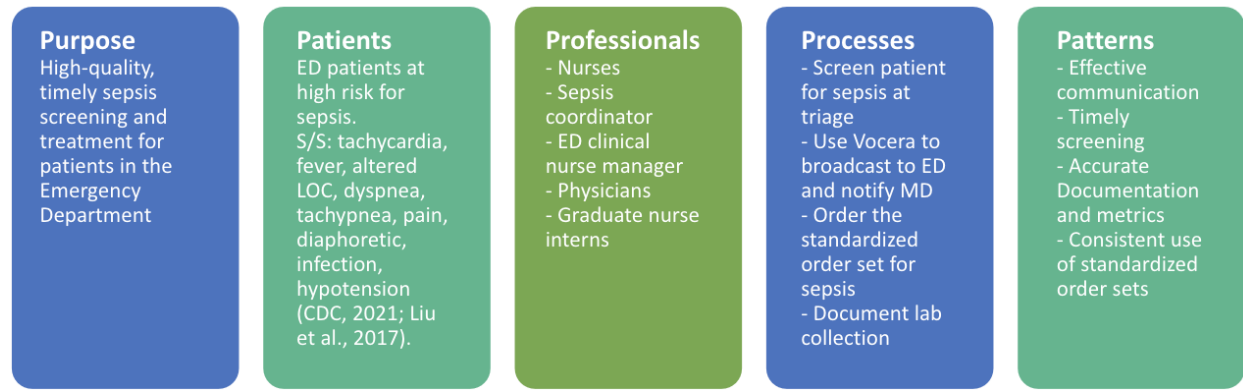
Appendix A

Sepsis Fishbone Diagram



Appendix B

5 P's



Appendix C

Cost Savings Chart

| | Sepsis | Severe Sepsis | Septic Shock |
|---|---------------|----------------------|---------------------|
| Avg. LOS | 4.5 | 6.5 | 16.5 |
| Cost per day | \$1,830 | \$2,193 | \$3,087 |
| LOS cost per case | \$8235 | \$14,254.50 | \$50935.50 |
| LOS decrease with SEP-1 compliance | 1 day | 1 day | 1 day |
| Total savings per case | \$1,830 | \$2,193 | \$3,087 |

In-service PowerPoint Slides

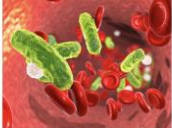
Sepsis In-Service for CPMC MBC

Angela Ho
Deric Wong
McKayla Howie

1

Utilize the Sepsis Order Set


- Every triage nurse should use the Suspected Sepsis order set for all triage screen and sepsis patients
- All triage screen patients will have an EPOC lactate performed at the bedside



2

Collaboration

- Every triage nurse will broadcast to the ED using Vocera to alert all staff of roomed sepsis patients
- All available nurses will assist with settling the roomed patient
- The primary nurse will communicate with the ED attending regarding the treatment care plan



3

Why Nurses Should be Using the Sepsis Order Set Immediately?

- RNs are allowed to initiate the order set and physicians do not always use the full order set
- Helps with SEP-1 bundle compliance data
- Each hour of delay in SEP-1 bundle compliance increases sepsis mortality (Seymour et al., 2017)
- Each hour of delay in antibiotics increases sepsis mortality rate (Liu et al., 2017)

| Required Action | Sepsis Order Set | | Single Order | |
|---|------------------|-------------|---|--|
| | 3-14 Bundle | 4-16 Bundle | 1-20 Bundle | 0-16 Bundle |
| Initial Lactate Collection | Yes | Yes | Must be completed within 2 hrs of Sepsis Screen/Physician | |
| Blood Culture Collection | Yes | Yes | | |
| Initial Antibiotic Started | Yes | Yes | Conditional within 1 hr of Sepsis Screen/Physician | Complete within 1 hr of ED/ICU/Inpatient or 2 hrs ED/ICU/Inpatient |
| Initial Lactate Collection (if Initial Lactate > 2) | N/A | Yes | Conditional within 1 hr of Sepsis Screen/Physician | |
| 30mL/kg Crystalloid Fluids Started | N/A | N/A | Yes | Yes |
| Antimicrobial Given (if appropriate) (within 1 hr) | N/A | N/A | Completed within 1 hr of Sepsis Screen | Yes |
| Fluid Volume Status Assessment | N/A | N/A | | Yes |

4

Measurable Goals for October, 2022

- First vital to lactic acid result within 60 minutes
 - First vital to lactic acid order within 15 minutes
 - First lactic acid order to draw within 15 minutes
- Lactic acid result to antibiotic administration within 60 minutes
- Antibiotic order to administration within 35 minutes



5

Sepsis Follow-along Epic Documentation Video Script

[intro]

This video is to demonstrate charting tips for sepsis patients.

