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Improving Intermediate Lactate Sepsis Bundle Performance

Jocelyn Alimboyoguen

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Improving Intermediate Lactate Sepsis Bundle Performance

Abstract

The aim of this project is to improve intermediate sepsis bundle performance with a primary focus on repeat lactate within 6 hours of arrival in the ED. One of the most significant problems we are facing today in healthcare, with an incidence of 300 to more than 1,000 cases per 100,000 persons annually in the United States, is severe sepsis (Gaieski, Edwards, Kalian, & Carr, 2013). Multiple studies have shown a strong correlation in reducing hospital and 30-day mortality by implementing process-oriented bundle for patients with sepsis and intermediate lactate values in accordance with the Surviving Sepsis Campaign guidelines. The site for this quality improvement project is a not-for-profit, medium-sized, tertiary hospital serving the San Joaquin and Stanislaus county communities. The improvement team comprised of a CNL student, physician champions, unit nurse champions, educators, and staff champions from lab, radiology, and pharmacy. The interventions for this project include, (a) developing a sepsis screening tool to help frontline nurses recognize early signs of sepsis, (b) developing a standardized process between lab and nursing for repeat lactate orders, (c) implementing the sepsis clock tool which outlines timely appropriate treatment based on clinical guidelines for patients diagnosed with sepsis, and (d) implement a sepsis alert protocol to activate early and appropriate interventions. Results show that use of a screening tool to help identify early signs of sepsis as well as use of sepsis clock tool which serves as a visual aid for the staff to keep track of specific timelines increased compliance with the sepsis bundle.

Introduction

Healthcare delivery in the 21st century continues to evolve to provide world-class quality of care in order to produce optimal patient outcomes. As care delivery shifts within a department's mission to best accommodate and meet the needs of the patient population, it is imperative for department members to feel empowered in their role as an integral part of the healthcare delivery team. With the shift in focus from volume to value-based care, much emphasis is placed on performance improvement, identifying best practices, and transforming healthcare delivery (Zangerle, Harris, Rimmasch, & Randazzo, 2016).

One of the most significant problems we are facing today in healthcare, with an incidence of 300 to more than 1,000 cases per 100,000 persons annually in the United States, is severe sepsis (Gaieski, Edwards, Kalian, & Carr, 2013). The number of critically ill patients presenting in the ED with sepsis is staggering. According to Hall et al. (2011), the number of patients in the hospital with a principal diagnosis of sepsis or septicemia has more than doubled from 11.6 in 2000 to 24.0 in 2008 per 10,000 patients with mortality associated with severe sepsis ranging at 30% - 60% (Hall, Williams, DeFrances, & Golosinskiy, 2011). Guidelines for early identification and treatment of sepsis has been known to decrease sepsis mortality by at least 14% or 12,500 lives saved per year (Moore et al., 2009). In addition, multiple studies have shown a strong correlation in reducing hospital and 30-day mortality by implementing process-oriented bundle for patients with sepsis and intermediate lactate values in accordance with the Surviving Sepsis Campaign guidelines. However, although these bundles are associated with improved patient outcomes, adherence to these bundles remain to be an area of opportunity (Ramsdell, Smith, and Kerkhove, 2017).

Therefore, this project aims to improve intermediate sepsis bundle performance with a primary focus on repeat lactate within 6 hours of arrival in the ED. The sepsis bundle is comprised of early recognition and treatment of sepsis which includes: Lactate drawn within one hr. of ED arrival, appropriate antibiotic administered within 3 hrs. of ED arrival, fluids administered appropriately within 3 hrs. of ED arrival, and repeat lactate drawn within 6 hrs. of ED arrival. Harris, Roussell, and Thomas (2014) states that the microsystem is a setting in which collaborative members of teams have the opportunity to test changes in healthcare delivery that directly impact patient outcomes. Therefore, this project aims to improve intermediate sepsis bundle compliance in the ED, thereby reducing sepsis mortality.

Problem Description

The site for this quality improvement project is a not-for-profit, tertiary hospital serving the San Joaquin and Stanislaus county communities. This medium-sized community hospital is licensed to operate 152 beds and offers many different services ranging from 24/7 emergency room, intensive care, medical/surgical/telemetry as well as maternity and pediatrics. The hospital's mission is "to provide high quality, affordable health care services and improve the health of our members and the communities we serve." Sepsis is the number one top diagnosis followed by CHF, Major surgery, GI bleed, Stroke, Cancer, Pancreatitis, ESRD, Diabetes, and Cellulitis. Thirty-nine percent of patients are discharged to home and 36% are discharged to a skilled nursing facility. The microsystem observed for this study is the ED.

Due to the wide array of diagnoses that this microsystem is often subjected to, teamwork and collaboration are of up-most importance among the staff members. Therefore, a multidisciplinary approach is necessary for providing high-quality patient care. Some potential barriers to change include staff resistance, staff shortage, resources, and trust which can often

evoke feelings of frustration. Therefore, utilizing the CNL's skill to build trust, to empower and influence teamwork is a critical piece in bringing about change. Finkelman (2016) recognized transformational leadership as one of the most effective styles of leadership in our healthcare system today. A transformational leader not only rewards but also provides guidance to help staff work towards a common or shared vision that embraces change and fosters positive work environments. Based on a review of the data for this microsystem, the sepsis intermediate lactate bundle performance has been well below the target of 55% for at least 9 out of the past 12 months. The "All or None" bundle is comprised of a minimum of 3 to a maximum of 7 elements. The performance was at times 35 percentage points lower than target. As a result, this medical center is one of the lowest performers in the region, which warrants a quality improvement project in order to improve performance with a primary focus on repeat lactate.

Available Knowledge

PICOT Question: Intermediate sepsis bundle

The PICOT question that guided the search for evidence in this project was: For patients identified with severe sepsis in the ED (P), does increasing compliance with intermediate sepsis bundle (I) compared to non-adherence to the bundle (C) improve sepsis care and reduce mortality outcome (O) from January 2018 to July 2018 (T).

Literature Review

A comprehensive electronic search was conducted in September 2017 reviewing evidence that examined sepsis management and its impact on patient outcomes in the following databases: Cochrane Database of Systemic Reviews, CINAHL Complete, and Pub Med. These databases were searched using combinations of the following search terms: severe sepsis, sepsis bundle, guidelines, sepsis screening. Limitations were set to include English only, peer-reviewed,

research, systemic reviews, randomized controlled trials, and publication dates no earlier than 2009. The search yielded 63 articles. Articles were considered for inclusion if they included severe sepsis and early identification/screening. Five articles specific to sepsis were selected for review. The Research Evidence Appraisal Tool (Dang & Dearholt, 2017) was used to appraise the evidence for this review. The appraisal tool (See Appendix G) includes criteria to evaluate the strength and quality of the evidence. The articles were appraised to be a Level 5 due to the fact that this is a quality improvement project. One article rated as high quality while the other four articles rated as good quality. These articles were very useful as it provided the evidence needed for this quality improvement project.

According to Mitchell (2013), cultural change occurs when new methods produce desirable behavioral change and superior performance. As previously mentioned, guidelines for early identification and treatment of sepsis has been known to decrease sepsis mortality by at least 14% or 12,500 lives saved per year (Moore, Jones, Kreiner, McKinley, Sucher, Todd, Turner, Valdivia, and Moore, 2009). Evidence-based practice (See Appendix B) has shown that interventions such as the sepsis intermediate lactate bundle has proven to be an effective treatment.

Rationale

While there are multiple methods of facilitating change at the organizational level, the assistance of a change agent is necessary to assure that all efforts are purposeful, calculated, and collaborative (Mitchell, 2013). According to Mitchell (2013), choosing a change theory for change agents to use that will provide a framework for implementing, managing and evaluating change is critical. Kotter's 8-step Process for leading change provides an effective framework for implementing the CNL's change strategy. This eight-step process includes "establishing a

sense of urgency, creating the guiding coalition, developing a vision and strategy, communicating the change vision, empowering broad-based action, generating short-term wins, consolidating gains and producing more change, and anchoring new approaches in the culture” (Kotter, 1996).

