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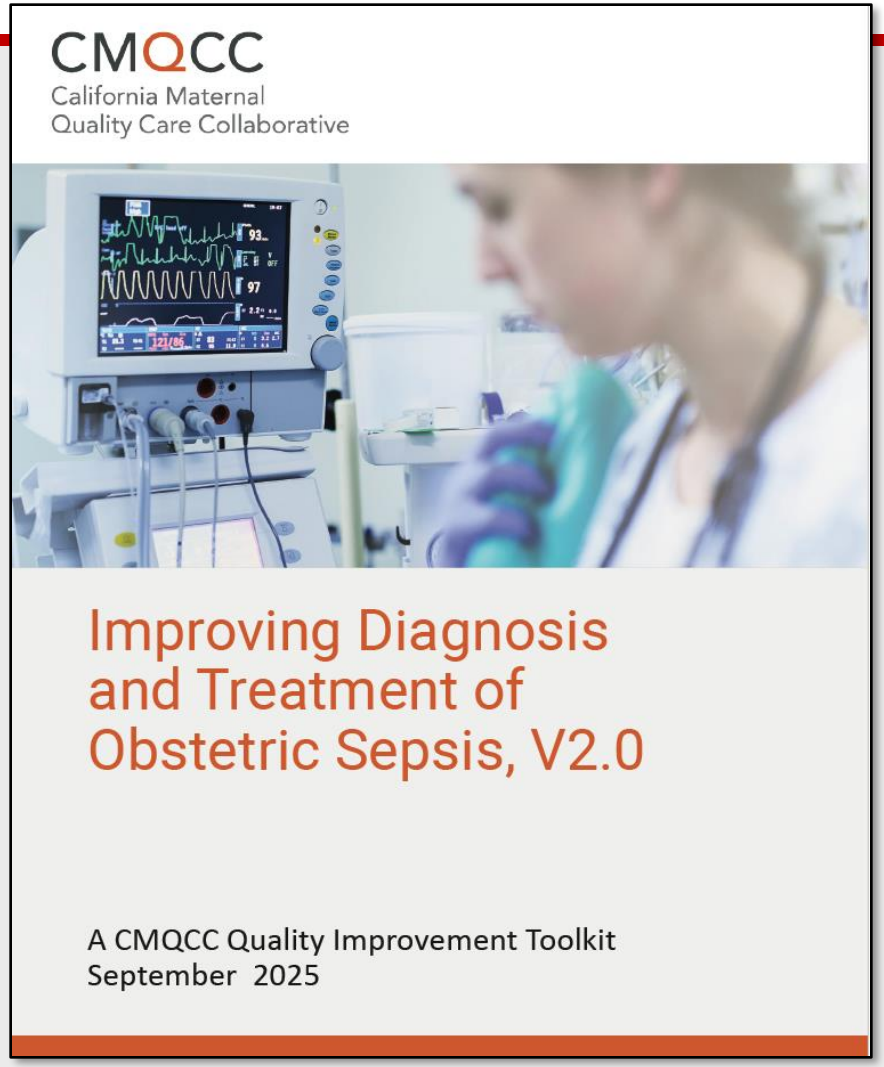
CMQCC
California Maternal
Quality Care Collaborative

Introduction to the Improving Diagnosis and Treatment of Obstetric Sepsis Toolkit

Second Edition
September 2025

Elliott K. Main, MD, Christa Sakowski, MSN, C-EFM, CLE, Ruhi Nath, MPH, Melissa E. Bauer, DO, Ronald S. Gibbs, MD, Editors



Acknowledgments

This work was supported by the Eunice Kennedy Shriver National Institute of Child Health and Human Development of the NIH under award **UH3HD108053: Large-scale Implementation of Community Co-led Maternal Sepsis Care Practices to Reduce Morbidity and Mortality from Maternal Infection** (Dr. Bauer and Dr. Main co-PIs). The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH.

We also acknowledge the partnership and support of the Department of Obstetrics & Gynecology, Stanford University School of Medicine.

Today's Webinar Will Be Recorded and All Materials Available at cmqcc.org

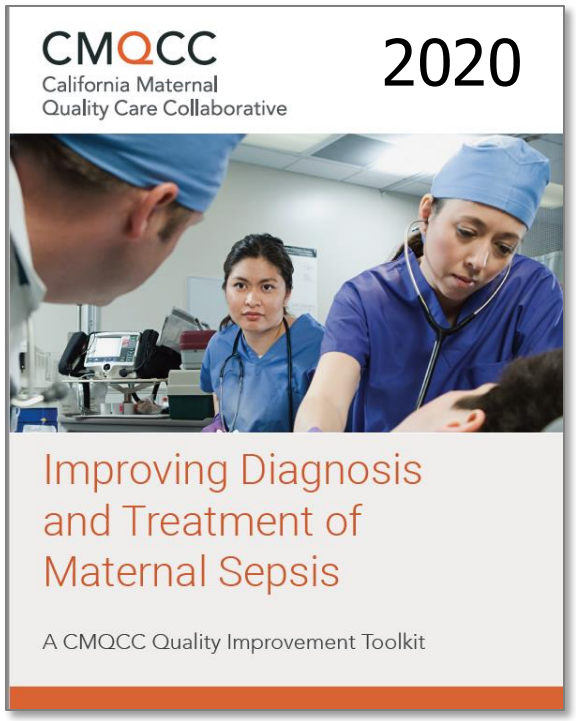
- You are welcome to use any of the slides provided for educational purposes
- If you modify or add a slide, please substitute your institutional logo and *do not use* the CMQCC logos
- We welcome your feedback and recommendations for improving the slide set
- This deck includes screen captures of sample algorithms, a case study, and additional slides appropriate for use to certain audiences.

This webinar is meant to introduce you to contents and additions in the new (2025) CMQCC Obstetric Sepsis Toolkit rather than a comprehensive lecture on the subject of maternal sepsis

Disclosure

This slide set is considered an educational resource but does not define the standard of care in California or elsewhere. Readers are advised to adapt the guidelines and resources based on their local facility's level of care and patient populations served and are also advised to not rely solely on the guidelines presented here.

Toolkit Revision: Key Source Materials (CA/MI)

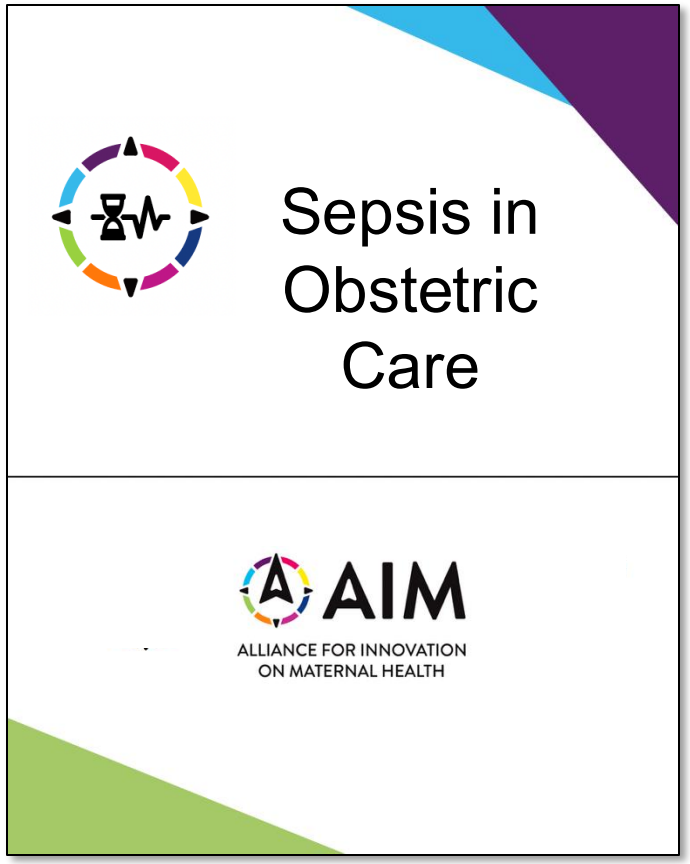


Original
CMQCC Sepsis Toolkit

- The planning phase of the NIH funding was used to partner with patients, community advocates, and clinicians to identify barriers and patient centered materials.
- EHR data from 70-hospitals and over 600,000 patients allowed validation of sepsis screening tools and flowchart
- The California/Michigan 18-month QI Learning Collaborative was used to refine content and identify implementation resources

