Improving the Diagnosis and Treatment of Obstetric Sepsis

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N670 Evidence-Informed Improvement Project Final Paper

Improving the Diagnosis and Treatment of Obstetric Sepsis

Edwije Joseph RN, BSN
Professor Catherine Coleman, DNP, MSN, CPHQ, CNL

July 31, 2024
Abstract

**Problem:** Maternal mortality affects women during four phases of obstetrics including triage, antepartum, labor & delivery, and postpartum. In the U.S., sepsis is the third leading cause of maternal death. Inconsistent screening practices and delays in recognizing symptoms can occur in any phase. These factors were identified as root causes in a northern California community hospital with 600 monthly deliveries.

**Context:** Two maternal sepsis cases cost $90,000 annually. A standardized pathway was initiated nationally in October 2023 through the California Maternal Quality Care Collaborative (CMQCC). One regional hospital system initiated a quality improvement project over 5 months within a community hospital and referral center for high-risk patients.

**Interventions:** An informatics clinical decision support (CDS) intervention- Best Practice Alert (BPA) – was introduced into the electronic health record (EHR). New electronic and educational workflows were tested.

**Measures:** Three process measures were utilized to monitor BPA workflows and satisfaction among clinicians (n=20). These included timely nursing assessment within 2 hours; timeliness of physician orders; and completion of pre/post implementation surveys.

**Results:** A reduction in time to detection resulted from early alerts and expedited clinical evaluations. Timely administration of antibiotics under 30 minutes improved by 96%; improved adherence to the CMQCC sepsis pathway occurred and provider feedback (n=20) indicated 90% satisfaction.
Conclusion: New BPA workflows reduced variation and increased standardization. All phases of the staff experience were positively affected. Maternal sepsis outcomes can be expected to improve with judicious selection of CDS tools and associated provider training across systems in obstetric care delivery.

Keywords: obstetric-maternal sepsis, early detection, best practice alert, clinical decision support, quality improvement, staff education.
**Personal Leadership Statement**

Leadership is essential, especially as a middle manager to promote engagement and education of all staff, optimize patient safety and to continuously try to bridge the gaps between senior leadership and front-line staff across systems. As a Clinical Nurse Leader (CNL), this quality improvement project has reflected three transformational roles of the CNL: risk anticipator, systems analyst and information manager (King et al., 2019). In addition to these roles, this author also practices leadership with a servitude philosophy (https://www.indeed.com/career-advice/career-development/servant-leadership). In other words, leading by example and being empathetic, fair and authentic.

Five strengths identified in *Strengths-based Leadership* (Clifton, 2007) include input, woo, positivity, learner, and arranger. This CNL’s vision for leadership is to embody all of these roles and characteristics in future career growth as a person, manager, and nursing professional (Rath, 2007).

**Problem Description**

Twelve cases of maternal sepsis were diagnosed in 2023 (CMQCC, 2024). An investigation is underway to determine if implementing the BPA could potentially reduce this incidence in 2024. Currently, in this community hospital, with 20 labor beds, and 60 postpartum beds, every pregnant patient who enters the labor & delivery triage or is admitted to postpartum with the diagnosis of chorioamnionitis (acute inflammation of the membranes and chorion of the placenta), urinary tract infection, pyelonephritis, endometritis (a condition that causes inflammation to the lining of your uterus), pneumonia, or intrauterine fetal demise is at risk of severe infection that can lead to sepsis (See Appendix A). Currently, the recommended screening process is to screen patients for these criteria: altered mental status, temperature > 100.4 F or < 96.8 F, Heart Rate > 110, Respirations > 24, White blood cells > 15000 or < 4000
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or > 10% bands in CBC differential. Patients with suspected infection are to be assessed within the first 2 hours of the start of a shift and as needed. Two or more of these criteria, known as Systemic Inflammatory Response Syndrome (SIRS) or Modified SIRS (mSIRS) for the maternal population or with altered mentation with noted infections, will require treatment. The nurse is responsible for notifying the provider, drawing labs (Calling lab to draw “Stat Sepsis”: Lactate, CBC, Chem 8, Type & screen if they have chorioamnionitis), obtaining urinalysis, initiating a fluid bolus and obtaining two sets of blood cultures before administering antibiotics. Increasing knowledge regarding how to diagnose and remedy the situation will decrease the likelihood of inpatients experiencing an adverse outcome. Obstetric sepsis treatment is time-sensitive, yielding favorable results when interventions occur quickly. For every maternal death, fifty women have experienced life-threatening morbidity from sepsis. Furthermore, studies suggest that a significant proportion, ranging from 63 to 73% of maternal fatalities resulting from sepsis could be avoided (CMQCC, 2022). In the United States, maternal sepsis ranks as the third leading cause of mortality, resulting in 261,000 deaths worldwide (Sepsis Alliance, 2024) (See appendix B).

Multiple pregnant patients with chorioamnionitis (an intraamniotic infection) are not being treated or screened for sepsis. Obstetric sepsis can lead to death or readmission, which is not only costly but also strains the family. For example, when a mom and baby must be separated, more family support for the household is required. Currently, there is variation in both patient diagnosis and treatment in this community hospital, which is part of a large integrated health delivery system and managed care organization in northern California (See Appendix C). In 2023, the state average for maternal sepsis, as reported by the CMQCC, was 0.2%. This community hospital’s rate of maternal sepsis matches the state average. In comparison, other facilities in this region have a slightly higher rate of 0.3%. Over the next year, a quality improvement project will be implemented, and it is anticipated that the scores will decrease by
incorporating early recognition. In examining the current state of clinical practices for maternal sepsis, it becomes evident that there exists a critical gap in accurately diagnosing and effectively treating this life-threatening condition (See Appendix D). Time Zero, which starts the clock to trigger the BPA and start the sepsis pathway, ensuring the timely management of OB sepsis. Time Zero starts when the BPA recognizes two or more mSIRS criteria: Lactate result ≥ 2, Hypotension, Acute dysfunction of renal/hepatobiliary/hematopoietic systems, and altered mental status from baseline.

Available Knowledge

PICOT questions help guide literature reviews in scholarly writing: P is the target population, I is the intervention, C is the comparison, O is the outcome, and T is the timeframe. For this project, the PICOT (P) In Pregnant, antepartum, and postpartum patients, (I) how does applying the best practice alert (BPA) within the electronic health record (EHR) (C) compared to the current practice improve the diagnosis of Obstetric Sepsis (T) by July 2024? (See Appendix E). A methodical electronic search was carried out to access articles from the following databases: Cochrane Database of Systematic Reviews, PubMed, CINAHL, and Evidence-Based journals. Five papers were determined to be most relevant to this ongoing statewide project.