Kotter’s eight-step process for change will be applied in the planning, development, implementation and evaluation phases of this change strategy project. Like most EDs, this is a fast-paced microsystem where changes occur constantly. Providing patient-centered care amid constant change can be challenging and stressful at times. Therefore, even though the nurses are accustomed to frequent change, it is imperative that process changes be implemented in a way that is sensitive to the level of stress the nurses are experiencing. Also, it needs to be organized in a way that will cause the least disruption in their ability to provide safe patient care. With this in mind, Kotter’s eight-step process will guide the action plan for the implementation of this change strategy and provide a systematic approach that will guide the primary change agent through a series of actions that can lead to enhanced change outcomes. In addition, the model for improvement framework will be used to test change ideas and determine if the change is an improvement using the Plan-Do-Study-Act (PDSA) method (See Appendix L).

Specific Project Aim

To increase the percentage of patients with a documented elevated intermediate lactate who receive intermediate lactate bundle interventions, from a baseline of 43% per month to 55% per month by July 2018 with a primary focus on repeat lactate within 6 hours.

Context

Microsystem Assessment

Understanding the microsystem is an important step toward improvement and provides the opportunity to transform the delivery of care at the front line (Nelson, Batalden & Godfrey, 2007, p.6). Using the Dartmouth assessment tool provided a systematic and objective review of the microsystem which focused on the 5 P's: purpose, patients, professionals, processes, and patterns. This tool helped gain a better understanding of the microsystem and provided baseline information necessary to build a successful high functioning microsystem which is the building block of all health care systems (Nelson, Batalden & Godfrey, 2007). The *purpose* of this hospital revolves around “improving the health of our members and the communities we serve”. The team works passionately to fulfill this promise by establishing processes that ensure patient safety and effective clinical care. They strive to deliver excellent care by reducing mortality, length of stay, and complications through a multidisciplinary approach. The team believes that collaboration with key stakeholders is a key component to success. There is significant number of the *Patient* population seen and assessed that are from low-income communities. There has been an increase in the number of patients served at this hospital who are uninsured and rely on Medi-Cal for coverage of treatment and services. The *professional* team is comprised of, but not limited to, ER physicians, an HBS physician, registered nurses, physician assistants, and other ancillary staff. Supporting diagnostic departments are available as needed. Thirty-three percent of the staff state that working in the unit is stressful. However, 76% of the staff state that they would recommend their unit as a good place to work. The *processes* of patient care are focused on patient stabilization and personalized treatment to fit every individual's plan of care. The unit has processes in place to ensure patient safety and excellent transition of care. In addition, the

unit has a very engaged rapid response team and multidisciplinary team that rounds on patients to discuss patient progress and discharge goals. The *pattern* consists of a multidisciplinary team-based approach to provide high-quality care that prioritized patient safety and satisfaction. There is a monthly nurse quality forum in which representatives of the team participate in to discuss clinical care issues. Also, there is a workgroup that meets monthly to discuss patient safety issues or concerns. The unit team takes pride in involving the patients and family members in their care. The team has gone through some challenges in the last year and a half with leadership turnovers and staff shortage which has dampened the morale of the team. However, they are encouraged and optimistic about their new leadership and onboarding of new staff.

The SWOT analysis (See Appendix K) revealed that the strengths of this project included improved patient outcome and standardization. The team's commitment to provide exceptional quality care and their openness to evidence-based practices that improve patient care are also their strengths. An identified weakness is that, although there is a sepsis workgroup already in existence, it was not effective. In addition, although the severe sepsis protocol has been standardized, the nurses and providers still did not follow the process as outlined within the bundle. There was also variation in the approach to sepsis identification and treatment which was identified as an opportunity. Threats include insufficient education/training due to lack of resources and time. Also, the potential for lack of interest and inconsistency by providers was identified as a threat. This analysis was shared with the team during the kick-off meeting.

Based on data compiled on the number of sepsis alerts per month for this medical center, the emergency department sees approximately 40-43 sepsis patients per month which equals to about 1.3 to 1.4 patients a day. This equates to about 480 – 516 patients being treated each year for sepsis at this facility and roughly estimates to 8.6 - 9.3 million dollars in sepsis treatment a

year. By increasing compliance to the intermediate lactate bundle ensuring that the patient receives the appropriate treatment according to the protocol, then the possibility of reducing the average LOS by 3.2 days in the ICU alone can save the organization a staggering \$1.7 million per year (See Appendix F).

Intervention

To provide the best possible patient-centered care maximizing the overall health of our members we needed to provide sepsis intermediate lactate bundle re-education for physicians, nurses, lab and pharmacy personnel. In addition, evidence supported early identification of signs and symptoms of severe sepsis by frontline nurses using a sepsis screening tool (Moore, Jones, Kreiner, McKinley, Sucher, Todd, Turner, Valdivia, and Moore, 2009).

Changes that were implemented include: (1) a revised sepsis screening tool to help frontline nurses recognize early signs of sepsis, (2) a sepsis alert protocol via an overhead page to activate early and appropriate interventions, (3) a revised sepsis reminder time tool which outlined timely appropriate treatment based on clinical guidelines for patients diagnosed with sepsis, and (4) a standardized process between lab and nursing for repeat lactate orders. Data collecting methods include chart reviews, observations, and the use of a survey to determine compliance with use of the tools and processes as outlined.

Study of the Intervention

Evidence-based practice has shown that interventions such as the sepsis intermediate lactate bundle have proven to be an effective treatment. Aiming for increased compliance in following the sepsis bundle will result in reduced mortality, reduced readmission, reduced length of stay, and reduced complications from sepsis, i.e. renal failure.

Data was obtained from 100% retrospective medical record review of the patient records for project measures per week from January – April 2018. Concurrent observations were conducted when a sepsis alert was called to see if the sepsis screening tool was used for identification of early signs of sepsis. In addition, an audit of the use of the sepsis reminder time tool was performed each time a sepsis alert was called. Weekly email communication was sent out to update the team on their progress. The PDSA cycle (See Appendix L) results were evaluated every month at the sepsis workgroup meeting. Cycle 1 took a couple of weeks to implement because we had to ensure that the sepsis alert was not only announced overhead but that it also generated an automated message that was sent via text to designated team members on their mobile phones as well as an automated call on their office work phones. These calls made it very easy for staff to spring into action once they were notified or heard the sepsis alert. Cycle 2 also took a couple of weeks because the staff determined that they needed to revise the sepsis screening tool so that it was easier for all the staff to use. This was a very important step since it was the team's idea to revise the tool, it made it easier to get buy-in from all the staff. The team had to go through the same process for the sepsis clock. The staff agreed that they would rename it as a sepsis reminder time tool. Once both tools were revised and implementation of the tools went very smoothly.

Measures

This project included an outcome measure which was to increase intermediate lactate bundle compliance. Within this bundle, there are four process measures which include lactate drawn within one hour of ED arrival, appropriate antibiotic administered within three hours of ED arrival, fluids administered appropriately within three hours of ED arrival, and repeat lactate drawn within six hours of ED arrival. Of these four elements, the one that this unit struggled

the most with was the repeat lactate drawn within six hours of ED arrival. Therefore, the team agreed that they would focus on this process measure as part of this improvement project.

Lastly, as a balancing measure, the team agreed to monitor if there would be an increase in workload for laboratory staff causing delay in completing other lab orders as a result of this project. Performance on these measures will be monitored with data displayed over time using Statit graphs. Please see Appendix C for family of measures and measure definition.