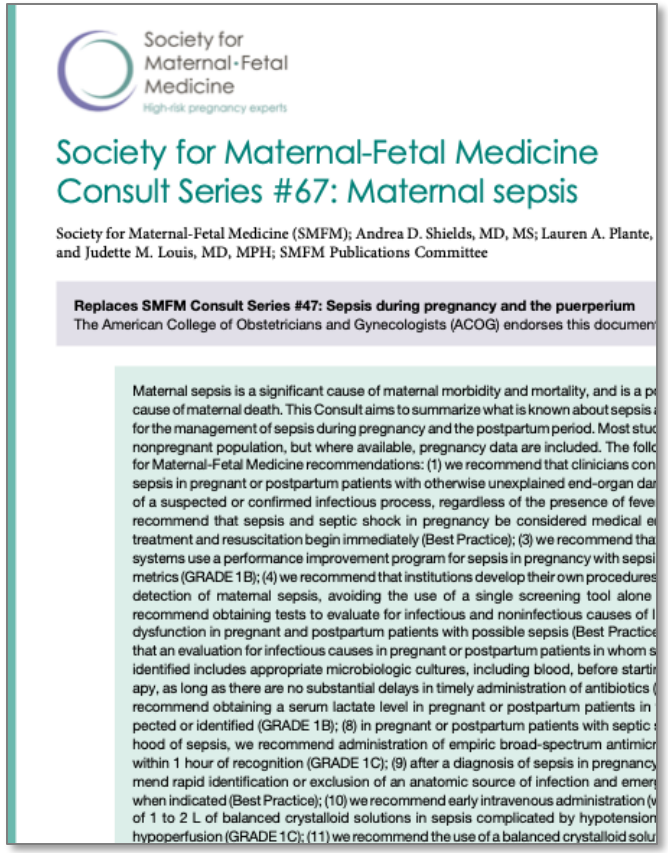
Toolkit Revision: Key Source Materials (National)

2023



National Safety Bundle: ACOG

September 2023


Society for Maternal-Fetal Medicine
High-risk pregnancy experts

Society for Maternal-Fetal Medicine Consult Series #67: Maternal sepsis

Society for Maternal-Fetal Medicine (SMFM); Andrea D. Shields, MD, MS; Lauren A. Plante, and Judette M. Louis, MD, MPH; SMFM Publications Committee

Replaces SMFM Consult Series #47: Sepsis during pregnancy and the puerperium
The American College of Obstetricians and Gynecologists (ACOG) endorses this documen

Maternal sepsis is a significant cause of maternal morbidity and mortality, and is a p
cause of maternal death. This Consult aims to summarize what is known about sepsis
for the management of sepsis during pregnancy and the postpartum period. Most stud
nonpregnant population, but where available, pregnancy data are included. The follo
for Maternal-Fetal Medicine recommendations: (1) we recommend that clinicians con
sepsis in pregnant or postpartum patients with otherwise unexplained end-organ dar
of a suspected or confirmed infectious process, regardless of the presence of feve
recommend that sepsis and septic shock in pregnancy be considered medical e
treatment and resuscitation begin immediately (Best Practice); (3) we recommend tha
systems use a performance improvement program for sepsis in pregnancy with sepsi
metrics (GRADE 1B); (4) we recommend that institutions develop their own procedures
detection of maternal sepsis, avoiding the use of a single screening tool alone
recommend obtaining tests to evaluate for infectious and noninfectious causes of
dysfunction in pregnant and postpartum patients with possible sepsis (Best Practice
that an evaluation for infectious causes in pregnant or postpartum patients in whom s
identified includes appropriate microbiologic cultures, including blood, before startin
apy, as long as there are no substantial delays in timely administration of antibiotics
recommend obtaining a serum lactate level in pregnant or postpartum patients in
pected or identified (GRADE 1B); (8) in pregnant or postpartum patients with septic
hood of sepsis, we recommend administration of empiric broad-spectrum antimicr
within 1 hour of recognition (GRADE 1C); (9) after a diagnosis of sepsis in pregnancy
mend rapid identification or exclusion of an anatomic source of infection and emer
when indicated (Best Practice); (10) we recommend early intravenous administration (
of 1 to 2 L of balanced crystalloid solutions in sepsis complicated by hypotension
hypoperfusion (GRADE 1C); (11) we recommend the use of a balanced crystalloid solu

SMFM Consult Series
Endorsed by ACOG

August 2025


Clinical Expert Series CME

Sepsis and Septic Shock During Pregnancy and Postpartum

Melissa E. Bauer, DO, and Luis D. Pacheco, MD

Sepsis and septic shock are leading causes of maternal morbidity and mortality. Sepsis complicates an estimated 1 in 1,000 pregnancies and is responsible for 24% of in-hospital maternal deaths. Because most cases occur outside of the hospital, it is crucial to educate patients about warning signs to seek early medical care and for clinicians to engage in critical listening and evaluation of patient concerns. In the hospital, screening patients for vital sign aberrancy, followed by bedside and laboratory evaluation for signs of end-organ injury, prompt antibiotic therapy, and restoration of perfusion (through fluid resuscitation and vasopressor administration), is critical for optimal outcomes. Long-term sequelae are common and include psychological sequelae, cognitive dysfunction, and weakness. Screening for these long-term effects and referrals for treatment are key to patient recovery.

(Obstet Gynecol 2025;146:207–22)
DOI: 10.1097/AOG.0000000000005991

According to the most recent report from the Centers for Disease Control and Prevention,[1] sepsis is the leading cause of pregnancy-related mortality. It is important to note that most of these deaths are believed to be preventable through early identification and treatment.[2] Physiologic changes of pregnancy overlap with early sepsis-induced vital sign abnormalities, making it more difficult for pregnant patients with sepsis to stand out until later in the disease process. The purpose of this article is to review the epidemiology, common causes, clinical pearls for screening, diagnosis, treatment, and long-term sequelae of sepsis during pregnancy and postpartum.

From the Department of Anesthesiology, Duke University, Durham, North Carolina; and the Departments of Obstetrics and Gynecology and Anesthesiology, University of Texas Medical Branch at Galveston, Galveston, Texas.

This work was supported by the Eunice Kennedy Shriver National Institute of Child Health and Human Development of the NIH under award UH3HD108053 (Dr. Bauer). The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH.

Each author has confirmed compliance with the journal's requirements for authorship.

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DEFINITION AND PATHOPHYSIOLOGY

Sepsis is defined as "life-threatening organ dysfunction caused by a dysregulated host response to infection."[3] *Septic shock* is defined as "a subset of sepsis in which particularly profound circulatory, cellular, and metabolic abnormalities are associated with a greater risk of mortality than with sepsis alone."[3] Furthermore, the diagnosis of septic shock requires the use of vasopressors and an elevated serum lactate above 2 mmol/L after adequate fluid resuscitation. Hemodynamically, cytokine-induced nitric oxide production by the endothelium results in profound vasodilation (decreased systemic vascular resistance) and systemic hypotension (distributive shock).[4] Hypotension is worsened by diffuse endothelial and glycocalyx injury (mediated by cytokines, elastases, proteases), resulting in third spacing with relative hypovolemia.[5] Although cardiac output is frequently increased as a result of minimal afterload, the heart is profoundly affected during sepsis (septic cardiomyopathy) with development of either systolic or diastolic dysfunction.[6] Systolic dysfunction is induced by direct myocardial contractile inhibition from cytokines; diastolic dysfunction may occur as fluid third spaces within the free wall of the left ventricle, obliterating its cavity and limiting diastolic preload filling.[6,7]

Simultaneously, activated inflammatory cells (eg, monocytes, neutrophils, macrophages) express tissue

Clinical Expert Series
Obstet Gynecol

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None of the toolkit authors report any conflicts of interest. One reviewer, Dr. Neil Silverman, was a consultant and speaker for Pfizer and Cepheid in the past but is not currently associated with the development or marketing of any Pfizer or Cepheid products.