CMQCC (2022) indicated that in a case-control study of maternal sepsis patients, SIRS criteria showed 93% sensitivity and 63% specificity for identifying sepsis. However, they resulted in high false-positive rates. For instance, in a study of 913 women with obstetric infections, 63% met SIRS criteria, but only five had sepsis. Another evaluation of Maternal Early Warning Scores (MEWS) found that 10.3% met the criteria with a score of ≥ 5, yet only five had sepsis. MEWS and SIRS had low efficacy in sepsis detection. A quality improvement toolkit with evidence from several sources with an evidence rating of V A.
The study examined nine maternal morbidity issues, including conditions like amniotic fluid embolism and sepsis. Out of 31 conditions identified, only these nine had documented outcomes and costs, representing less than one-third of all maternal morbidity costs (The Commonwealth Fund, 2021, November 12). Literature review evidence rating of VA.

The review identified diverse terms, definitions, and criteria for maternal sepsis. Many studies (11 out of 27) and guidelines (7 out of 9) adapted or varied from the general definitions of sepsis, which were initially formulated for non-pregnant individuals. The articles selected were released from 2010 to 2016 and were included without any limitations on language or geographical location (World Health Organization, 2017). The literature review has an evidence rating of VA.

Tita et al. (2023) reported a QuaNtitative Randomized controlled trial (RCT). Among 14,526 participants given azithromycin, 1.6% experienced mortality or sepsis, compared to 2.4% of 14,637 who received the placebo. Azithromycin reduced the risk of maternal death or sepsis by about a third. Overall, deaths were rare (0.1% in both groups), with sepsis occurring in 1.5% of azithromycin recipients versus 2.3% in the placebo group. JHNEBP appraisal rating IA.

Frost et al. (2020) conducted a Quality improvement project in a hospital comprised of 34 labor, antepartum, triage beds, and a 49-bed postpartum unit, handling around 5,000 deliveries annually. Each one-hour simulation involves up to four labor nurses and two obstetric providers, incorporating a 10-minute pre-brief, a 30-minute escape room simulation, and a 20-minute debrief session. A mixed method study on an evidence rating of VA.

**Rationale**

When addressing maternal sepsis, CNLs and healthcare professionals often rely on a combination of frameworks, models, and theories to understand the problem, design interventions, and predict their effectiveness. The quality improvement (QI) framework called the
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Model for Improvement (MFI) from the Institute for Healthcare Improvement (IHI) (King et al., 2019) was utilized to help this facility systematically test a new intervention. The MFI includes three key questions: 1. What are we trying to accomplish? 2. How will we know a change is an improvement? 3. What change can we make that will result in improvement? This QI project used Plan Do Study Act (PDSA) cycles to trial and then scale up the new BPA intervention and associated CMQCC OB sepsis pathways for early detection and treatment of maternal sepsis.

**Project Aims**

**Global Aim:** By July 2025, to standardize the best practice alert (BPA) intervention in the electronic health record (EHR) related to early detection and management of obstetric sepsis in the Roseville Community Hospital's Maternal Child Health mesosystem (Triage, Labor & Delivery, Antepartum, and Postpartum).

**Specific Aim:** By July 2024, to improve the diagnosis and treatment of obstetric sepsis by decreasing Roseville Community Hospital's monthly maternal sepsis score from 0.2 to 0.1 (1%) in the mesosystem.

**Context**

Several contextual elements are crucial when introducing interventions, such as BPA and standardized CMQCC OB sepsis pathways, to ensure their effectiveness and smooth implementation (Wright et al., 2010). Sepsis scores at this hospital align with the state average; however, discrepancies in treatment administration and diagnosis exist. A consistent and standardized approach may decrease sepsis rates or maintain the current level. Integrating the BPA tool within EHR is anticipated to facilitate the identification of at-risk patients and begin timely treatment to reduce sepsis scores.
**Mesosystem Assessment**

The 5 P’s framework (5 P’s include purpose, patients, professionals, processes, and patterns) offers a mesosystem approach to healthcare improvement, addressing key essential components for delivering high-quality, patient-centered care and driving organizational excellence. By integrating a systems approach, including metrics that matter, healthcare organizations can work towards achieving their goals and improving patient and organizational outcomes (King et al., 2019). In this mesosystem, a SWOT analysis (strengths, weaknesses, opportunities, threats) was also conducted (See Appendix F).

**Clinical Environment and Workflow**

Understanding the specific clinical settings where the interventions will be implemented is essential. This includes examining current workflows and how the interventions might integrate without causing disruption. For instance, the effectiveness of the BPA relies heavily on its seamless integration into existing electronic health record systems and clinical workflows.

**Staff Readiness and Training**

The healthcare staff’s knowledge, attitudes, and skills are critical. Training programs are necessary to familiarize staff with the new protocols and technology. Staff readiness also includes their openness to adopting new practices, which can significantly influence the success of the intervention (King et al., 2019).

**Technology Infrastructure**

For technology-driven interventions like BPAs, CNL must examine and evaluate the existing IT infrastructure. It is crucial that the current system can support new tools without frequent breakdowns or glitches. The BPA intervention might involve assessing hardware and software compatibility, data security measures, and the availability of technical support.
Organizational Culture

The culture within the healthcare organization can significantly affect adopting new practices. A culture that promotes safety, quality improvement, and innovation will likely embrace standardized care and BPAs more readily than one resistant to change (Johnson & Sollecito, 2020).

Patient Characteristics

Understanding the demographics, health literacy, and specific needs of the patient population being served is vital. These characteristics can influence how interventions are tailored to ensure they are patient-centered and capable of addressing the unique aspects of patient care.

Regulatory and Compliance Factors

Ensuring that the interventions comply with health regulations and standards is fundamental. This includes privacy concerns around patient data used in BPAs and adherence to clinical guidelines in standardized care protocols.

Evaluation and Communication Mechanisms

Establishing mechanisms for ongoing evaluation and feedback is essential to monitor the effectiveness of the interventions and make iterative improvements. This involves setting up metrics for success and regular reporting systems to gather data on performance.

A Power Interest Grid describes a communication plan that includes regular updates and education sessions, tailored communications, open channels for feedback, documentation and transparency, and cascading communication. It helps decide the right communication strategy for engaging various stakeholders (Reddi, 2023). The findings can be described using the Power Interest Grid for an interprofessional team communication plan about OB sepsis (See Appendix G).
Intervention

One intervention and best practice described in the literature to improve maternal outcomes is implementation of a new workflow utilizing electronic CDS tools (Amland, & Hahn-Cover, 2019). CDS tools can aid in early recognition and treatment improves diagnosing outcomes, which can be challenging. A study assessed a cloud-based sepsis alert system's performance, analyzed sepsis epidemiology, and identified quality improvement opportunities. Data from 6200 adult hospitalizations (2012-2013) showed the system flagged 13% of patients, with 51% already suspected of infection. The study focused on patients flagged before suspected infection. The median time from arrival to CDS system activation was 3.5 hours, and from activation to diagnosis was 8.6 hours (Amland, 2019).