Ethical Considerations

As an advocate, the CNL role provides an opportunity to address the concerns of colleagues, providing a platform for discussion, providing opportunities to reinforce the positives. Ethical considerations were taken to ensure that there was no unfair discrimination based on age, gender, gender identity, race, ethnicity, culture, national origin, religion, sexual orientation, disability, socioeconomic status, or any basis proscribed by law. In addition, steps were taken to ensure there was no financial conflict of interest. The project was reviewed by faculty and is determined to qualify as an Evidence-based Change in Practice Project, rather than a Research Project. Institutional Review Board (IRB) review is not required (See Appendix A, IRB Non-Research Determination Form). Lastly, Privacy and Confidentiality were taken into consideration to build trust, to empower and influence teamwork, which is a critical piece in bringing about change.

Results

Following initiation of the sepsis alert via overhead page in January, results show that there was a total of 165 sepsis alerts called between January to April 2018. An audit of these cases revealed that utilization of the sepsis screening tool and the sepsis time reminder tool ranged from 65% to 90% (See Appendix J). In addition, results show that compliance with the

use of the sepsis screening tool (See Appendix H) and sepsis time reminder tool (See Appendix I) resulted in improved intermediate sepsis bundle performance starting in January (See Appendix D). Performance in February continued to show improvement which was above the target of 55%. Lastly, repeat lactate compliance also showed significant improvement after standardizing a workflow process between lab and nursing for repeat lactate orders (See Appendix F). This data suggests that consistent use of the sepsis screening tool and the sepsis reminder time tool resulted in increased performance with the intermediate lactate bundle compliance which evidence also suggest. Secondly, there seems to be a correlation with the improved repeat lactate performance and the improved intermediate lactate bundle performance as shown in the graph.

Discussion

Summary

According to Mitchell (2013), cultural change occurs when new methods produce desirable behavioral change and superior performance. The improvement in performance as shown in Appendix D and Appendix F had it not been for the cultural shift within this unit. It was not until the staff recognized the need for change and took ownership of the change process that improvement occurred. The staff took the initiative to take the tools that were not working for them and changed it so that they had a tool that was easier for the staff to use and developed a process that was sustainable and not person dependent. Also, having the sepsis physician and nurse champions who drove the process improvement efforts made a significant difference. So far, current performance has been above target for the last 3 months which shows that the interventions worked. As mentioned earlier, results from this project has the potential of reducing the average LOS by 3.2 days for patients admitted in the ICU. This can potentially

save the organization \$1.7 million per year. In addition to the cost-saving factor for this improvement project, an increase in patient satisfaction may also be obtained since patients are able to go home sooner rather than later. Although this is only a soft dollar benefit, providing the patient an excellent care experience is rewarding in and of itself. Ultimately, I believe this is the greatest incentive for conducting a performance improvement project.

Conclusion

As mentioned earlier, the focus of this project is to improve intermediate lactate bundle performance by providing tools to help nurses identify sepsis early and allowing treatment to be started timely to achieve a better outcome for the patient. The CNL role is in a unique position to reinforce change, and has been historically proven effective in facilitating changes in the microsystem level, having a positive impact on patient outcomes (Stanley et al., 2008). Also, the CNL functions as a quality manager who is skillful at identifying departmental needs and championing cost-effective, evidence-based care within the microsystem which is vital to this improvement project. While there were some delays in getting the project going, overall, implementation of the sepsis screening tool and the sepsis reminder time tool and re-educating the staff regarding the hospital's sepsis protocol went very smoothly. The aim of the project was achieved within the second month of implementation.

Emphasizing staff empowerment not only helped implement the change but it also helped improve the unit environment. Utilizing sepsis nurse and physician champions to hardwire the process was a critical factor for this project along with a cultural shift which resulted in increased compliance to the intermediate lactate bundle and provided a strong possibility for sustainability. In conclusion, I feel that this change strategy positively impacted the lives of our patients as well as the overall health of the organization.

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Appendix A

CNL Project: Statement of Non-Research Determination Form**Title of Project:**

Improving Sepsis Care by improving intermediate lactate bundle performance

Brief Description of Project:

One of the most significant problems we are facing today in healthcare, with an incidence of 300 to more than 1,000 cases per 100,000 persons annually in the United States, is severe sepsis (Gaijeski, Edwards, Kalian, & Carr, 2013). The number of critically ill patients presenting in the ED with sepsis is staggering. According to Hall et al. (2011), the number of patients in the hospital with a principal diagnosis of sepsis or septicemia has more than doubled from 11.6 in 2000 to 24.0 in 2008 per 10,000 patients with mortality associated with severe sepsis ranging at 30% - 60% (Hall, Williams, DeFrances, & Golosinskiy, 2011). Guidelines for early identification and treatment of sepsis has been known to decrease sepsis mortality by at least 14% or 12,500 lives saved per year (Moore, Jones, Kreiner, McKinley, Sucher, Todd, Turner, Valdivia, and Moore, 2009).

A) Aim Statement:

To improve sepsis care by increasing compliance with the intermediate lactate bundle from 43% to 55% by July 2018.

B) Description of Intervention:

To provide the best possible patient-centered care maximizing the overall health of our members, we need to provide Sepsis intermediate lactate bundle re-education for physicians, nurses, lab and pharmacy personnel. In addition, evidence supports early identification of signs and symptoms of severe sepsis by frontline nurses using a sepsis screening tool.

C) How will this intervention change practice?

Evidence based practice has shown that interventions such as the sepsis intermediate lactate bundle has proven to be an effective treatment. Aiming for increased compliance in following the sepsis bundle elements will result in reduced mortality, reduced readmission, reduced length of stay, and reduced complications from sepsis.

D) Outcome measurements:

Outcome: Increased Sepsis Bundle compliance for Intermediate lactate

Process: Repeat Lactate Drawn within 6 hrs. of ED arrival

Balancing: Increase in workload for lab staff causing delay in completing other lab orders

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: Improving Intermediate Lactate Sepsis Bundle Performance	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	

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

Appendix B

Evaluation Table

Study	Design	Sample	Outcome/Feasibility	Evidence rating
Amland, R. C., & Hahn-Cover, K. E. (2016). Clinical Decision Support for Early Recognition of Sepsis. <i>American Journal of Medical Quality</i> , 31(2), 103–110.	Quality Improvement using retrospective cohort design	817 Patients were segmented into one of 3 cohorts based on intervals between first alert activation and initial orders for diagnostics and interventions.	Provides guidelines for cloud-based sepsis CDS. Integrated with enterprise EHR systems can be an effective approach toward early recognition of sepsis in a hospital setting.	L V A  Clinical Decision Support for Early Re
Drahnak, D. M. (2016). Scripting Nurse Communication to Improve Sepsis Care.	Quality Improvement project using pre- & post-survey design	Conducted in a 648-bed Level 1 trauma hospital using a randomized sample involving 681 nurses.	Provides a strong foundation on which to build an inter-professional organizational sepsis treatment program.	L V B  Nurse communication to ir
Gaieski, D., Edwards, J., Kallan, M., Carr, B. Benchmarking the incidence and mortality of severe sepsis in the United States. <i>Crit Care Med</i> . 2013;41(5):1167-1174.	Case presentation	none	A uniform, consistent method is needed for use in national registries to facilitate accurate assessment of clinical interventions and outcome comparisons between hospitals and regions.	L V B  Benchmarking the Incidence and Mort
Moore, L., Jones, S., Kreiner, L., McKinley, B., Sucher, J., Todd, S., Turner, K., Valdivia, A., Moore, F. (2009). Validation of a sepsis screening tool for the early identification of sepsis. <i>The Journal of Trauma, Infection, and Critical Care</i> , 66(6), 1539-1547	Quality Improvement retrospective observational design	Conducted 4,991 sepsis screens on 920 patients representing 927 ICU admissions.	Implementation of this tool and logic-based sepsis protocol has decreased sepsis-related mortality.	L V B  Validation of a Screening Tool for E