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2025 Toolkit Table of Contents

Readiness	Obstetric Sepsis Educational Resources Preparedness Considerations for Low-Resource Hospitals and Emergency Departments
Recognition	Screening and Diagnosis of Sepsis in Pregnancy Bedside Evaluation EMR and Nurse-Driven Care
Response	Fundamentals in the Care of Sepsis Source Control Antibiotics for Sepsis and Serious Inf Chorioamnionitis / Intraamniotic Infection Prophylactic Antibiotics on Labor and Delivery Management of Allergies to Penicillin and Beta-Lactam Antibiotics
Reporting and System Learning	Measuring Quality in the Care of Obstetric Sepsis / SEP-1 Measure Measures for Obstetric Sepsis Bundle Implementation Debriefs and Multidisciplinary Case Review Guidance
Respectful and Supportive Care	Initiating Healing After a Severe Maternal Event Connecting with Community and Patient Advocates

Sepsis Toolkit 2nd Edition: 128 pages plus 58 pages of appendices

Highlights of what is new in this edition

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Organization of Each Chapter:

READINESS

Obstetric Sepsis Educational Resources

Elliott Main, MD, Stanford University School of Medicine
Melissa Bauer, DO, Duke University School of Medicine

Key Principles

1. Shared education documents create a shared mental model for communications between patients and clinicians.
2. Patient education is critical for early identification of sepsis.
3. Patient stories are invaluable for sensitizing clinicians of all disciplines to patient perspectives and critical importance of thorough and empathetic listening.

Introduction

Studies have shown that most maternal deaths occur due to delays in recognition, treatment, and escalation of care.[1,2,3] An important factor in these delays is the lack of patient understanding of key symptoms to watch for. Utilizing standardized warning signs education is helpful in teaching patients what warning signs to note and when to seek medical attention. Typically, education on these warning signs has been provided at the time of discharge following delivery, which is both too late for antenatal complications and at a time when the patient and family are overwhelmed with information. Additionally, standard discharge education handouts may be lost or accidentally discarded.

Recommendations (Level of Evidence)

1. Patient education materials that cover key symptoms related to severe maternal morbidities (such as Urgent Maternal Warning Signs) should be widely shared, ideally at multiple points during pregnancy/postpartum. (LEVEL B)
2. Videos featuring patient stories are very powerful tools for stressing the importance of listening and should be widely utilized. (LEVEL C)
3. "Advocacy Tips for Patients" and "Warning Signs Follow-up Guide for Health Care Professionals" have been useful tools for improved patient-healthcare team communication and are recommended for broad use. (LEVEL C)

Educational Tools and Sample Resources

1. ACOG/AIM Urgent Maternal Warning Signs
2. AWHONN POST-BIRTH Warning Signs
3. Appendix A: Warning Signs Follow-up Guide for Health Care Professionals
4. Appendix B: Advocacy Tips for Patients and Families (English)
5. Appendix C: Advocacy Tips for Patients and Families (Spanish)
6. MI AIM Sepsis Collaborative Patient Story
7. Sepsis Alliance: Pregnancy and Childbirth - Patient information and patient stories
8. Begin Again Foundation Patient Stories
9. American College of Obstetricians and Gynecologists/Alliance for Innovation in Maternity Care. AIM: Sepsis in Obstetric Care

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1. Geller SE, Koch AR, Martin NJ, Rosenberg D, Bigger HR; Illinois Department of Public Health Maternal Mortality Review Committee Working Group. Assessing preventability of maternal mortality in Illinois: 2002-2012. Am J Obstet Gynecol. 2014 Dec;211(6):698.e1-11.
2. Seacrist MJ, Morton CH, VanOtterloo LR, Main EK. Quality Improvement Opportunities Identified Through Case Review of Pregnancy-Related Deaths from Sepsis. J Obstet Gynecol Neonatal Nurs. 2019 May;48(3):311-320. doi: 10.1016/j.jogn.2019.02.007.
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4. Alliance for Innovation on Maternal Health (AIM)-Urgent Maternal Warning Signs (2024). https://saferbirth.org/aim-resources/aim-cornerstones/urgent-maternal-warning-signs-2/

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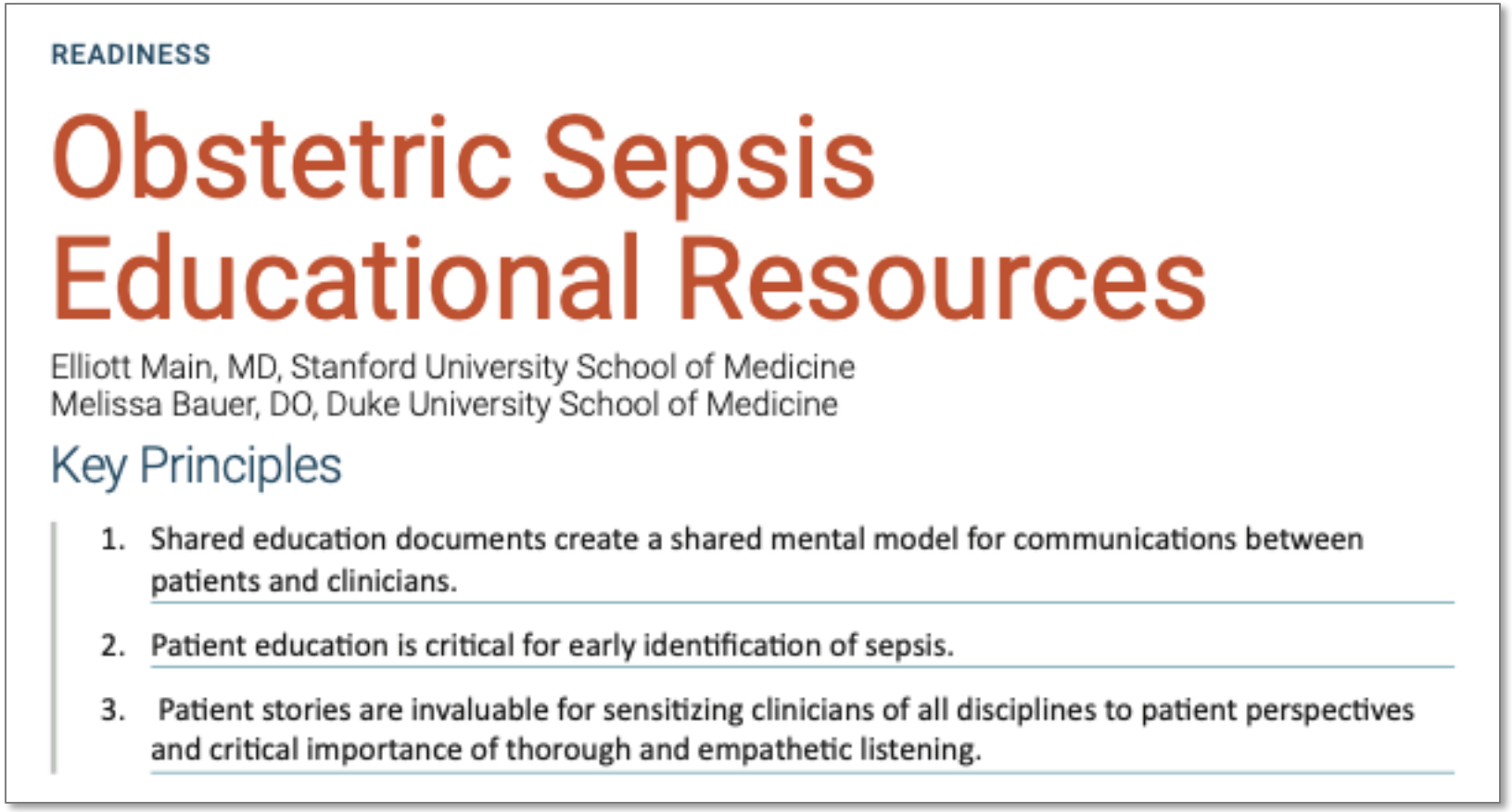
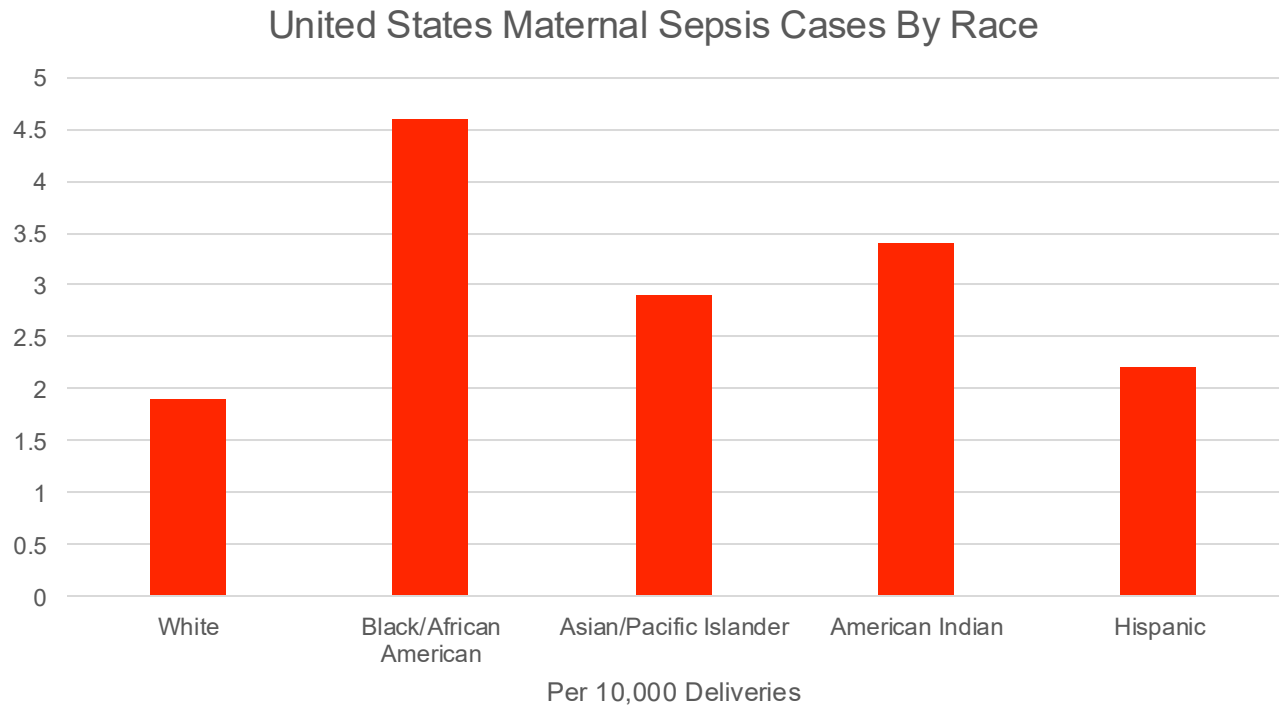