Technology in healthcare can contribute to more positive and accurate detection. In an environment where change can be challenging, teaching staff demonstrates that the value of standardized care is vital to facilitate earlier detection, diagnosis, and recommended treatment. Should CDS prove to optimize efficiency in the diagnosis and treatment of maternal sepsis in a subset of high-risk patients, this may become a replicable intervention throughout Northern California and other sister facilities to prevent maternal morbidity.

This QI project intervention involves the integration of BPA within the EHR system to enhance the management of obstetric (OB) sepsis.

Description of the intervention(s)
Integration of the BPA in the EHR for OB sepsis aims to improve the early detection and management of sepsis in obstetric patients by providing timely alerts to medical staff and team members across the mesosystem.
**Budget**

Budget will include:

Implementation Costs: Computer courses teaching providers how to diagnose and treat Maternal Sepsis and reading material properly will cost $64,703.50. Cost Avoidance or Revenue generation: $26,926.

Cost savings: Subtract implementation costs from cost avoidance or revenue generation. $37,777.50.

Financial Analysis: According to Paoli et al. (2018), The length of stay for a sepsis patient is 4.5 days for sepsis, 6.5 days for severe sepsis, and 16.5 days for septic shock. With two maternal Sepsis cases, a year can cost $90,000. Yearly education will cost $64,703.50, a cost avoidance of $26,926 (See Appendix H).

**Study of the Intervention**

When assessing and testing the impact of interventions like the BPA for obstetric sepsis within the EHR system, a systematic approach is essential to determine effectiveness and attribute outcomes directly to the intervention. PDSA cycles represent a practical approach for implementing and refining interventions for QI projects (See Appendix I). This method allows healthcare teams to test changes on a small scale, learn from the results, and make necessary adjustments before broader implementation. A PDSA cycles is the “improvement process that never ends” (King et al., 2019, p. 11).

**Operationalizing the BPA Intervention**

In a detailed project charter, specific operational tasks are outlined (See Appendix J). Assessment and continuous, timely documentation are critical during PDSA cycles. For example, “Time Zero” tracking ensures timely sepsis management. In the EHR, Time Zero begins when there are two OB sepsis criteria that need to be initiated. This triggers the BPA to
send notifications and suggestions for care management. These actions are referred to as the Sepsis pathway. Staff training and simulation drills were provided throughout the PDSA cycles. Mechanisms for continuous monitoring and feedback were also established in a project timeline (See Appendix K).

By systematically employing the MFI and QI tools, it is possible to robustly assess the impact and operations of the Best Practice Alert for obstetric sepsis and confidently determine whether the observed improvements in patient care and response times are directly attributable to the intervention.

Staff & Patient Education

Both self-study education via a standardized computer module and simulated BPA scenarios were implemented in the early phase of project initiation. It is essential to develop and implement consistent and standardized educational approaches. Furthermore, educating staff about the signs and symptoms of obstetric sepsis infections reduces false positive and false negative results of OB sepsis. Lastly, postpartum nurses reinforced patient education using existing education materials about signs and symptoms to report during the 42-day postpartum period.

For maternal sepsis, interventions are considered adequate if they achieve the following three outcomes: 1. Reduce the Incidence of Sepsis - By preventing infection or identifying signs and symptoms early before the condition progresses; 2. Lower Mortality and Morbidity Rates - Effective interventions lower the incidence and severity of sepsis, thus saving lives and reducing complications; 3. Improve Patient Experience - Interventions that make the healthcare journey less stressful and more patient-centered are considered successful.
The effectiveness of CDS interventions in preventing and managing maternal sepsis is predicated on sound medical practice, evidence-based guidelines, and comprehensive healthcare strategies encompassing education, prevention, early detection, and timely treatment.

Ethical Considerations

This project has been approved as a quality improvement project by the regional organization research determination office (RDO) (See Appendix L). University of San Francisco faculty also reviewed guidelines for QI projects and determined that this QI project did not require IRB approval (See Appendix M).

Implementing and studying interventions such as the BPA for OB sepsis involves several ethical considerations that must be carefully addressed to protect patients, maintain integrity in research, and uphold professional standards. Reflecting on this project through the lens of Jesuit values and the American Nurses Association (ANA) code of conduct, and ethical standards provides a unique opportunity to examine its ethical and moral dimensions. Jesuit values focus on holistic education and personal growth, encouraging a commitment to service, justice, and promoting the common good. These values include a focus on personalized care, outreach to underserved communities, ethical considerations, and professional development (Marion et al, 2016).

Patient consent may not be required for quality improvement initiatives such as the BPA implementation, but transparency in communication is crucial. Providing educational materials or info sessions can help patients understand the intervention's purpose and implications. Three ethical issues were considered before undertaking this project: 1. Privacy and Confidentiality - Ensuring the privacy and confidentiality of patient data collected through the EHR. Implementing robust data security measures to safeguard patient information within the
EHR system is crucial. Adhering to relevant privacy regulations such as the Health Insurance Portability and Accountability Act (HIPAA) in the United States is required. Access to patient data should be restricted to authorized personnel only, and data should be anonymized when used for research purposes (Kings et al., 2019).

2. Equity and Fairness: Ensuring the implementation of the BPA does not inadvertently exacerbate healthcare disparities or inequities. Conducting a thorough assessment of the potential impact of the intervention on different patient populations, including marginalized or vulnerable groups, must be accomplished. Monitoring and analyzing data to identify disparities in the BPA utilization or patient outcomes across demographic groups provides key data on population subgroups. Finally, the team must adjust implementation strategies as needed to promote equity, prevent discrimination of marginalized groups, and reinforce staff awareness of disparities (Beauchamp & Childress, 2019). For example, the reality of maternal morbidity in black women is a national priority and therefore equity in obstetric care cannot be overemphasized.

3. Conflict of Interest: Potential conflicts of interest, such as financial or professional interests, could bias the implementation or interpretation of the intervention's outcomes. The team should be encouraged to disclose any potential conflicts of interest among researchers, clinicians, or stakeholders in implementing or evaluating the BPA intervention. Transparency about financial relationships, affiliations, or competing interests helps maintain the integrity and credibility of the QI project. According to the Institute of Medicine (2009), minimizing the influence of conflicts of interest by ensuring that project design, data analysis, and interpretation are conducted objectively and independently will provide scholarly integrity.
Outcome Measure Results

In the calendar year 2023, one case of maternal sepsis occurred each month in this mesosystem with no maternal deaths. Unfortunately, there was a maternal death in early February 2024 due to OB sepsis prior to going live with the BPA. The BPA could have potentially aided in the earlier diagnosis of this maternal death since the patient's condition escalated quickly. The team was unsure if implementing a BPA system for maternal sepsis could have significant implications for healthcare outcomes.

During this project, both quantitative and qualitative data were collected.