<p>Stanley, J. M., Gannon, J., Gabuat, J., Hartranft, S., Adams, N., Mayes, C., & Burch, D. (2008). The clinical nurse leader: A catalyst for improving quality and patient safety. <i>Journal of Nursing Management</i>, (5), 614.</p>	<p>Case presentation</p>	<p>None</p>	<p>Through formal, standardized education programs, and nationally recognized role competencies and expectations, the CNL represents a promising opportunity for nursing to take a leadership role in implementing quality improvement and patient safety initiatives across all health care settings.</p>	<p>L V A</p>  <p>The Clinical Nurse leader. a catalyst for</p>
<p>Ramsdell, T.H., Smith, A.N., and Kerkhove, E. (2017). Compliance with Updated Sepsis Bundles to Meet New Sepsis Core Measure in a Tertiary Care Hospital</p>	<p>Quality Improvement retrospective cohort design</p>	<p>Conducted in 158 patients with a diagnosis of severe sepsis or septic shock from April 2015 to February 2016.</p>	<p>Increased adherence to the care bundles may improve in-hospital survival. Implementation of BPA messages allows for rapid identification of sepsis and provides for immediate access to checklists and order sets for timely initiation of appropriate treatment.</p>	<p>L V B</p>  <p>Compliance with Updated Sepsis Bun</p>

Appendix C

Project Charter**Project Charter:**

Improving Sepsis Care by improving intermediate lactate bundle performance.

Global Aim:

To reduce Severe Sepsis (lactate 2-4) mortality from 7.8% to 5.3%.

Specific Aim:

To improve sepsis care by increasing compliance with the intermediate lactate bundle from 43% to 55% by July 2018.

Background:

One of the most significant problems we are facing today in healthcare, with an incidence of 300 to more than 1,000 cases per 100,000 persons annually in the United States, is severe sepsis (Gaieski, Edwards, Kalian, & Carr, 2013). The number of critically ill patients presenting in the ED with sepsis is staggering. According to Hall et al. (2011), the number of patients in the hospital with a principal diagnosis of sepsis or septicemia has more than doubled from 11.6 in 2000 to 24.0 in 2008 per 10,000 patients with mortality associated with severe sepsis ranging at 30% - 60% (Hall, Williams, DeFrances, & Golosinskiy, 2011). Guidelines for early identification and treatment of sepsis has been known to decrease sepsis mortality by at least 14% or 12,500 lives saved per year (Moore, Jones, Kreiner, McKinley, Sucher, Todd, Turner, Valdivia, and Moore, 2009). Evidence based practice has shown that interventions such as the sepsis intermediate lactate bundle has proven to be an effective treatment. This hospital's performance has been well below the target of 55% for intermediate lactate for at least 9 out of 12 months this past year. Performance were at times 35 percentage points lower than target. As a result, this medical center is one of the lowest performers in the region when it comes to sepsis care. Therefore, the aim of this project is to increase intermediate lactate bundle compliance by 12% from 43% to 55% by July 2018.

Goals:

To provide the best possible patient-centered care maximizing the overall health of our members by providing:

1. Sepsis intermediate lactate bundle education for physicians, nurses, lab and pharmacy personnel.
2. Early identification of signs and symptoms of severe sepsis.

Family of Measures

Measure	Data Source	Target
Outcome		
Increased Sepsis Bundle compliance for Intermediate lactate	Statit	55%
Process		
Lactate drawn within 1 hr. of ED arrival	Chart Review - KPHC	95%
Appropriate antibiotic administered within 3 hrs. of ED arrival	Chart Review - KPHC	95%
Fluids administered appropriately within 3 hrs. of ED arrival	Chart Review - KPHC	95%
Repeat lactate drawn within 6 hrs. of ED arrival	Chart Review - KPHC	95%
Balancing		
Increase in workload for lab staff causing delay in completing other lab orders	Chart Review - KPHC	5%

Sponsors

Chief Nursing Executive	Shanthi Margoschis
Area Quality Leader	Jerry Grandon

Team Members

ED physician champion	Dr. Stephanie Zarfoss
ED nurse champion	Tanisha Jimenez/Theresa Garrett
ED educator	Mia Alcavala
ICU physician champion	Dr. Theodore Fong
ICU nurse champion	Quyen Nguyen
ICU educator	Terry Olson
Laboratory	Roniel Duquez
Radiology	Tom Lansburg
Pharmacy	Kelsea Kerr
Quality nurse (CNL)	Jocelyn Alimboyoguen

Measurement Strategy**Population Criteria:**

All inpatients with Sepsis diagnosis present on admission and a lactic acid ≥ 2 in ED

Data Collection Method:

Data will be obtained from retrospective medical record review of patient records for project measures per week from January – July 2018. Data plan will be reevaluated q month based on results.