Burden of Sepsis on Maternal Mortality and Morbidity

- 2nd leading cause of maternal mortality
- 3rd leading cause of Severe Maternal Morbidity (SMM) at delivery but it is 1st leading cause in antepartum and postpartum periods
- Significant racial inequities:



Trost et al, CDC DHHS, 2022
Creanga AA et al. *Obstet Gynecol 2017*
Petersen EE et al, *MMWR Morb Mortal Wkly Rep* 2019
Kendel et al. AJOG 2019

Preventability

California	North Carolina	Michigan
39% Preventable	43% Preventable	73% Preventable

Bauer *et al*. *Obstet Gynecol* (2015)
Berg CJ *et al. Obstet Gynecol* (2005)
Main EK *et al*. *Obstet Gynecol* (2015)

Community and Patient Engagement

An approach to research that involves partnership, power-sharing, and direct engagement from people the research will impact






Maternal Sepsis Community Leadership Board:

Guided qualitative studies of patient and families and helped share the results







Patients did not remember education about about warning signs

"I think if when they discharged me, if they had said be on the lookout for these symptoms, if you have any of them, call and check in. If they had taken five minutes to do that, I think it would've made a huge difference."

Improving Patient Education for Maternal Warning Signs

ACOG: Council on Patient Safety

CDC: HEAR HER Campaign

Identifies 15 key symptoms/signs for <u>multiple causes</u> of severe morbidity

We have identified multiple ways of sharing this tool in in and out-patient settings.

As noted, patients with Urgent Warning Signs should be evaluated right away.

Now available in **>90** languages

Each warning sign has embedded clarifying language (useful for education and triage).

Share This Information Everywhere!

- Posters in L&D, antepartum testing and triage rooms
- Posters in prenatal office exam rooms
- Place on patient and partner phones as a tile

Patients were not listened to

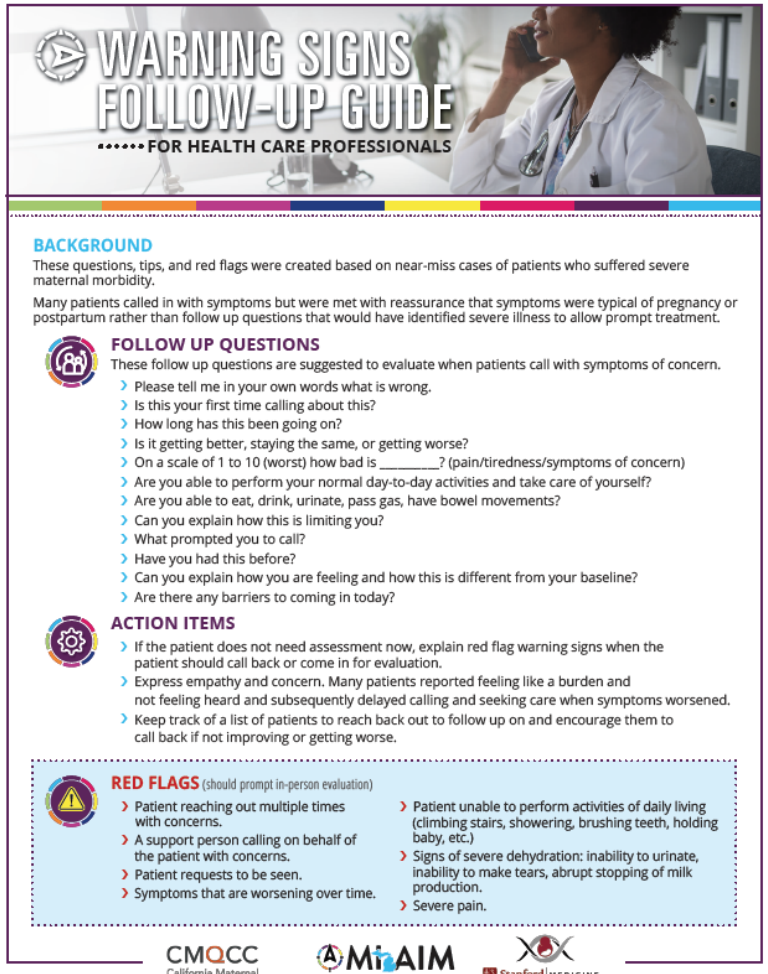
- *“I don’t feel like they ever took my concerns seriously., They were brushing me off and trying to get rid of me. They wanted to send me home, saying ‘Take this anxiety medicine, you’re going to feel better.”*

Patients wanted a way to advocate and to ensure that they were heard

- "*It would have been helpful to have this list to give me the language. I had these symptoms and knew something was wrong. My husband and I thought we should be advocating for ourselves but didn't know what we were supposed to be advocating for*."
- "*Patients and their support person should be taught to watch for warning signs and know what they could potentially mean and what to say when entering an emergency room*"

Improving Patient-Clinician Communications
Listening and Advocacy Tools

Appendix A



WARNING SIGNS FOLLOW-UP GUIDE

FOR HEALTH CARE PROFESSIONALS

BACKGROUND

These questions, tips, and red flags were created based on near-miss cases of patients who suffered severe maternal morbidity.