Quantitative Data

Since the BPA intervention was operationalized in February 2024, only 6 cases of OB sepsis were reported between February 2024 and May 2024. This data shows the rate to be consistent with one case per month except for May 2024, in which 3 cases were detected. This BPA-targeted alert could improve patient outcomes and implementing this QI project the author anticipates that less variation and more standardization will occur long-term as the team monitors both process and outcome measures. Therefore, outcome data must be meticulously collected and analyzed (See Appendix N). A dashboard was created to monitor timeliness of component nursing tasks that were integral to process improvements of the BPA (See Appendix O).

Qualitative Data

Two qualitative surveys including both open-ended and satisfaction questions were conducted in April 2024 (pre-implementation) and July 2024 (post-implementation). Providers from the night and day shift were included (RNs, midwives, physicians in the triage, antepartum, labor and delivery, and postpartum microsystems). In the pre-implementation survey (n=20) a
verbal set of two questions included: 1. “What are your thoughts about the diagnosis and treatment of maternal sepsis in the department? 2. “What are your thoughts on the new electronic BPA maternal sepsis workflow?” In the post-implementation QR code survey (July 2024) the following two questions were included: 1. “What are your thoughts about diagnosing and treating maternal sepsis in our department since the BPA implementation?” Two answer options were provided (“I think it’s going well” and “I don’t think it’s going well”. Please answer in the next space”). If participants chose the second answer, they were asked to elaborate. 2. “What are your thoughts on the new electronic BPA maternal sepsis workflow?” Two answer options were provided: (“It is helpful” or “not helpful” Please answer in the next space”). If participants chose the “not helpful” answer, they were asked to elaborate.

Based on these staff surveys, the summary of feedback from the pre-implementation survey includes four findings: 1. Increased early detection rates - Improving detection timing and standardized screening; 2. Improved treatment times - time for antibiotic administration and protocol adherence; 3. Improved documentation and data collection - Data accuracy, completeness, and quality improvement; 4. Increased healthcare provider awareness and education - Educational feedback from the BPA intervention resulted in more consistent clinical practice.

Feedback-Pre-Implementation Survey

Within the mesosystem, staff were excited to participate in a new intervention to decrease sepsis rates. Three negative findings were identified in the pre-implementation survey. These findings include: 1. Alert Fatigue - One potential downside of BPAs is alert fatigue, where the high frequency of alerts can lead to desensitization among healthcare providers, possibly causing them to ignore essential alerts. Some nurses stated there is a glitch in BPA, where alerts remain after completing the task. It becomes a hard stop and will not allow a nurse to
chart when the alert has been acknowledged. 2. Adaptation - Integrating BPAs into clinical workflow requires adjustments and buy-in from the healthcare team, which can be a significant hurdle in some settings. Providers are bypassing BPA and treating it as a guideline versus a protocol. They treat the patient the way they did before the new workflow. 3. Normalized Deviance - Delay in real-time charting. Nurses are not documenting maternal vital signs in real time. Nurses were back-charting vital signs instead of documenting them at the time of assessment. This practice can seriously affect accurate BPA recognition.

**Feedback-Post Implementation Survey**

Feedback from the post-implementation survey was mixed; however, most findings were supportive of the new BPA. One MD provider conveyed dissatisfaction with the BPA because she felt that the alert interfered with her clinical judgment and seemed intolerant to using technology to aid in clinical decision making. One nurse felt that the BPA generated an excess number of notification alerts. This provider also stated that despite the new BPA, “All providers not on board”. Surprisingly, a majority of healthcare providers offered positive feedback through QI project. These clinicians recognized the BPA intervention role in supporting clinical decision-making and standardizing care. Mesosystem clinical staff indicated 90% satisfaction with the new BPA and associated workflows (See Appendix P).

**Summary**

Clearly, automation of clinical tasks related to potential morbidity and mortality in high-risk departments such as obstetrics is worth the investment of time, people and organizational informatics resources.
Key Findings

Three key findings have positively influenced the integration and potential replication of this QI project: 1. Early detection improvement - The BPA system significantly reduced the time it took to detect maternal sepsis, allowing for quicker clinical evaluations. Normally, it took the provider more time to identify sepsis, but now it was detected sooner. 2. Timely treatment - The time to antibiotic administration increased to 96%, which is crucial for effective sepsis management. Once the provider acknowledged the suggestion for antibiotics, orders were placed, and the RNs administered them in under 30 minutes. 3. CMQCC OB sepsis pathway Adherence - Implementing the BPA system improved adherence to the sepsis management pathway, ensuring consistent and effective care. The process became more streamlined, and the team was more confident in detecting and treating OB sepsis (See Appendix O). The BPA also led to an assessment in triage and postpartum by nurses within 2 hours of admission to the hospital.

Lessons Learned

Many lessons were learned during this QI project by the CNL, and the interdisciplinary mesosystem team members including an informatics nurse consultant. For example, comprehensive training sessions were essential to decrease misunderstanding and successfully adopt the BPA intervention; thus, ensuring that all healthcare providers understood its functionality and importance. The labor & delivery nurses also received additional training on calculating the total fluid amount to deliver when bolusing a septic patient since there was some confusion surrounding this task.

Another critical lesson learned relates to customizing the BPA criteria and workflow to align with the specific needs and practices of the mesosystem setting to optimize effectiveness.
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For example, there were some glitches where the alert continued to “fire” notifications despite the task being correctly completed by the clinician the first time. Additional electronic BPA options were added to silence the alert and support step-by-step workflow. Nurses had to give a rationale when they acknowledged the alert (See Appendix Q). Regular monitoring and feedback mechanisms helped identify areas for informatics improvement to maintain the CDS BPA efficacy. Balancing the frequency and relevance of BPA-associated alerts was necessary to prevent alert fatigue and ensure that providers remained responsive to important notifications.

Contributions to Successful Change

The four contributing factors that aided this mesosystem’s success included: 1. Leadership support - Strong support from healthcare leadership facilitated the implementation process and encouraged staff buy-in. 2. Interdisciplinary collaboration - Collaboration among departments and specialties ensured a holistic approach to managing maternal sepsis. 3. Technology integration - Effective integration of the BPA intervention with the existing EHR system streamlined workflows and minimized disruption. 4. Ongoing education - Continuous education and training sessions helped maintain awareness and proficiency among healthcare providers. Since the introduction of the BPA intervention was deemed successful in this setting on a small scale, the plan for a broader roll-out to sister facilities is anticipated within one year. However, this will necessitate that all modifications be included and resources available for more extensive training and implementation. This author recommends continuation of this QI project until December 2024 including a final interdisciplinary report to be generated prior to more widespread dissemination.
Conclusion

The CDS BPA contributed to reduced sepsis-related morbidity and mortality rates during the five-month QI project. BPAs can increase healthcare provider awareness and education while improving documentation, and data collection to decrease maternal sepsis. Continuous monitoring and testing of informatics interventions require ongoing evaluation and team feedback to make adjustments as necessary. The PDSA cycles are iterative, and they represent critical components of success. By systematically applying the PDSA cycles, healthcare providers can effectively test and refine interventions to improve the diagnosis and treatment of OB sepsis, ultimately enhancing patient outcomes and care efficiency (Johnson et al., 2020).