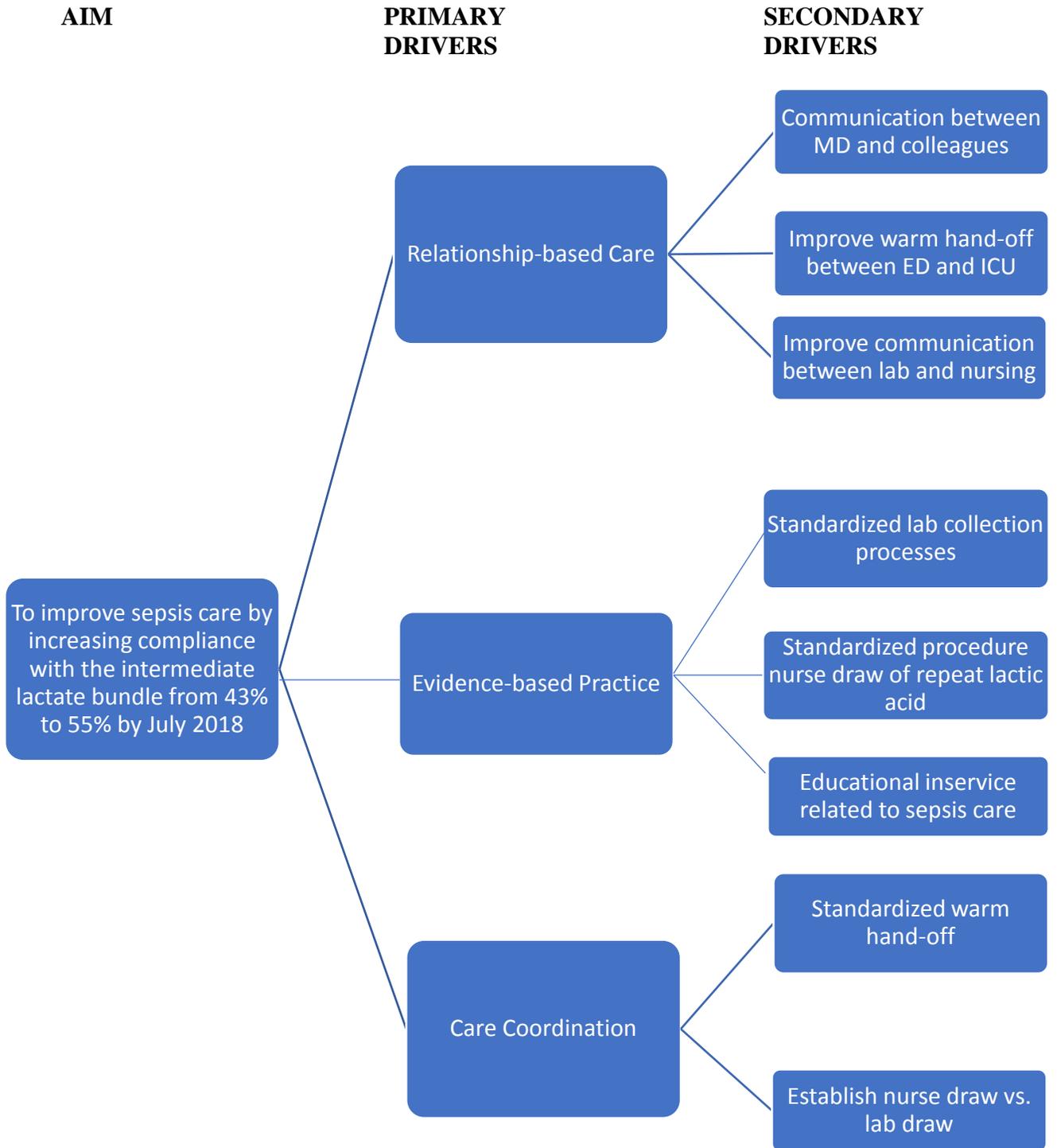
Data Definitions

Data Element	Definition
Sepsis	SIRS plus clinical suspicion of infectious etiology
SIRS (Systemic Inflammatory Response Syndrome)	Requires 2 of the 5 criteria: <ul style="list-style-type: none"> - Temperature <36 degrees C or >38 degrees C - Heart rate >90 beats per minute - Respiratory rate >20 breaths per minute or PaCO₂ <32 mm Hg - WBC $<4,000$/cubic mm or $>12,000$/cubic mm or Greater than 10% bands on differential - Altered mental status
Severe Sepsis	Sepsis and any of the following that are attributable to infection: <ul style="list-style-type: none"> - Intermediate lactate level (2 to 3.9 mmol/L) - Any systolic blood pressure reading below 90 mm Hg - Any single MAP less than 65 mm HG - Systolic blood pressure >40 mm HG below patient baseline - Organ dysfunction regardless of lactate level, defined as: hypoxia or mechanical ventilation, delirium, creatinine >20mg/dL, bilirubin >2mg/dl, platelet count $<100,000$, INR >1.5 or aPTT >60 sec.

Measure Description

Measure	Measure Definition	Data Collection source	Goal
Sepsis Intermediate Lactate Bundle - % of compliance	N=# cases that met each element of the bundle D=# total number of cases that met severe sepsis criteria	Chart audit	100%
% of patients with lactate drawn within 1 hr. of ED arrival	N= # patients with lactate w/in 1 hr D= # patients with lactate drawn	Infoview report Chart audit-	100%
% patients given antibiotics w/in 3 hours	N= # patients given antibiotics w/in 3 hrs D=# patients given antibiotics for sepsis	Infoview report Chart audit	100%
% patients given fluids w/in 3 hours	N= # patients given fluids w/in 3 hrs D=# patients given fluids for sepsis	Infoview report Chart audit	100%
% of patients with repeat lactate drawn within 6 hrs	N= # patients with lactate w/in 6 hrs D= # patients with lactate drawn	Infoview report Chart audit-	100%

Driver Diagram



Recommendations for Changes

1. Develop Sepsis screening tool to help frontline nurses recognize early signs of Sepsis.
2. Develop a standardized process between lab and nursing for repeat lactate orders.
3. Develop a system for timely reassessment of patient diagnosed with sepsis.

Project Timeline

Kotter’s Change Model	Creating a change climate				Engaging & enabling others					Implementing & sustaining change			
	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12 - 24	On-going
Microsystem Assessment	Active	Active	Active	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
Develop Aim	Light	Light	Active	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
Identify team	Light	Active	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
Sepsis Workgroup meetings	Light	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active
Develop project charter	Light	Light	Light	Active	Light	Light	Light	Light	Light	Light	Light	Light	Light
Staff interview	Light	Light	Light	Light	Active	Light	Light	Light	Light	Light	Light	Light	Light
Develop training plan	Light	Light	Light	Light	Active	Active	Light	Light	Light	Light	Light	Light	Light
Staff Education & training	Light	Light	Light	Light	Light	Active	Active	Active	Active	Light	Light	Light	Light
Observe Sepsis alerts	Light	Light	Light	Light	Light	Light	Light	Light	Light	Active	Active	Active	Light
Chart audit for compliance with bundle	Light	Light	Light	Light	Light	Light	Light	Light	Light	Active	Active	Active	Active
Attend staff in-service meetings	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Active	Active	Active
Address any outstanding issues	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Active

Lessons Learned

1. Identified that there is a sepsis workgroup already in existence but not effective
2. Identified that there is variation in the approach to sepsis identification and treatment
3. Gaps in sepsis care specifically around patient reassessment
4. Lack of warm hand off between departments i.e. lab and nursing, ED staff and ICU staff

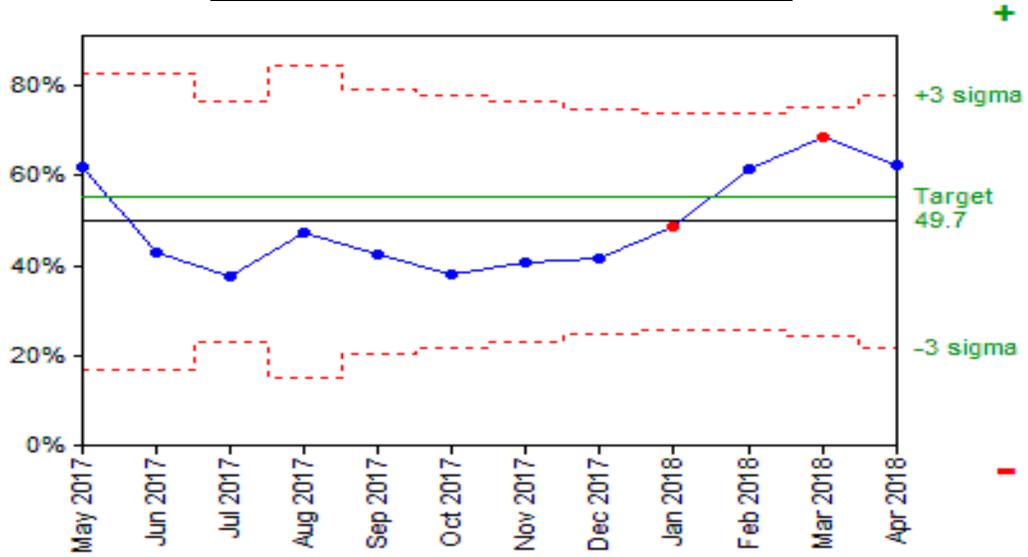
CNL Competencies

The CNL as defined by the *American College in Nursing* is “a master’s educated nurse, prepared for practice across the continuum of care within any healthcare setting” (“American Association of Colleges of Nursing | Clinical Nurse Leader (CNL),” n.d.). They also implement evidence-based practice in all healthcare settings. CNLs educate individuals, families, groups, and other health care providers. They lead in clinical decision making, and they oversee care delivery and outcomes. (Harris, Roussel, & Thomas, 2014)

The CNL role is in a unique position to reinforce change, and has been historically proven effective in facilitating changes at a microsystem level, having a positive impact on patient outcomes (Stanley et al., 2008). As a team leader and a team member, the CNL functions as a leader within the microsystem and a quality manager, proficient with interdepartmental, and interdisciplinary communication, while being skillful at identifying departmental needs and championing cost effective, evidence based care within the microsystem (Wienand, et al., 2015). As a member of a profession, bound by the ongoing challenge to effect positive change in health care practice and outcomes, the CNL has a large skill set to draw upon (American Association of Colleges of Nursing, 2017). As an advocate, the CNL role provides an opportunity to address the concerns of colleagues, providing a platform for discussion, providing opportunities to reinforce the positives. Additionally, through incorporating the role of an educator where there may be a lack of clarity, the CNL can also encourage team members to address their concerns and initiate discussion. The CNL’s ability to facilitate working relationships within the microsystem while developing a successful implementation of sepsis care interventions in the ICU setting can further enhance the care provided to the patient. Ultimately, our shared agenda is to provide the best care possible for our patients.