Many patients called in with symptoms but were met with reassurance that symptoms were typical of pregnancy or postpartum rather than follow up questions that would have identified severe illness to allow prompt treatment.

FOLLOW UP QUESTIONS

These follow up questions are suggested to evaluate when patients call with symptoms of concern.

- Please tell me in your own words what is wrong.
- Is this your first time calling about this?
- How long has this been going on?
- Is it getting better, staying the same, or getting worse?
- On a scale of 1 to 10 (worst) how bad is _____? (pain/tiredness/symptoms of concern)
- Are you able to perform your normal day-to-day activities and take care of yourself?
- Are you able to eat, drink, urinate, pass gas, have bowel movements?
- Can you explain how this is limiting you?
- What prompted you to call?
- Have you had this before?
- Can you explain how you are feeling and how this is different from your baseline?
- Are there any barriers to coming in today?

ACTION ITEMS

- If the patient does not need assessment now, explain red flag warning signs when the patient should call back or come in for evaluation.
- Express empathy and concern. Many patients reported feeling like a burden and not feeling heard and subsequently delayed calling and seeking care when symptoms worsened.
- Keep track of a list of patients to reach back out to follow up on and encourage them to call back if not improving or getting worse.

RED FLAGS (should prompt in-person evaluation)

- Patient reaching out multiple times with concerns.
- A support person calling on behalf of the patient with concerns.
- Patient requests to be seen.
- Symptoms that are worsening over time.
- Patient unable to perform activities of daily living (climbing stairs, showering, brushing teeth, holding baby, etc.)
- Signs of severe dehydration: inability to urinate, inability to make tears, abrupt stopping of milk production.
- Severe pain.

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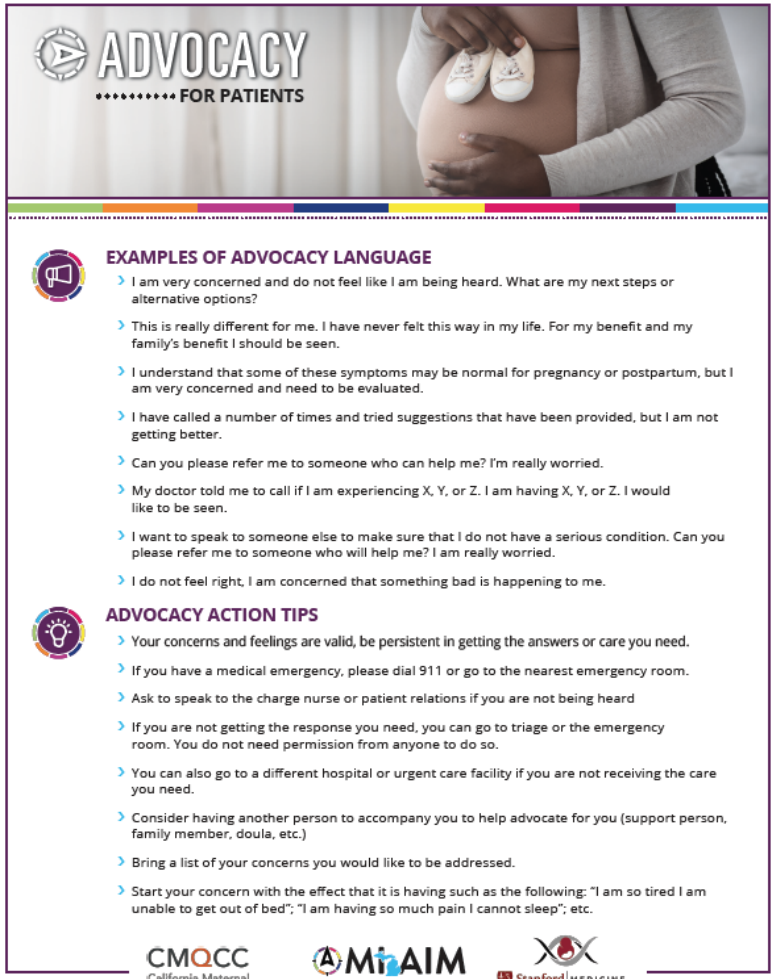
Appendix B



ADVOCACY

FOR PATIENTS

EXAMPLES OF ADVOCACY LANGUAGE

- I am very concerned and do not feel like I am being heard. What are my next steps or alternative options?
- This is really different for me. I have never felt this way in my life. For my benefit and my family's benefit I should be seen.
- I understand that some of these symptoms may be normal for pregnancy or postpartum, but I am very concerned and need to be evaluated.
- I have called a number of times and tried suggestions that have been provided, but I am not getting better.
- Can you please refer me to someone who can help me? I'm really worried.
- My doctor told me to call if I am experiencing X, Y, or Z. I am having X, Y, or Z. I would like to be seen.
- I want to speak to someone else to make sure that I do not have a serious condition. Can you please refer me to someone who will help me? I am really worried.
- I do not feel right, I am concerned that something bad is happening to me.

ADVOCACY ACTION TIPS

- Your concerns and feelings are valid, be persistent in getting the answers or care you need.
- If you have a medical emergency, please dial 911 or go to the nearest emergency room.
- Ask to speak to the charge nurse or patient relations if you are not being heard
- If you are not getting the response you need, you can go to triage or the emergency room. You do not need permission from anyone to do so.
- You can also go to a different hospital or urgent care facility if you are not receiving the care you need.
- Consider having another person to accompany you to help advocate for you (support person, family member, doula, etc.)
- Bring a list of your concerns you would like to be addressed.
- Start your concern with the effect that it is having such as the following: "I am so tired I am unable to get out of bed"; "I am having so much pain I cannot sleep"; etc.

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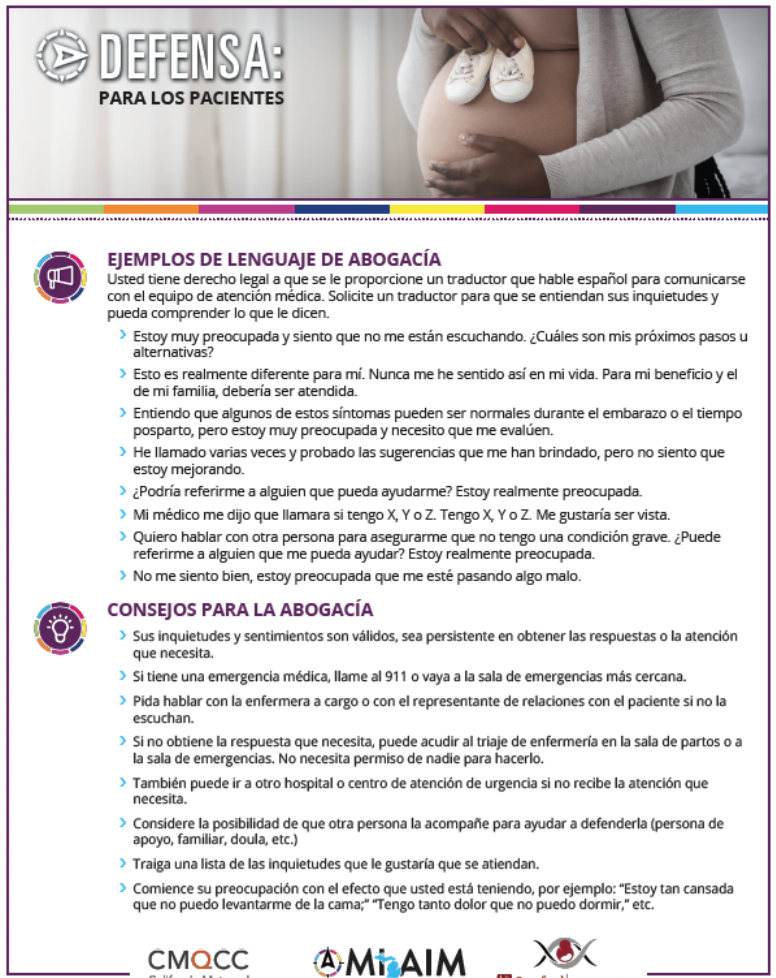
Appendix C (Spanish)



DEFENSA:

PARA LOS PACIENTES

EJEMPLOS DE LENGUAJE DE ABOGACÍA

Usted tiene derecho legal a que se le proporcione un traductor que hable español para comunicarse con el equipo de atención médica. Solicite un traductor para que se entiendan sus inquietudes y pueda comprender lo que le dicen.