[While going through a sepsis screening quickly]

Your patient screens positive for sepsis.

When you have a positive sepsis screen, be sure to document what actions you took using the check boxes.

[show check boxes for calling sepsis alert, notifying MD, etc.]

You will use the broadcast to ED function on vocera to notify staff of the sepsis alert and notify the MD.

[Click over to the manage orders tab and start locating the standardized order set for sepsis]

Always order the standardized order set for sepsis immediately when you triage a patient who screens positive for sepsis. It can be found by searching “standardized” in the orders tab.

[go to the ED narrator after the order set is in]

When collecting labs, click them off in epic with the collection time before tubing them to lab. This not only accurately captures the collection time for sepsis tracking, but it generates a label in lab so the lab tech knows blood is on the way.

Waiting for lab to enter the times can sometimes cause delays in processing and falsely depicts a delay in collection times for sepsis tracking, making our positive screen to lab collection times much longer than they really are.

Thank you for all of your hard work. Your attention to documentation will reflect the immense effort you place on patient care and show improved sepsis metrics.

[end]

Project: Statement of Determination and Non-Research Determination Form

Student Name: Angela Ho

Title of Project:

Brief Description of Project

The goal of this project is to decrease sepsis mortality rates by timely recognition of sepsis and antibiotic administration. The SEP-1 bundle is an existing protocol to decrease sepsis mortality rates and is supported by existing literature. After data collection, we hope to identify specific factors that can increase SEP-1 compliance, which may include education and monitoring.

Data that Shows the Need for the Project

According to the Joint Commission (n.d.), sepsis is the leading cause of death in hospital patients, costs hospitals \$17 billion annually, and has a mortality rate of 25 to 50 percent causing 220,000 deaths annually. In addition, data on the CPMC Mission Bernal show that the goal of administering antibiotics within 60 minutes of obtaining a lactic acid result decreased from reaching the benchmark of 90% in March to not meeting this goal in April 2022. Compliance to administering antibiotics within 35 minutes of receiving an order also decreased from 100% in May 2022 to becoming consistently below the 90% benchmark. In a study by Townsend et al. (2021), compliance to SEP-1 decreased sepsis mortality rates from 27.48% to 21.81%. It is important for us to identify ways to increase compliance for desired patient outcomes.

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Aim Statement

The aim of this project is to improve sepsis recognition and early intervention in the CMPC Mission Bernal Campus Emergency Department. The process begins with nurses using a standardized sepsis screening tool (in alignment with SEP-1). The process ends with patients receiving effective and efficient care according to the SEP-1 protocol. By working on the process, we expect (1) reduced time between the onset of symptoms, recognition, and intervention, (2) decline in sepsis rates, (3) decrease in sepsis mortality

rates, and (4) lower cost of care. As we receive more data, I intend to focus on a specific factor to improve compliance. It is important to work on this now because according to the Joint Commission (n.d.), (1) sepsis is the leading cause of death in hospital patients, (2) costs hospitals \$17 billion annually, and (3) has a mortality rate of 25 to 50 percent causing 220,000 deaths annually.

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Description of Intervention(s)

After understanding CPMC's current protocols and completing data collection, we will have a better idea of which interventions are most applicable and effective for the emergency department. I suspect that education and open-communication on the SEP-1 bundle will increase awareness, address resistance to change, and therefore compliance.

Desired Change in Practice

The desired change is increased compliance to the SEP-1 bundle, which includes a reduction in time between sepsis identification and antibiotic administration.

Outcome measurement(s)

Through medical documentation, we can assess timestamps of lactic acid results and antibiotic administration. Additionally, we can see if SEP-1 protocols were followed through Epic.

To qualify as an Evidence-based Change in Practice Project, rather than a Research Project, the criteria outlined in federal guidelines will be used:

<http://answers.hhs.gov/ohrp/categories/1569>

- This project meets the guidelines for an Evidence-based Change in Practice Project as outlined in the Project Checklist (attached). 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:

EVIDENCE-BASED CHANGE OF PRACTICE PROJECT CHECKLIST *

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

| Project Title: | YES | NO |
|--|------------|-----------|
| 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. | x | |
| 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. | x | |
| 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. | x | |
| 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. | x | |
| 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. | x | |
| 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. | x | |
| The project has NO funding from federal agencies or research-focused organizations and is not receiving funding for implementation research. | x | |
| 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. | x | |
| 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: <i>“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.”</i> | x | |

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.

STUDENT NAME (Please print):

Angela Ho

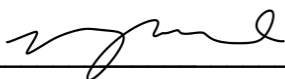
Signature of Student:



DATE September 17, 2022

SUPERVISING FACULTY MEMBER NAME (Please print):

Signature of Supervising Faculty Member



DATE 9/17/22