In conclusion, implementing a BPA for maternal sepsis can significantly improve early detection, expedite treatment response, and optimize overall patient outcomes. Such tools also provide an evidence-based intervention for continuous learning, integration of technology and improvement in healthcare delivery. However, the effectiveness of CDS BPA interventions and workflow changes depend heavily on design, and implementation, especially the ongoing management of human factors such as alert fatigue. Statewide initiatives such as the CMQCC maternal sepsis pathway must be strongly considered and carefully test informatics decision-support interventions before replication to ensure human, technical, clinical, and operational efficacy.
References


SepsisToolkit_FINAL.2_Errata_7.1.22.pdf (cmqcc.org)

California Maternal Quality Care Collaborative. (2022, July 1). Improving diagnosis and treatment of maternal sepsis: Screening and diagnosis of sepsis (see Appendix H).

https://www.cmqcc.org/resources-toolkits/toolkits/improving-diagnosis-and-treatment-maternal-sepsis-errata-712022


https://www.cmqcc.org/sites/default/files/Sepsis%20Toolkit_FINAL.2_Errata_7.1.22.pdf


Azithromycin to prevent sepsis or death in women planning a vaginal birth. New England Journal of Medicine, 388(13), 1161-1170.

https://iris.who.int/bitstream/handle/10665/254608/WHO-RHR-17.02-eng.pdf?sequence=1

Wright, A., Phansalkar, S., Bloomrosen, M., Jenders, R. A., Bobb, A. M., Halamka, J. D.,
Appendices

Appendix A

OB Sepsis At-risk Patients

**TABLE 1. Leading Causes of Maternal Sepsis**

<table>
<thead>
<tr>
<th>Antepartum</th>
<th>Intrapartum/Immediate Postpartum</th>
<th>Post-discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Septic abortion</td>
<td>Chorioamnionitis/intraamniotic infection</td>
<td>Pneumonia/influenza</td>
</tr>
<tr>
<td>Chorioamnionitis/intraamniotic infection</td>
<td>Endometritis</td>
<td>Pyelonephritis</td>
</tr>
<tr>
<td>Pneumonia/influenza</td>
<td>Pneumonia/influenza</td>
<td>Wound infection/necrotizing fasciitis</td>
</tr>
<tr>
<td>Pyelonephritis</td>
<td>Pyelonephritis</td>
<td>Mastitis</td>
</tr>
<tr>
<td>Appendicitis</td>
<td>Wound Infection/necrotizing fasciitis</td>
<td>Cholecystitis</td>
</tr>
</tbody>
</table>

Source: California Maternal Quality Care Collaborative. (2022, July 1).
Appendix B
Sepsis Alliance

Source: Sepsis Alliance, (2024)
Appendix C

Fishbone Diagram
Appendix D
Gap Analysis

<table>
<thead>
<tr>
<th>Desired State</th>
<th>Current State</th>
<th>Action Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>A process to more accurately diagnose and treat maternal sepsis.</td>
<td>Inconsistency in recognizing and treating Obstetric sepsis in a timely fashion.</td>
<td>• Development and implementation of consistent and standardized approaches to care.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Educate staff about the signs and symptoms of obstetric sepsis infections.</td>
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<tr>
<td></td>
<td></td>
<td>• A new two-step approach to screening.</td>
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<td></td>
<td></td>
<td>• Algorithm for Maternal Sepsis Evaluation Flow Chart.</td>
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<td></td>
<td></td>
<td>• Assessment and monitoring recommendations.</td>
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<td></td>
<td></td>
<td>• Guidelines for distinguishing chorioamnionitis/intraamniotic, endometritis, pneumonia/influenzas, pyelonephritis, and wound infections/necrotizing infection from sepsis.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Guidance on antibiotics and source control by infectious conditions.  CMQCC, (2022).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Incorporate BPA in EHR for timely treatment.</td>
</tr>
</tbody>
</table>
**Appendix E**

**Evaluation Table**

**PICOT Question**

In (P) pregnant, antepartum, and postpartum patients, how does integration of a new electronic BPA (Best Practice Alert) to the Electronic Medical Record (EHR) (I) compared to current practice (C) improve the timely diagnosis of Obstetric Sepsis (O) by July 2024 (T)?

<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Sample</th>
<th>Outcome/Feasibility</th>
<th>Evidence rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gibbs, R., Bauer, M., Olvera, L., Sakowski C., Cape V, Main E. (2020). Improving diagnosis and treatment of maternal sepsis: A quality improvement toolkit. (California Maternal Quality Care Collaborative). See Appendix H</td>
<td>Quality improvement Toolkit</td>
<td>Several levels of evidence were incorporated into this toolkit.</td>
<td>V A</td>
<td></td>
</tr>
<tr>
<td><a href="https://www.cmqcc.org/sites/default/files/Sepsis%20Toolkit_FINAL.2_Errata_7.1.22.pdf">https://www.cmqcc.org/sites/default/files/Sepsis%20Toolkit_FINAL.2_Errata_7.1.22.pdf</a></td>
<td></td>
<td>Timely identification and treatment of sepsis in pregnant and postpartum women typically lead to favorable outcomes in this young and healthy group. The toolkit proposed a novel, two-step method for diagnosing sepsis in pregnancy and postpartum periods. BPA is useful for identifying criteria and determining the next steps in treating maternal sepsis properly.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| The Commonwealth Fund. (2021, November 12). New report: Pregnancy and delivery complications cost the United States billions in health care expenses, lost productivity and social support services. | Literature Review | 31 morbidities/conditions were studied.                                                                                                                                                                      | V A             |
| https://www.commonwealthfund.org/press-release/2021/new-report-pregnancy-and-delivery-complications-cost-united-states-billions |                                                                 | 9 morbidities were documented as important outcomes in new mathematical model quantifying the financial impacts of maternal health issues on both mother and child during and after pregnancy for all U.S. births in 2019. Useful in showing cost of care in |

Useful in showing...
## Improving the Diagnosis and Treatment of Obstetric Sepsis

<table>
<thead>
<tr>
<th>Source</th>
<th>Methodology</th>
<th>Details</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>World Health Organization (WHO). (2017). <em>Maternal sepsis</em>. <a href="https://www.who.int/teams/sexual-and-reproductive-health-and-research-(srh)/areas-of-work/maternal-and-perinatal-health/maternal-sepsis#:~:text=Maternal%20Literature">https://www.who.int/teams/sexual-and-reproductive-health-and-research-(srh)/areas-of-work/maternal-and-perinatal-health/maternal-sepsis#:~:text=Maternal%20Literature</a> Review 27 articles, out of 245 citations identified in the systematic review, and 9 guidelines and 3 additional WHO documents Provide a new definition of maternal sepsis. “By enhancing the Focus on Maternal Sepsis” laid the groundwork for acknowledging and tackling the significance of maternal infection by establishing key themes and an action plan framework. It is helpful in bringing awareness to maternal sepsis, a morbidity that has been ignored and is on the rise globally.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frost, K., North, F., &amp; Smith, K. (2020). Interprofessional simulation to improve the understanding of obstetric sepsis. <em>Journal for Nurses in Professional Development</em>, 36(6), E18-E26. <a href="https://doi.org/10.1097/NND.0000000000000679">https://doi.org/10.1097/NND.0000000000000679</a> Mixed Method study Quality improvement Project using simulation. 28 offered simulations, a total of 126 obstetric professionals participated, including 80 clinical nurses and 46 medical providers. The educational simulation intervention improved outcomes for earlier identification of maternal sepsis signs and symptoms. The intervention was valuable for staff educators, enhancing</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
interprofessional engagement and maternal sepsis knowledge.