- Estoy muy preocupada y siento que no me están escuchando. ¿Cuáles son mis próximos pasos u alternativas?
- Esto es realmente diferente para mí. Nunca me he sentido así en mi vida. Para mi beneficio y el de mi familia, debería ser atendida.
- Entiendo que algunos de estos síntomas pueden ser normales durante el embarazo o el tiempo posparto, pero estoy muy preocupada y necesito que me evalúen.
- He llamado varias veces y probado las sugerencias que me han brindado, pero no siento que estoy mejorando.
- ¿Podría referirme a alguien que pueda ayudarme? Estoy realmente preocupada.
- Mi médico me dijo que llamara si tengo X, Y o Z. Tengo X, Y o Z. Me gustaría ser vista.
- Quiero hablar con otra persona para asegurarme que no tengo una condición grave. ¿Puede referirme a alguien que me pueda ayudar? Estoy realmente preocupada.
- No me siento bien, estoy preocupada que me esté pasando algo malo.

CONSEJOS PARA LA ABOGACÍA

- Sus inquietudes y sentimientos son válidos, sea persistente en obtener las respuestas o la atención que necesita.
- Si tiene una emergencia médica, llame al 911 o vaya a la sala de emergencias más cercana.
- Pida hablar con la enfermera a cargo o con el representante de relaciones con el paciente si no la escuchan.
- Si no obtiene la respuesta que necesita, puede acudir al triaje de enfermería en la sala de partos o a la sala de emergencias. No necesita permiso de nadie para hacerlo.
- También puede ir a otro hospital o centro de atención de urgencia si no recibe la atención que necesita.
- Considere la posibilidad de que otra persona la acompañe para ayudar a defenderla (persona de apoyo, familiar, doula, etc.)
- Traiga una lista de las inquietudes que le gustaría que se atiendan.
- Comience su preocupación con el efecto que usted está teniendo, por ejemplo: "Estoy tan cansada que no puedo levantarme de la cama;" "Tengo tanto dolor que no puedo dormir," etc.

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All of these materials can be shared by a link on the patient's phone

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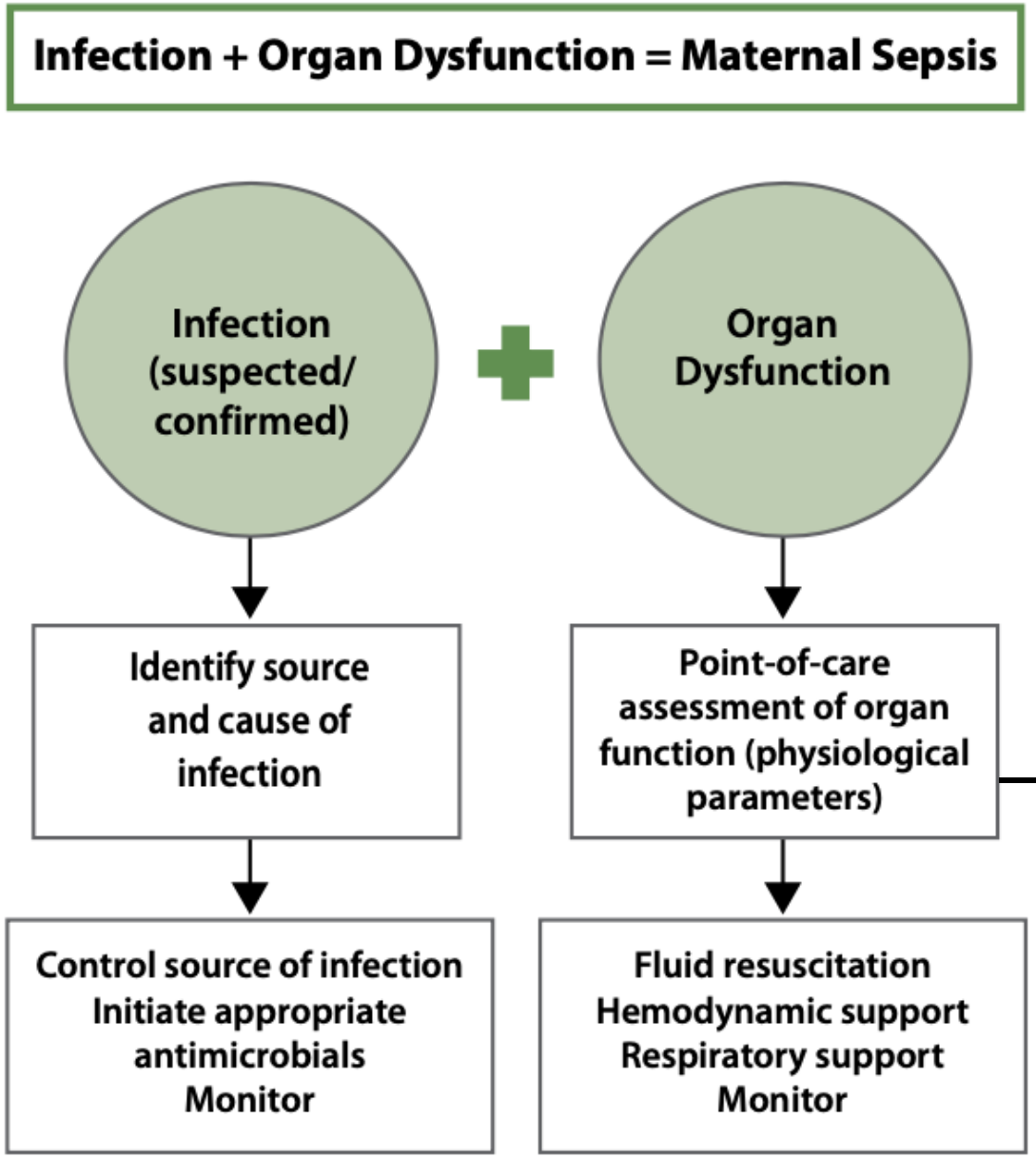
RECOGNITION

Screening and Diagnosis of Sepsis

Key Principles

1. Current multi-organization consensus (Sepsis-3) defines sepsis as life-threatening organ dysfunction caused by a dysregulated host response to infection.
2. All national and international organizations (ACOG, SMFM, WHO, FIGO, CDC) define maternal sepsis similarly, requiring end-organ injury related to an infection.
3. Current one-step sepsis screening tools, such as SIRS criteria, as used in the CMS measure SEP-1, perform poorly in pregnancy and should not be used for diagnosis.
4. Waiting for evidence of end-organ injury (Sepsis-3 definition) may delay critical treatments. This dilemma requires a new approach and new terminology for diagnosing obstetric sepsis.
5. This Taskforce recommends a two-step approach for the diagnosis of sepsis during pregnancy and postpartum to promote rapid treatment of serious infections and early evaluation for sepsis.