Appendix D

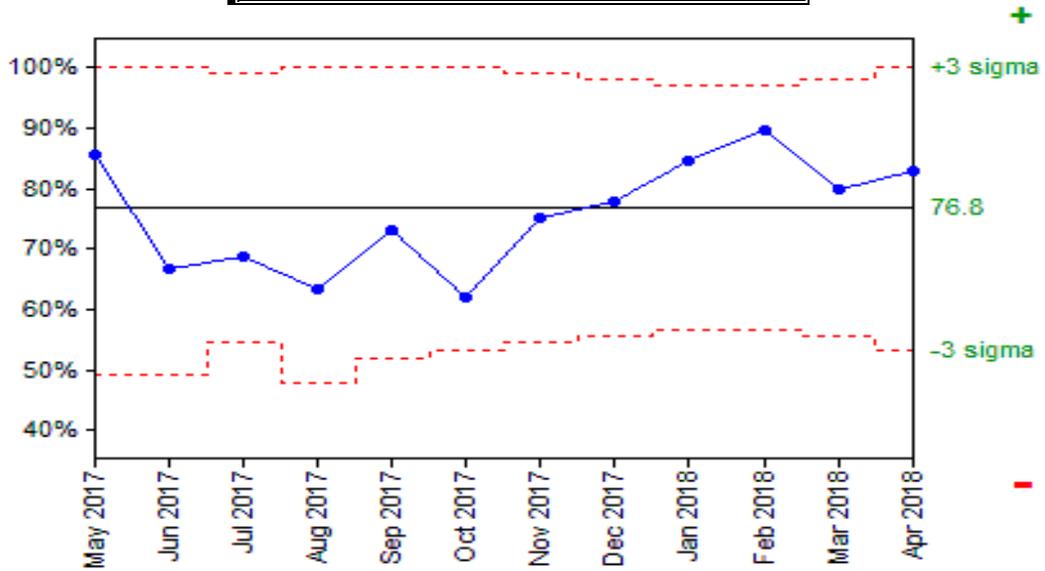
Intermediate Lactate Bundle Compliance



Date	BUNDLE NUM	DENOM	Percent
May 2017	13	21	62%
Jun 2017	9	21	43%
Jul 2017	12	32	38%
Aug 2017	9	19	47%
Sep 2017	11	26	42%
Oct 2017	11	29	38%
Nov 2017	13	32	41%
Dec 2017	15	36	42%
Jan 2018	19	39	49%
Feb 2018	24	39	62%
Mar 2018	24	35	69%
Apr 2018	18	29	62%

Appendix E

Repeat Lactate Compliance



Date	LACTATE NUM	DENOM	Percent
May 2017	18	21	86%
Jun 2017	14	21	67%
Jul 2017	22	32	69%
Aug 2017	12	19	63%
Sep 2017	19	26	73%
Oct 2017	18	29	62%
Nov 2017	24	32	75%
Dec 2017	28	36	78%
Jan 2018	33	39	85%
Feb 2018	35	39	90%
Mar 2018	28	35	80%
Apr 2018	24	29	83%

Appendix F

Estimated Cost of Business Plan			
Staff	Hour/Unit	Hourly Rate	Final Cost
RN champion salary	4 hrs./wk x 24 wks = 96 hours	\$75.00	\$7,200
Lab champion salary	4 hrs./wk x 24 wks = 96 hours	\$50.00	\$4,800
Educator champion salary	4 hrs./wk x 24 wks = 96 hours	\$75.00	\$7,200
Office Supplies (copy paper, chart pads, markers, highlighter, pens)			\$800
Educational Materials (badge cards, etc.)			\$2,000
Total Operating Expenses:		\$200.00	\$22,000
Projected Savings			
Hard Financial Benefit		12-month impact	Key Assumptions
Decrease hospital days by average of 4.7 days Jul – Nov 16 average LOS: Target not met: 9 days Target met: 4.3 days	52% reduction	Approx. \$18,000 per case – Projecting reduction of 4.7 days per case (516 cases/year): \$4,850,400/year	Severe Sepsis rates for one year will follow trend of Jul – Nov 16 Average hospital cost of \$6,000/day
Decrease ICU LOS by average of 3.2 days (\$2000 average per day) Jul – Nov 16 average LOS: Target not met: 6 days Target met: 2.8 days	53% reduction	Approx. \$6,000 per case – Projecting reduction of 3 days per case (516 cases/year): \$1,651,200/year	Severe Sepsis rates for one year will follow trend of Jul – Nov 16 Average hospital cost of \$2,000/day
Averted ICU Admissions	10%	Approx. 100 cases would be averted with avg. hospital LOS of 5 days: \$1,000,000/year	Based on screening eligibility for severe sepsis care and not meeting criteria: Average ICU LOS \$2,000/day over regular hospital bed for 5 days
Total Savings:		\$7,501,000	

Appendix G

**Johns Hopkins Nursing Evidence-Based Practice
Appendix F: Non-Research Evidence Appraisal Tool**

Evidence level and quality rating:		_____	
Article title:		Number:	
Author(s):		Publication date:	
Journal:			
Setting:		Sample (composition and size):	
Does this evidence address my EBP question?		<input type="checkbox"/> Yes <input type="checkbox"/> No Do not proceed with appraisal of this evidence.	
<input type="checkbox"/> Clinical Practice Guidelines LEVEL IV Systematically developed recommendations from nationally recognized experts based on research evidence or expert consensus panel			
<input type="checkbox"/> Consensus or Position Statement LEVEL IV Systematically developed recommendations, based on research and nationally recognized expert opinion, that guide members of a professional organization in decision-making for an issue of concern			
- Are the types of evidence included identified?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
- Were appropriate stakeholders involved in the development of recommendations?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
- Are groups to which recommendations apply and do not apply clearly stated?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
- Have potential biases been eliminated?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
- Does each recommendation have an identified level of evidence stated?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
- Are recommendations clear?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
Complete the corresponding quality rating section.			

Johns Hopkins Nursing Evidence-Based Practice Appendix F: Non-Research Evidence Appraisal Tool

<input type="checkbox"/> Literature review LEVEL V Summary of selected published literature including scientific and nonscientific such as reports of organizational experience and opinions of experts		
<input type="checkbox"/> Integrative review LEVEL V Summary of research evidence and theoretical literature; analyzes, compares themes, notes gaps in the selected literature		
• Is subject matter to be reviewed clearly stated?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
• Is literature relevant and up-to-date (most sources are within the past five years or classic)?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
• Of the literature reviewed, is there a meaningful analysis of the conclusions across the articles included in the review?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
• Are gaps in the literature identified?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
• Are recommendations made for future practice or study?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Complete the corresponding quality rating.		
<input type="checkbox"/> Expert opinion LEVEL V Opinion of one or more individuals based on clinical expertise		
• Has the individual published or presented on the topic?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
• Is the author's opinion based on scientific evidence?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
• Is the author's opinion clearly stated?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
• Are potential biases acknowledged?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Complete the corresponding quality rating.		
Organizational Experience		
<input type="checkbox"/> Quality improvement LEVEL V Cyclical method to examine workflows, processes, or systems with a specific organization		
<input type="checkbox"/> Financial evaluation LEVEL V Economic evaluation that applies analytic techniques to identify, measure, and compare the cost and outcomes of two or more alternative programs or interventions		
<input type="checkbox"/> Program evaluation LEVEL V Systematic assessment of the processes and/or outcomes of a program; can involve both quantitative and qualitative methods		

Johns Hopkins Nursing Evidence-Based Practice Appendix F: Non-Research Evidence Appraisal Tool