This knowledge can inform future educational strategies using technology for staff development and interdisciplinary teamwork.
## Appendix F

### SWOT Analysis

<table>
<thead>
<tr>
<th>Internal (attributes of the organization)</th>
<th>Favorable/Helpful</th>
<th>Unfavorable/Harmful</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strengths</strong></td>
<td>• The stakeholders are supportive of this project.</td>
<td>• A patient with sepsis is not treated despite the screening results.</td>
</tr>
<tr>
<td></td>
<td>• Collaborative care, where the patient is part of the whole team, and Team Stepps are used highly.</td>
<td>• Competitors have more out-of-network opportunities.</td>
</tr>
<tr>
<td></td>
<td>• This health system charges a flat fee, so patients do not receive multiple bills from other providers or services.</td>
<td>• The amount it will cost to train everyone.</td>
</tr>
<tr>
<td></td>
<td>• Ability to have nurses screen patients promptly.</td>
<td>• Providers and nurses must follow the guidelines, or the sponsors can withdraw the grant.</td>
</tr>
<tr>
<td></td>
<td>• Improved patient outcomes.</td>
<td>• User resistance</td>
</tr>
<tr>
<td></td>
<td>• Standardization of care.</td>
<td>• Alarm fatigue</td>
</tr>
<tr>
<td></td>
<td>• Data collection and analysis</td>
<td>• Technical issues</td>
</tr>
<tr>
<td></td>
<td>• Education to all health care providers and nurses to ensure everyone is on the same page.</td>
<td></td>
</tr>
<tr>
<td><strong>Weaknesses</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>External (attributes of the organization)</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Bimonthly sepsis town hall meetings to ensure that the screenings take place. A network of nurses searching for solutions and ideas.</td>
<td>• Patients who do not follow discharge instructions return with sepsis. The outpatient population.</td>
</tr>
<tr>
<td></td>
<td>• Quality improvement</td>
<td>• If our sponsor decides to pull the grant.</td>
</tr>
<tr>
<td></td>
<td>• Patient safety</td>
<td>• Patients who have access to Google may decline treatment.</td>
</tr>
<tr>
<td></td>
<td>• Regulatory compliance</td>
<td>• Privacy and security concerns</td>
</tr>
<tr>
<td></td>
<td>• Expansion of scope</td>
<td>• Dependence on technology</td>
</tr>
</tbody>
</table>
Appendix G
Stakeholder Power Interest Grid Analysis

Keep Satisfied
- Chief Medical Officer
- Chief Nurse Officer
- Chief Financial Officer
- Standford-Sponsor
- Chief Quality Officer

Manage Closely
- Nurse Director
- OB Sepsis Committee
- Nurse Manager
- Clinical Nurse Specialist
- Quality Consultant
- IT

Monitor
- CDC
- CMQCC
- Lab
- Assistant Nurse Manager (ANM)

Keep Informed
- Physicians
- Nurse Midwives
- Nurses
- Patients
### Appendix H

ROI or cost avoidance calculation

**Increasing Early Diagnosis and Treatment of Obstetric Sepsis by 1% per month**

<table>
<thead>
<tr>
<th>Improvement Revenue (Cost Avoidance)</th>
<th>Cost/Day</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Length of Stay for Sepsis</td>
<td>9 days</td>
<td>$5,000</td>
</tr>
<tr>
<td>Avoidance of 2 cases of sepsis</td>
<td></td>
<td>($45,000 x 2) = $90,000</td>
</tr>
<tr>
<td>Improvement cost</td>
<td>Number</td>
<td>Hourly Rate +.4 Benefit</td>
</tr>
<tr>
<td>Nurse Educator</td>
<td>1</td>
<td>$146</td>
</tr>
<tr>
<td>Registered Nurses</td>
<td>380</td>
<td>$140</td>
</tr>
<tr>
<td>Midwives</td>
<td>10</td>
<td>$168</td>
</tr>
<tr>
<td>Physicians</td>
<td>20</td>
<td>$350</td>
</tr>
<tr>
<td>Education Materials/Supplies</td>
<td></td>
<td>$150</td>
</tr>
<tr>
<td>Total Cost of 1 Class Session (1 Hour)</td>
<td></td>
<td>$62,074</td>
</tr>
<tr>
<td>Project Savings/Cost Avoidance (ROI)</td>
<td></td>
<td>$26,926</td>
</tr>
</tbody>
</table>
## Appendix I

### Selected PDSA cycles

<table>
<thead>
<tr>
<th>PDSA #</th>
<th>Change to Test</th>
<th>Prediction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Standardize Treatment of Sepsis.</td>
<td>There is a lack of consistency in the care provided, with some patients receiving treatments while others are not.</td>
</tr>
<tr>
<td>2</td>
<td>Develop a BPA system for early sepsis detection in obstetric patients.</td>
<td>BPA will help the healthcare team to improve in the early detection and management of maternal sepsis in obstetric setting.</td>
</tr>
<tr>
<td>3</td>
<td>Expand training programs and enhance communication protocols for sepsis response.</td>
<td>BPA will help the healthcare team to improve in the early detection and management of maternal sepsis in obstetric setting.</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### IMPROVING THE DIAGNOSIS AND TREATMENT OF OBSTETRIC SEPSIS

<table>
<thead>
<tr>
<th>Actual</th>
<th>Reflection</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>How did you measure success? Record data/results and observations</td>
<td>What did we learn and what Conclusions did we draw from the test? What worked, what didn’t work and why?</td>
<td>What will we do based on what we’ve learned? Adapt, Adopt, Abandon</td>
</tr>
<tr>
<td>Chart audits, receiving scores from the CMQCC database. OB Sepsis Score of 0.2.</td>
<td>Inconsistency in recognizing and treatment of OB sepsis.</td>
<td>Adopt</td>
</tr>
<tr>
<td>Scores from the CMQCC. OB Sepsis Scores 0.2. Analyze response times to sepsis alerts and patient outcomes.</td>
<td>Some Providers bypass the BPA and treat it as they please. Based on feedback, adjust the BPA criteria to improve specificity and sensitivity.</td>
<td>Adopt</td>
</tr>
<tr>
<td>Unchanged</td>
<td>Nurses are confused regarding bolusing patients appropriately and fine-tuning training content and communication guidelines based on evaluative data and staff feedback.</td>
<td>Adopt</td>
</tr>
</tbody>
</table>
Appendix J

Project Charter

**Global Aim:** To standardize the approach to care and treating obstetric sepsis. Patients at Kaiser Roseville Maternal Child Health (Labor & Delivery, Antepartum, and Postpartum) Accelerate the reduction of preventable maternal deaths related to sepsis and lower the risk of maternal sepsis.