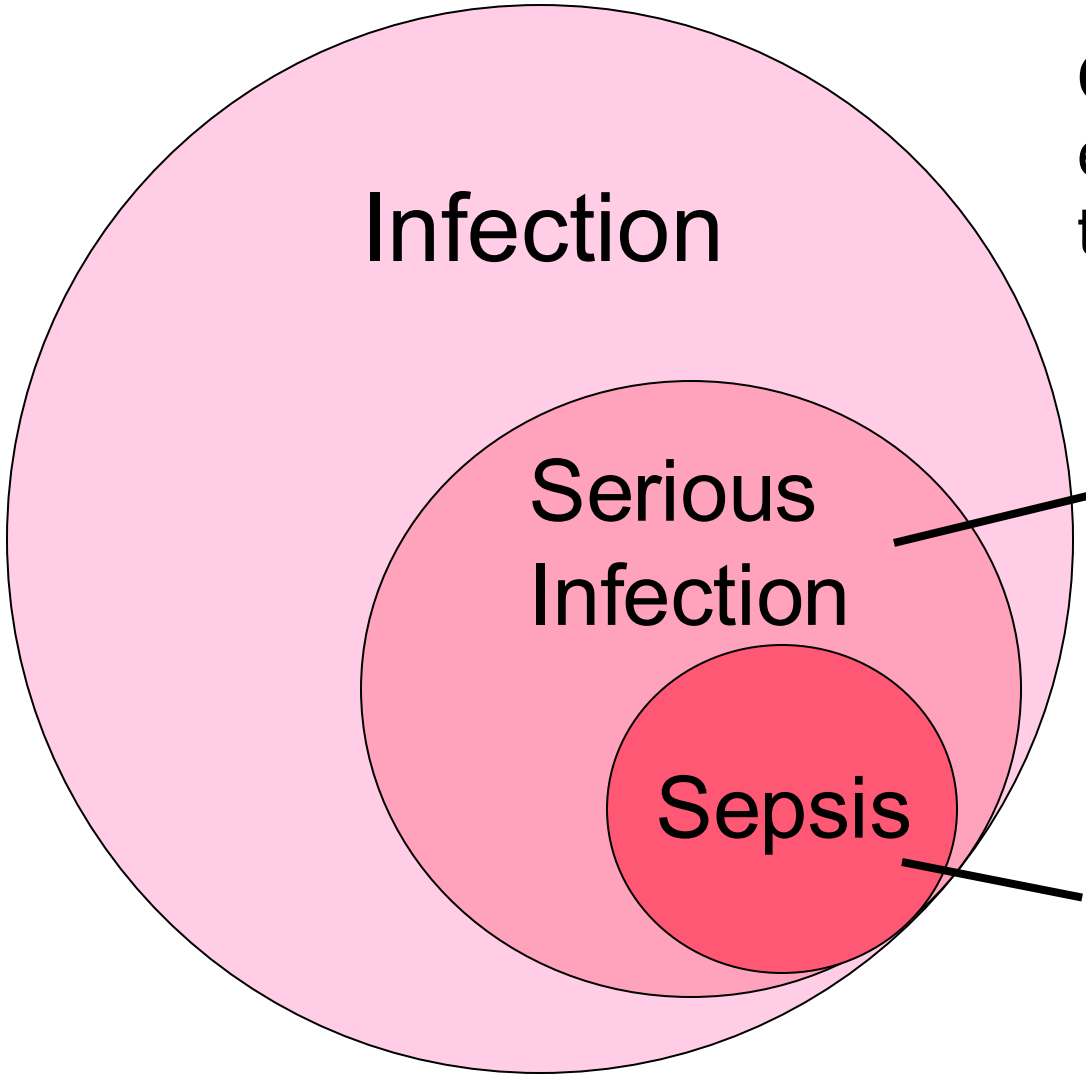
WHO, ACOG, SMFM, and the CDC have adopted the Sepsis-3 definition of Sepsis requiring End-Organ Injury

- This is equivalent to the CMS SEP-1 definition of Severe Sepsis.
- SIRS is no longer a criteria for Sepsis

Evaluation of organ function is performed using a combination of vital signs, physical examination, and laboratory tests

http://apps.who.int/iris/bitstream/10665/254608/1/WHORHR-17.02-eng.pdf

Maternal Infection Terminology



Concern: SEP-3 definition does not promote early recognition of severe infections in time to prevent End Organ Injury (Sepsis).

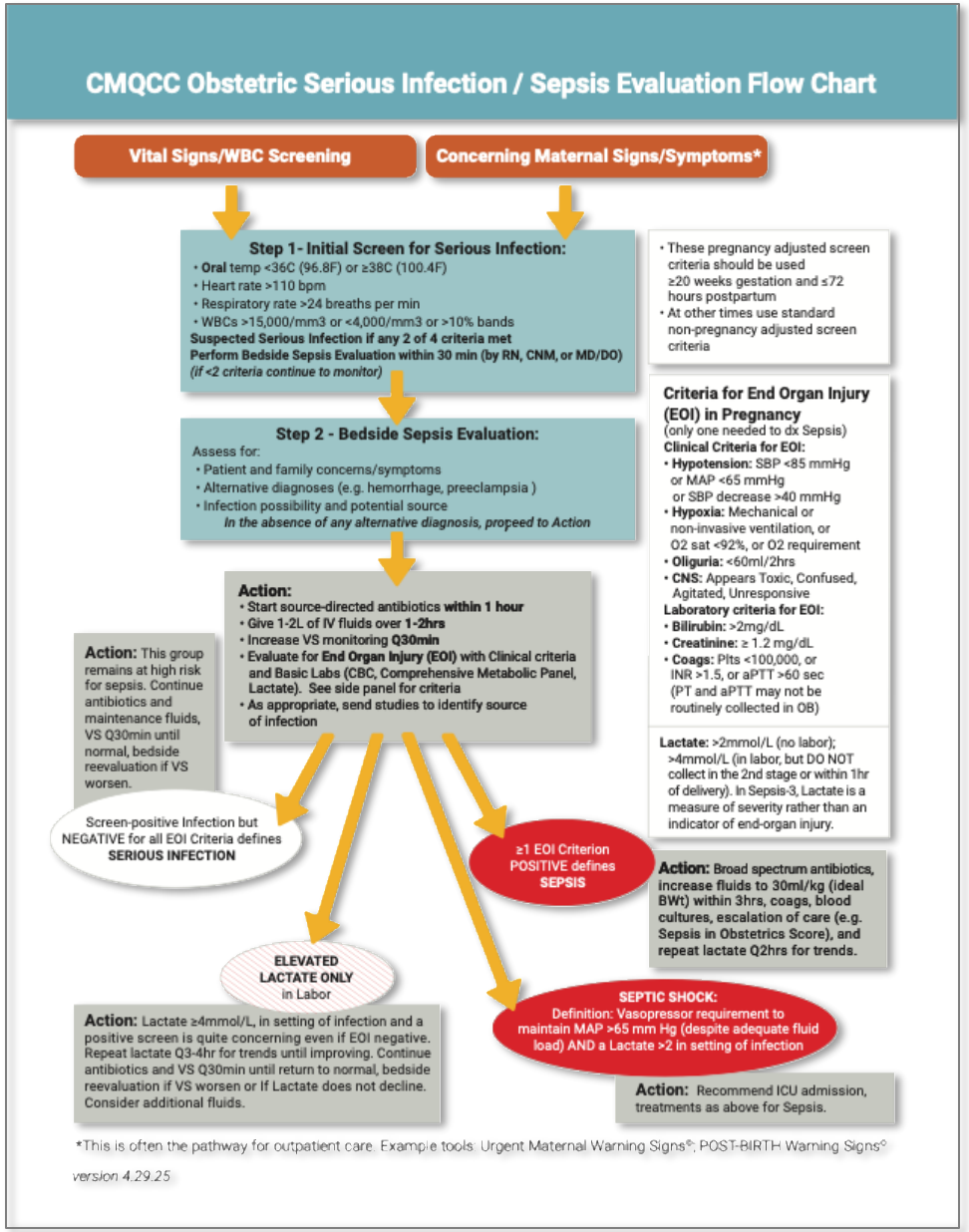
Need to identify infections most likely to advance to End Organ Injury for earlier and more intensive treatment. The term "Serious Infection" is taken from new CDC terminology.