Setting	Sample Composition/Size		
• Was the aim of the project clearly stated?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
• Was the method fully described?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
• Were process or outcome measures identified?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
• Were results fully described?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
• Was interpretation clear and appropriate?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
• Are components of cost/benefit or cost effectiveness analysis described?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Complete the corresponding quality rating.			
<input type="checkbox"/> Case report LEVEL V			
In-depth look at a person or group or another social unit			
• Is the purpose of the case report clearly stated?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
• Is the case report clearly presented?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
• Are the findings of the case report supported by relevant theory or research?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
• Are the recommendations clearly stated and linked to the findings?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Complete the corresponding quality rating.			
Community standard, clinician experience, or consumer preference LEVEL V			
<input type="checkbox"/> Community standard: Current practice for comparable settings in the community			
<input type="checkbox"/> Clinician experience: Knowledge gained through practice experience			
<input type="checkbox"/> Consumer preference: Knowledge gained through life experience			
Information Source(s)	<u>Number of Sources</u>		
• Source of information has credible experience.	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
• Opinions are clearly stated.	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
• Evidence obtained is consistent.	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Findings That Help You Answer the EBP Question			

Johns Hopkins Nursing Evidence-Based Practice Appendix F: Non-Research Evidence Appraisal Tool

Quality Rating for Clinical Practice Guidelines, Consensus, or Position Statements (Level IV)
<p>A. High quality Material officially sponsored by a professional, public, or private organization or a government agency; documentation of a systematic literature search strategy; consistent results with sufficient numbers of well-designed studies; criteria-based evaluation of overall scientific strength and quality of included studies and definitive conclusions; national expertise clearly evident; developed or revised within the past five years.</p> <p>B. Good quality Material officially sponsored by a professional, public, or private organization or a government agency; reasonably thorough and appropriate systematic literature search strategy; reasonably consistent results, sufficient numbers of well-designed studies; evaluation of strengths and limitations of included studies with fairly definitive conclusions; national expertise clearly evident; developed or revised within the past five years.</p> <p>C. Low quality or major flaw Material not sponsored by an official organization or agency; undefined, poorly defined, or limited literature search strategy; no evaluation of strengths and limitations of included studies; insufficient evidence with inconsistent results; conclusions cannot be drawn; not revised within the past five years.</p>
Quality Rating for Organizational Experience (Level V)
<p>A. High quality Clear aims and objectives; consistent results across multiple settings; formal quality improvement or financial evaluation methods used; definitive conclusions; consistent recommendations with thorough reference to scientific evidence.</p> <p>B. Good quality Clear aims and objectives; formal quality improvement or financial evaluation methods used; consistent results in a single setting; reasonably consistent recommendations with some reference to scientific evidence.</p> <p>C. Low quality or major flaws Unclear or missing aims and objectives; inconsistent results; poorly defined quality improvement/financial analysis method; recommendations cannot be made.</p>
Quality Rating for Case Report, Integrative Review, Literature Review, Expert Opinion, Community Standard, Clinician Experience, Consumer Preference (Level VI)
<p>A. High quality Expertise is clearly evident, draws definitive conclusions, and provides scientific rationale; thought leader in the field.</p> <p>B. Good quality Expertise appears to be credible, draws fairly definitive conclusions, and provides logical argument for opinions.</p> <p>C. Low quality or major flaws Expertise is not discernable or is dubious; conclusions cannot be drawn.</p>

Appendix H

SIRS/Sepsis Screening Tool

PATIENT LABEL

This is a tool to help screen patients for SIRS/sepsis in the emergency department

1. Suspect potential infection if patient answers yes to the following symptoms?

YES: _____ NO: _____

- | | | | |
|---|--|--|---|
| <input type="checkbox"/> SOB/Cough | <input type="checkbox"/> Burning, Urgency, Frequency | <input type="checkbox"/> Recently diagnosed infection | <input type="checkbox"/> Fever |
| <input type="checkbox"/> Skin/soft tissue infection | <input type="checkbox"/> Wound infection | <input type="checkbox"/> Acute abdominal pain/ infection | <input type="checkbox"/> Bone/joint infection |
| <input type="checkbox"/> Other signs of infection _____ | <input type="checkbox"/> Patient is on antibiotics | | |

2. Is patient positive for 2 or more (possible signs of SIRS)

YES: _____ NO: _____

- | | | | |
|--|---|---|--------------------------------------|
| <input type="checkbox"/> Hyperthermia > 38.3 C (101.0 F) | <input type="checkbox"/> Tachypnea > 20 | <input type="checkbox"/> Hyperglycemia (BG > 140- non-diabetic) | <input type="checkbox"/> ALOC |
| <input type="checkbox"/> Hypothermia < 36 C (96.8 F) | <input type="checkbox"/> Tachycardia > 90 bpm | <input type="checkbox"/> WBC > 12000 or < 4000 | <input type="checkbox"/> Bands > 10% |

- ✓ If answer is yes to both 1 & 2 & fever is present start fever ESP,
- ✓ If answer is yes to both 1 & 2 & NO fever call MD for verbal orders for lab draw

3. Does patient have positive risk factors for sepsis

YES: _____ NO: _____

- | | | | |
|--|---|--|---|
| <input type="checkbox"/> Has Foley catheter | <input type="checkbox"/> Recent admission | <input type="checkbox"/> Immunocompromised | <input type="checkbox"/> AGE > 60 |
| <input type="checkbox"/> Diabetic | <input type="checkbox"/> Chronic kidney disease | <input type="checkbox"/> chronic liver disease | <input type="checkbox"/> recent surgery |
| <input type="checkbox"/> Presence of invasive line | <input type="checkbox"/> ETOH/IV DRUG ABUSE | | |

4. Does patient display any signs of organ dysfunction (new onset)

YES: _____ NO: _____

- | | | | |
|--|---|---|------------------------------------|
| <input type="checkbox"/> Elevated Total Bilirubin > 2mg/dl | <input type="checkbox"/> lactate > 2.0 mmol/l | <input type="checkbox"/> Platelet count < 100,000 | <input type="checkbox"/> ALOC |
| <input type="checkbox"/> Creatinine > 2.0 mg/dl | <input type="checkbox"/> increased O2 requirements to maintain SpO2 > 90% | | <input type="checkbox"/> PTT & INR |
| <input type="checkbox"/> Needs vasopressor support to maintain adequate BP | | | |

5. If patient is **positive** for categories 1, 2 & 3 OR Any combination containing both 1 & 4 patient meets criteria for SEPSIS?

****CALL SEPSISALERT ANDBED PATIENT IMMEDIATELY

Time called: _____:_____

(Tool not part of patients chart)

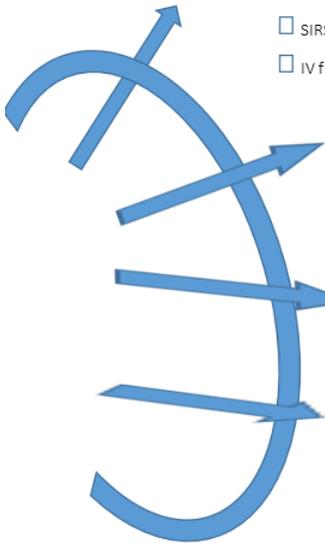
Appendix I

Patient label

ED SEPSIS CLOCK

ED ARRIVAL TIME ZERO :	SIRS ≥ 2 <input type="checkbox"/> TEMP >38.3 < 36 <input type="checkbox"/> HR >90 <input type="checkbox"/> RR > 20 <input type="checkbox"/> WBC > 12,000 < 4,000 <input type="checkbox"/> AMS	WT. _____ (KG actual) Ht. _____ (inches)
---------------------------	---	---

1 Hour ends @ _____:



SIRS charted MD notified lactate & BC drawn @ _____:_____ 2 large bore IV's started

IV fluids started (30ml/KG) – (use pressure bag) _____:_____ ABX started @ _____:_____ NICOM/Cheetah used

2nd HOUR ends @ _____:

IV fluids - 30ml/kg infusing Antibiotic started - IV ONLY after 2 BC are drawn

2nd Lactic Acid drawn

*** Consider Inotropes – vasopressors - central line

3rd HOUR ends @ _____:

Vasopressor started @ _____:_____ (for refractory or persistent hypotension)

** scan and account for all fluids in EMAR, Chart fluid in flow sheet

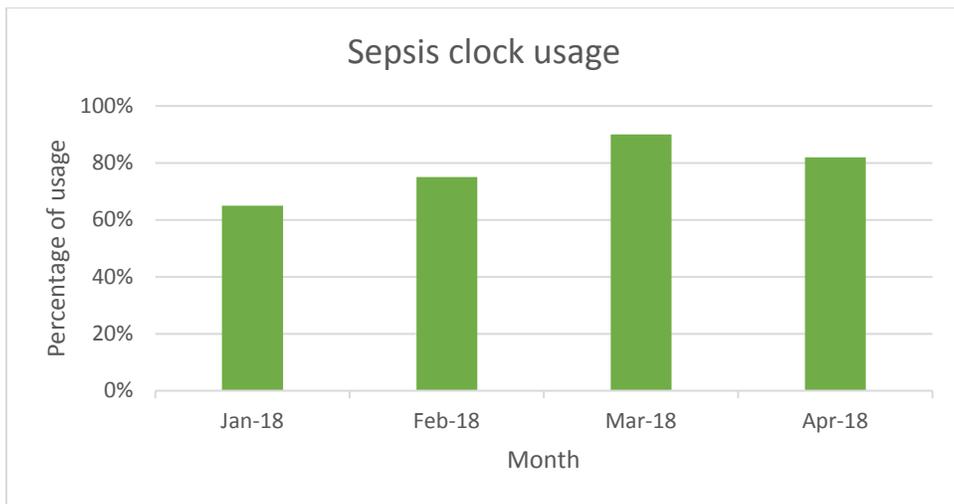
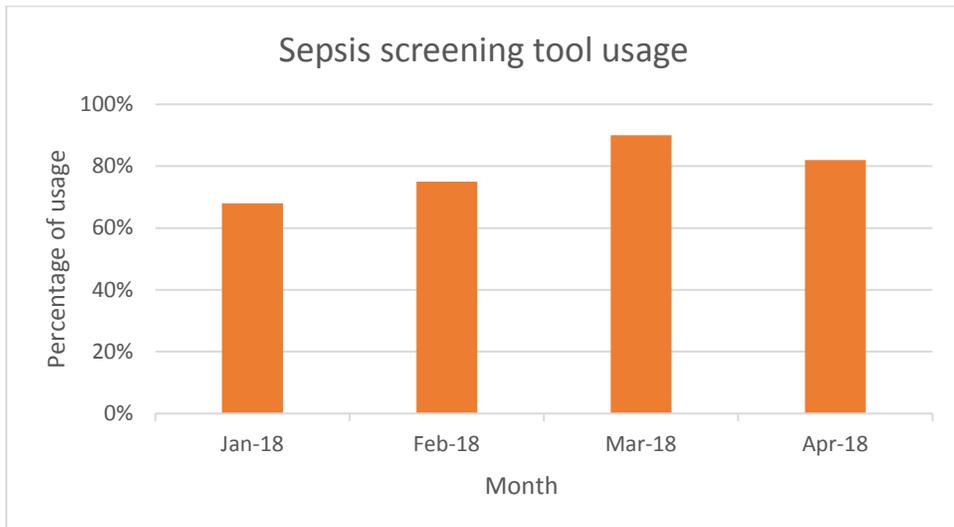
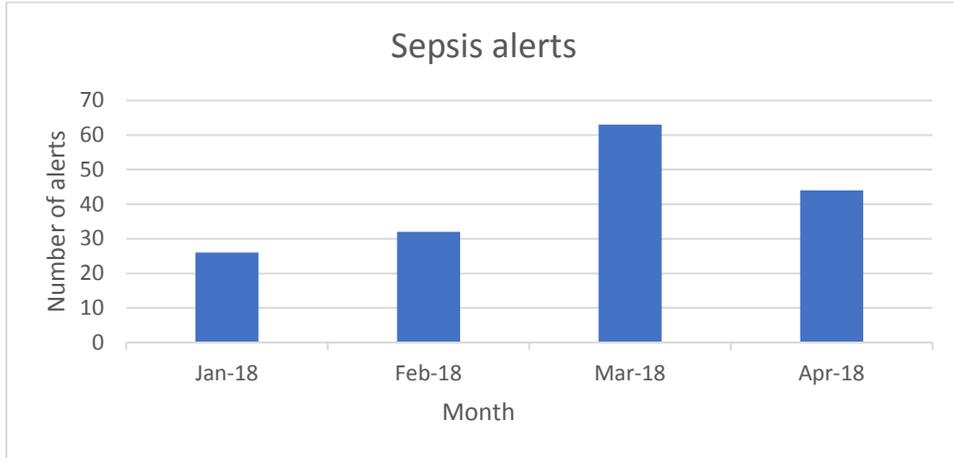
4- 6 HOURS ends @ _____:

2nd Lactate Resulted @ _____:_____

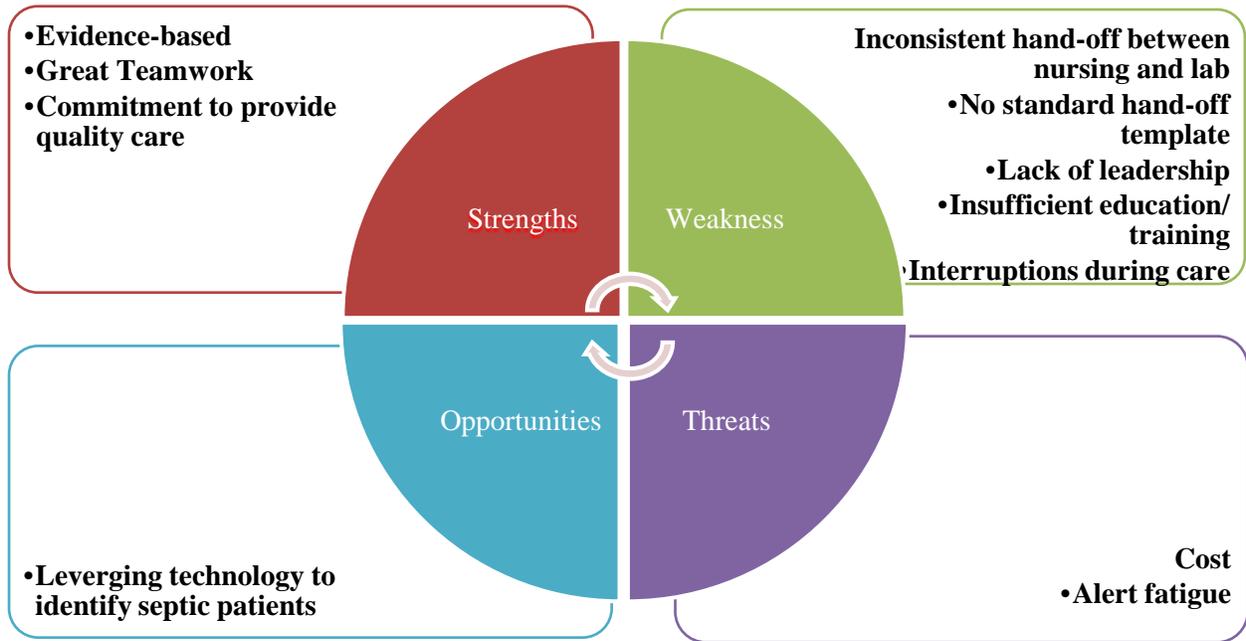
Primary RN	Second RN	ED MD	HBS MD
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(Not part of the patients chart)

Appendix J



Appendix K



Appendix L



Cycle 1	Cycle 2	Cycle 3	Cycle 4
Initiate Sepsis Alert	Develop Sepsis screening tool	Implement Sepsis clock tool	Develop a standardized process between lab and nursing for repeat lactate orders