**Specific Aim:** Improving the diagnosis and treatment of obstetric Sepsis by decreasing Kaiser Roseville Maternal Sepsis score from 0.2 to 0.1 (1%) of pregnant and postpartum by July 2024.

**Background:**

Multiple pregnant patients with chorioamnionitis/ intraamniotic infection are not being treated or screened for Sepsis. Obstetric Sepsis can lead to death or readmission, which is not only costly but also strains the family. For example, when a mom and baby must be separated, more family support for the household is required. Currently, there is variation in both patient diagnosis and treatment in this facility, Kaiser Permanente, an integrated health delivery system.

According to the California Maternal Quality Care Collaborative (CMQCC) (2022), The World Health Organization (WHO) defines “maternal sepsis simply a life-threatening condition with organ dysfunction resulting from infection during pregnancy, childbirth, post-abortion, or the postpartum period (up to 42 days)". Currently, in Kaiser Roseville, every pregnant patient who enters the labor & delivery triage or is admitted to postpartum with the diagnosis of chorioamnionitis (acute inflammation of the membranes and chorion of the placenta), urinary tract infection, pyelonephritis, endometritis (a condition that causes inflammation to the lining of your uterus), pneumonia, or intrauterine fetal demise is at risk of severe infection that can lead to sepsis.

**Sponsors**

| Stanford Medicine | Kaiser Permanente Roseville Medical Center |

**Goals**

1. Educate Nursing staff and medical providers about the signs and symptoms of obstetric sepsis infections. This awareness can lead to early recognition and intervention, therefore reducing false positive and false negative results.
2. Educate patients on signs and symptoms to report during the intrapartum phase (While Pregnant at home)
3. Inform patients of signs and symptoms to report during the 42-day postpartum period.
4. Huddle each shift and highlight all patients at risk for Obstetric Sepsis
5. Conduct Obstetric Sepsis Bimonthly Collaboration Meetings with the Inter-departmental Team.
Develop and implement standardized protocols and clinical guidelines for diagnosing and managing obstetric sepsis. These protocols should cover the continuum of care from screening to treatment, including antibiotic therapy, fluid resuscitation, and supportive care.

### Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Data Source</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcome</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Decreasing Obstetric Sepsis scores.</td>
<td>Chart Review-EHR and CMQCC Maternal Sepsis database</td>
<td>90%</td>
</tr>
<tr>
<td>% Decreasing readmission of patients who had infections during labor and postpartum admission.</td>
<td>Chart Review-EHR</td>
<td>90%</td>
</tr>
<tr>
<td><strong>Process</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Decrease number of maternal Sepsis.</td>
<td>Chart review-EHR</td>
<td>60%</td>
</tr>
<tr>
<td>% Decrease re-admissions of cases with sepsis criteria.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Increase in physician writing orders when notified by nurses.</td>
<td>Chart Review-EHR</td>
<td>50%</td>
</tr>
<tr>
<td>% Increased in patient’s assessment within 2 hours.</td>
<td></td>
<td>50%</td>
</tr>
<tr>
<td>% Conduct 2 surveys of 20 clinicians during implementation of the new BPA workflow.</td>
<td></td>
<td>90%</td>
</tr>
<tr>
<td><strong>Balancing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitor the incidence of Maternal Deaths related to Obstetric sepsis.</td>
<td>Quality Report</td>
<td>&lt; 6/month</td>
</tr>
</tbody>
</table>

### Team

- 6 Staff Nurses
- Physicians
- Midwives
- Assistant Nurse Managers
- Clinical Nurse Specialist
Measurement Strategy

**Background (Global Aim)** To standardize the approach to care and treatment of obstetric sepsis. Accelerate the reduction of preventable maternal deaths related to sepsis and lower the risk of maternal sepsis by August 2024 in the Antepartum, Labor and Delivery, and Postpartum Units.

**Population Criteria:** Antepartum, Labor & Delivery and Postpartum Unit.

**Data Collection Method:** Robust data collection systems and surveillance mechanisms to monitor obstetric sepsis incidence, outcomes, and trends. This information can inform quality improvement initiatives and resource allocation. Data will be obtained from chart audits of patients with obstetric sepsis criteria and the treatments they are administered. Shadowing triage nurses and their processes. Shadowing providers and their methods for diagnosing and treatment.

Report from the quality department. Chart review from a sample of 30 patient records to establish a baseline. We will look at “Time Zero,” which starts the clock to trigger BPA and ensure the timely management of OB sepsis. We will compare the actual time the provider writes orders. After baseline data is collected, 10 patient records will be reviewed for project measures per month for Q1 2024. The data plan will be reevaluated every month based on the results.

**Data Definitions**

<table>
<thead>
<tr>
<th>Data Element</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best Practice Alerts (BPA).</td>
<td>Building the electronic medical record (EHR) to notify nurses and doctors when a patient meets the criteria for sepsis. It also states the recommended intervention and turns off the alert once completed.</td>
</tr>
<tr>
<td>Sepsis</td>
<td>The body’s life-threatening response to an infection can lead to tissue damage, organ failure, and death.</td>
</tr>
<tr>
<td>Systemic Inflammatory Response Syndrome (SIRS).</td>
<td>This results from an exaggerated body response to infection and can indicate sepsis.</td>
</tr>
<tr>
<td>The Modified SIRS (mSIRS)</td>
<td>Criteria for the perinatal population. This includes additional parameters or compartments better suited to representing specific disease dynamics in pregnant patients.</td>
</tr>
</tbody>
</table>
### Measure Description

<table>
<thead>
<tr>
<th>Measure Description</th>
<th>Measure Definition</th>
<th>Data Collection source</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreasing Obstetric Sepsis scores</td>
<td>N=# patients with Risk factors for Ob sepsis D=# patients admitted</td>
<td>Chart audit</td>
<td>90%</td>
</tr>
<tr>
<td>% Patients are to be assessed within the first 2 hours of the start of a shift.</td>
<td>N= # patients assessed within 2 hours D=# patients admitted</td>
<td>Chart review</td>
<td>60%</td>
</tr>
<tr>
<td>% Providers place orders within one hour when nurses notify them.</td>
<td>N= # patients with documented BPA for sepsis D=# patients admitted</td>
<td>Chart Review</td>
<td>50%</td>
</tr>
</tbody>
</table>

ETS 1:1 consult developing and vamping and Gantt chart.
Appendix K
Gantt Chart

Improving Diagnosis and Treatment of Obstetric Sepsis

Assemble Perinatal Quality Improvement Team
Communication Plan/ Sepsis townhall
Regularly meet as a team to implement interventions and monitor...
Complete structure measures in the Maternal Data Center (MDC).
Educational programs including the onboarding/ webinars
Go Live Support
Go live OB Sepsis Best Practice Alert (PBA)
Data Reporting- Respective Report Training & Education
Appendix L

RDO Approval Letter

Date: April 25, 2024
Subject: RDO KPNC 24 - 089
Title: Improving the Diagnosis and Treatment of Obstetric Sepsis

Dear Ms. Noyer:

The Research Determination Committee for the Kaiser Permanente Northern California region has reviewed the documents submitted for the above referenced project to be used by Edwije Joseph for her MSN project. The project does not meet the regulatory definition of research involving human subjects as noted here:

Not Research

The activity does not meet the regulatory definition of research per 45 CFR 46.102(d): Research means a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge.

This determination is based on the information provided. If the scope or nature of the project changes in a manner that could impact this review, please resubmit for a new determination. The word “research” should not appear in any posters or publications resulting from this project. Further, if publications, presentations or posters are generated from this project the following wording must be used to reference to the project research determination outcome:

“The Research Determination Committee for the Kaiser Permanente Northern California region has determined the project does not meet the regulatory definition of research involving human subjects per 45 CFR 46.102(d)”

You are expected, however, to implement your study or project in a manner congruent with accepted professional standards and ethical guidelines as described in the Belmont Report (http://www.hhs.gov/ohrp/humansubjects/guidance/belmont.html).

Additionally, you are responsible for keeping a copy of this determination letter in your project files as it may be necessary to demonstrate that your project was properly reviewed. Provide this approval letter to the Physician in Charge (PIC), your Area Manager, and Chief of Service, to determine whether additional approvals are needed.

Finally, all manuscripts/case series/case studies must receive written approval prior to submission to a journal or book. The Principal Investigator (PI) or first author (if different) must request their PIC1, or the Division of Research (DOR) Director2, or the Research & Innovation Academy (RIA)3 or an equivalent level leader4 review and provide written approval for publication submission. The PI is responsible for retaining a copy of the approval.

Sincerely,

The Research Determination Committee
KPNC-RDO@kp.org

1 PIC approval is required for all manuscripts/case series/case studies that do not include a DOR employee as an author; including but not limited to medical students, residents, and fellows.
2 DOR Director approval is required for all manuscripts/case series/case studies that include DOR employees as authors.
3 For all nurse-authored manuscripts/case series/case studies, approval by the Research & Innovation Academy is required.
4 If you are not sure who this would be, please contact the Research Determination Office (KPNC-RDO@kp.org)
Appendix M
Guidelines for QI Projects and Determined

CNL Project: Statement of Non-Research Determination Form

Student
Name: Edwige Joseph

Title of Project:
Improving the Diagnosis and Treatment of Obstetric Sepsis.

Brief Description of Project:

A) Aim Statement: Improving the diagnosis and treatment of obstetric Sepsis by decreasing Kaiser Roseville Sepsis score from 4.51 to 4.33 (11%) of pregnant and postpartum patients at Kaiser Roseville Maternal Child Health (Labor & Delivery, Antepartum, and Postpartum) by August 2024.

B) Description of Intervention: Educate Nursing staff and medical providers about the signs and symptoms of obstetric sepsis infections. This awareness can lead to early recognition and intervention; therefore, reducing false positive and false negative results.

C) How will this intervention change practice? Develop and implement standardized protocols and clinical guidelines for diagnosing and managing obstetric sepsis.

D) Outcome measurements: To standardize the approach to care and treatment of obstetric sepsis. Accelerating the reduction of preventable maternal deaths related to sepsis as well as lowering the risk of maternal sepsis.
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:

<table>
<thead>
<tr>
<th>Project Title: Improving Diagnosis and Treatment of Obstetric Sepsis</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></td>
<td>X</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></td>
<td>X</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></td>
<td>X</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></td>
<td>X</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></td>
<td>X</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></td>
<td>X</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></td>
<td>X</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></td>
<td>X</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: &quot;The Research Determination Committee for</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
the Kaiser Permanente Northern California region has determined the project does not meet the regulatory definition of research involving human subjects per 45 CFR 46.102(d).

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): Edwige Joseph

Signature of Student: ____________________________ DATE 6-1-2024

SUPERVISING FACULTY MEMBER NAME (Please print):

Signature of Supervising Faculty Member: ____________________________ DATE 4-18-2024

Department Manager NAME (Please print):

Signature of Department Manager: ____________________________ DATE 4-1-2024

5-17
Appendix N

Comparison of CMQCC Monthly OB Sepsis Rates

Deliveries with a sepsis diagnosis code among all deliveries.

CA MDC = Maternal Data Center

Source: California Maternal Quality Care Collaborative. (2022, July 26)

Note: 1 maternal death occurred in February 2024 →BPA QI project started in February 2024
### Appendix O

#### Dashboard-BPA Nursing Tasks

<table>
<thead>
<tr>
<th>Elements</th>
<th>iLA (%)</th>
<th>rLA (%)</th>
<th>BCX (%)</th>
<th>ABX (%)</th>
<th>Fluid (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROS</td>
<td>97.7</td>
<td>96.2</td>
<td>26</td>
<td>96.5</td>
<td>96.5</td>
</tr>
</tbody>
</table>

- **iLA** = Initial Lactate lab drawn by nurse
- **rLA** = Repeated Lactate lab drawn by nurse
- **BCX** = Blood Culture drawn by lab
- **ABX** = Antibiotics given by nurse
- **Fluid** = administration by nurse
Appendix P

Pre & Post Implementation Provider Satisfaction with BPA

Providers (n=20) include midwives, physicians and mesosystem nurses
Appendix Q

Maternity Sepsis Pathway BPA with Clinical Decision Support

The patient met severe sepsis or septic shock criteria >=60 minutes ago.

The physician/CNM has not received the alert. The managing physician/CNM must open the chart to receive the alert and review the patient.

Assess the patient and notify the managing physician/CNM with SBAR

SIRS: 04/28/2023 16:00
- Heart Rate > 110
- Respirations > 24
- Organ dysfunction: 04/28/2023 16:20
- Lactate ≥2 & <4
- Shock criteria: ()

Acknowledgment Reason:
- I have/will notify the physician/CNM
- Dismiss: Administrative Review

Important (1)

Initial Lactic Acid collection missing: Patient on sepsis pathway

Acknowledgment Reason:
- Initial Lactic Acid drawn
- Specimen collection needed
- Difficult access
- Dismiss: Administrative Review
Source: EHR Screenshots of BPA Notifications (accessed by author 7/25/24)