End Organ Injury related to dysregulated host response to infection

Two-Step Algorithm to Identify Serious Infection and Obstetric Sepsis

- Pregnancy adjusted VS screen identifies Serious Infection, but the false positive rate is still too high to use alone for diagnosis sepsis ➔ Two step approach
- Goal is to conserve labs/interventions without sacrificing sepsis diagnostic specificity
- Remember that we do two-step evaluations for many diagnoses in OB/GYN

SMFM Consult Series highlighted the CMQCC two-step approach



CMQCC Obstetric Serious Infection / Sepsis Evaluation Flow Chart

Vital Signs/WBC Screening

Concerning Maternal Signs/Symptoms*

Step 1: Initial Screen for Serious Infection

- **Oral** temp <36C (98.6F) or ≥38C (100.4F)
- Heart rate >110 bpm
- Respiratory rate >24 breaths per min
- WBCs >15,000/mm3 or <4,000/mm3 or >10% bands

Suspected Serious Infection if any 2 of 4 criteria met
Perform Bedside Sepsis Evaluation within 30 min (by RN, CNM, or MD)
(if <2 criteria continue to monitor)

New Step: Bedside Evaluation with direction for all clinicians (including RNs, Hospitalists)

Step 2: Bedside Sepsis Evaluation

Assess for:

- Patient and family concerns/symptoms
- Alternative diagnoses (e.g. hemorrhage, preeclampsia, CVD)
- Exam for source of infection

In the absence of any alternative diagnosis, proceed to Action

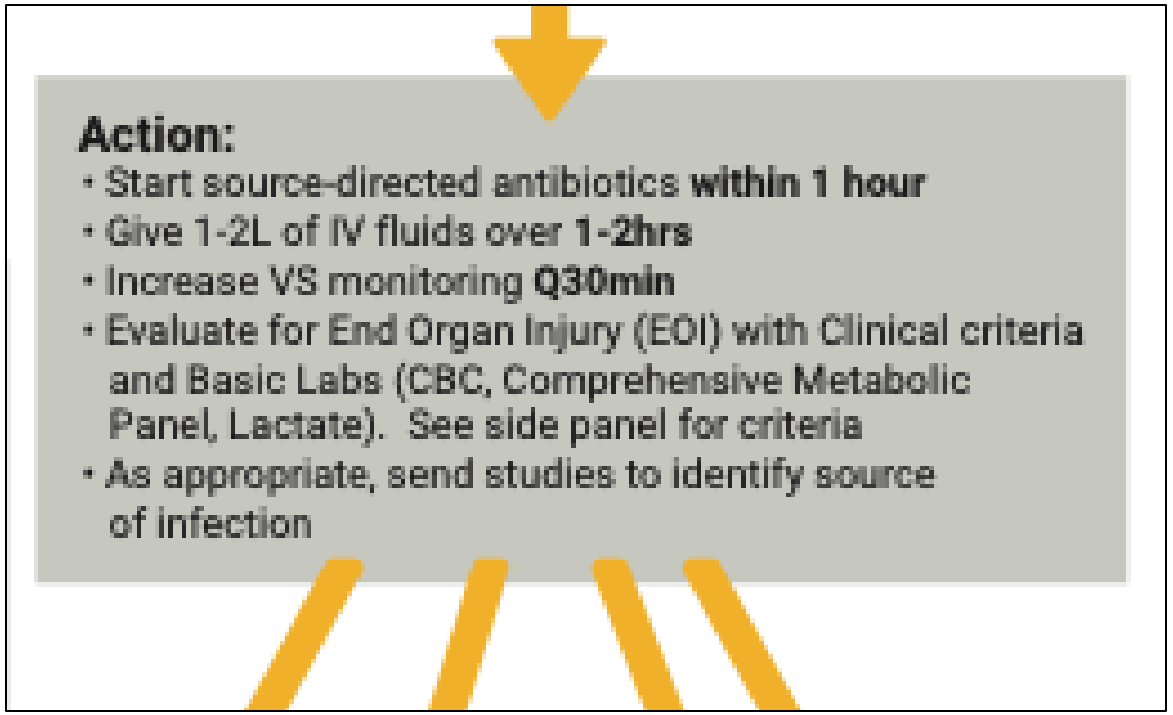
Important VS Criteria for First Step Screening

- HR meet criteria only if persisted on a recheck within 20 min.
- RR and T are classified as abnormal with a single value as they would be unlikely to be repeated within 20 minutes.
- The abnormal VS are required to be within 2 hours of each other.
- White blood cell count is required to be within 24 hours of the other abnormal criteria.

These criteria identify seriously ill patients
and are important to build into your EHR

Main EK, Fuller M, Kovacheva VP, etal. Performance Characteristics of Sepsis Screening Tools During Delivery Admissions. Obstet Gynecol. 2024 Mar 1;143(3):326-335.

ACTION STEPS AFTER POSITIVE SCREEN AND BEDSIDE EVALUATION



4 potential clinical paths

If any EOI criteria is met, then diagnosis of sepsis is made

Criteria for End Organ Injury (EOI) in Pregnancy
(only one needed to dx Sepsis)

Clinical Criteria for EOI:
- **CNS:** Appears: Toxic, Confused, Agitated, Unresponsive
- **Hypoxia:** O2 requirement, O2Sat<92%
- **Oliguria:** <60ml/2hrs

Laboratory criteria for EOI:
- **Platelets**: <100 x109/L
- **Bilirubin:** >2mg/dL
- **Creatinine:** ≥ 1.2 mg/dL or doubling of creatinine

Lactic Acid (a measure of severity of infection rather than a true EOI): >2mmol/L (no labor); >4mmol/L (in labor, but DO NOT collect in the 2nd stage or within 1hr of delivery)

Appendix D

CMQCC Obstetric Serious Infection / Sepsis Evaluation Flow Chart

Vital Signs/WBC Screening

Concerning Maternal Signs/Symptoms*

Step 1- Initial Screen for Serious Infection:
- Oral temp <36C (96.8F) or ≥38C (100.4F)
- Heart rate >110 bpm
- Respiratory rate >24 breaths per min
- WBCs >15,000/mm3 or <4,000/mm3 or >10% bands

Suspected Serious Infection if any 2 of 4 criteria met
Perform Bedside Sepsis Evaluation within 30 min (by RN, CNM, or MD/DO)
(if <2 criteria continue to monitor)

- These pregnancy adjusted screen criteria should be used ≥20 weeks gestation and ≤72 hours postpartum
- At other times use standard non-pregnancy adjusted screen criteria

Step 2 - Bedside Sepsis Evaluation:
Assess for:
- Patient and family concerns/symptoms
- Alternative diagnoses (e.g. hemorrhage, preeclampsia)
- Infection possibility and potential source

In the absence of any alternative diagnosis, proceed to Action

Criteria for End Organ Injury (EOI) in Pregnancy
(only one needed to dx Sepsis)
Clinical Criteria for EOI:
- **Hypotension:** SBP <85 mmHg or MAP <65 mmHg or SBP decrease >40 mmHg
- **Hypoxia:** Mechanical or non-invasive ventilation, or O2 sat <92%, or O2 requirement
- **Oliguria:** <60ml/2hrs
- **CNS:** Appears Toxic, Confused, Agitated, Unresponsive

Laboratory criteria for EOI:
- **Bilirubin:** >2mg/dL
- **Creatinine:** ≥ 1.2 mg/dL
- **Coags:** Plts <100,000, or INR >1.5, or aPTT >60 sec (PT and aPTT may not be routinely collected in OB)

Action:
- Start source-directed antibiotics within 1 hour
- Give 1-2L of IV fluids over 1-2hrs
- Increase VS monitoring Q30min
- Evaluate for End Organ Injury (EOI) with Clinical criteria and Basic Labs (CBC, Comprehensive Metabolic Panel, Lactate). See side panel for criteria
- As appropriate, send studies to identify source of infection

Action: This group remains at high risk for sepsis. Continue antibiotics and maintenance fluids, VS Q30min until normal, bedside reevaluation if VS worsen.

Lactate: >2mmol/L (no labor); >4mmol/L (in labor, but DO NOT collect in the 2nd stage or within 1hr of delivery). In Sepsis-3, Lactate is a measure of severity rather than an indicator of end-organ injury.

Screen-positive Infection but NEGATIVE for all EOI Criteria defines **SERIOUS INFECTION**

≥1 EOI Criterion POSITIVE defines SEPSIS

Action: Broad spectrum antibiotics, increase fluids to 30ml/kg (ideal BWt) within 3hrs, coags, blood cultures, escalation of care (e.g. Sepsis in Obstetrics Score), and repeat lactate Q2hrs for trends.

ELEVATED LACTATE ONLY in Labor

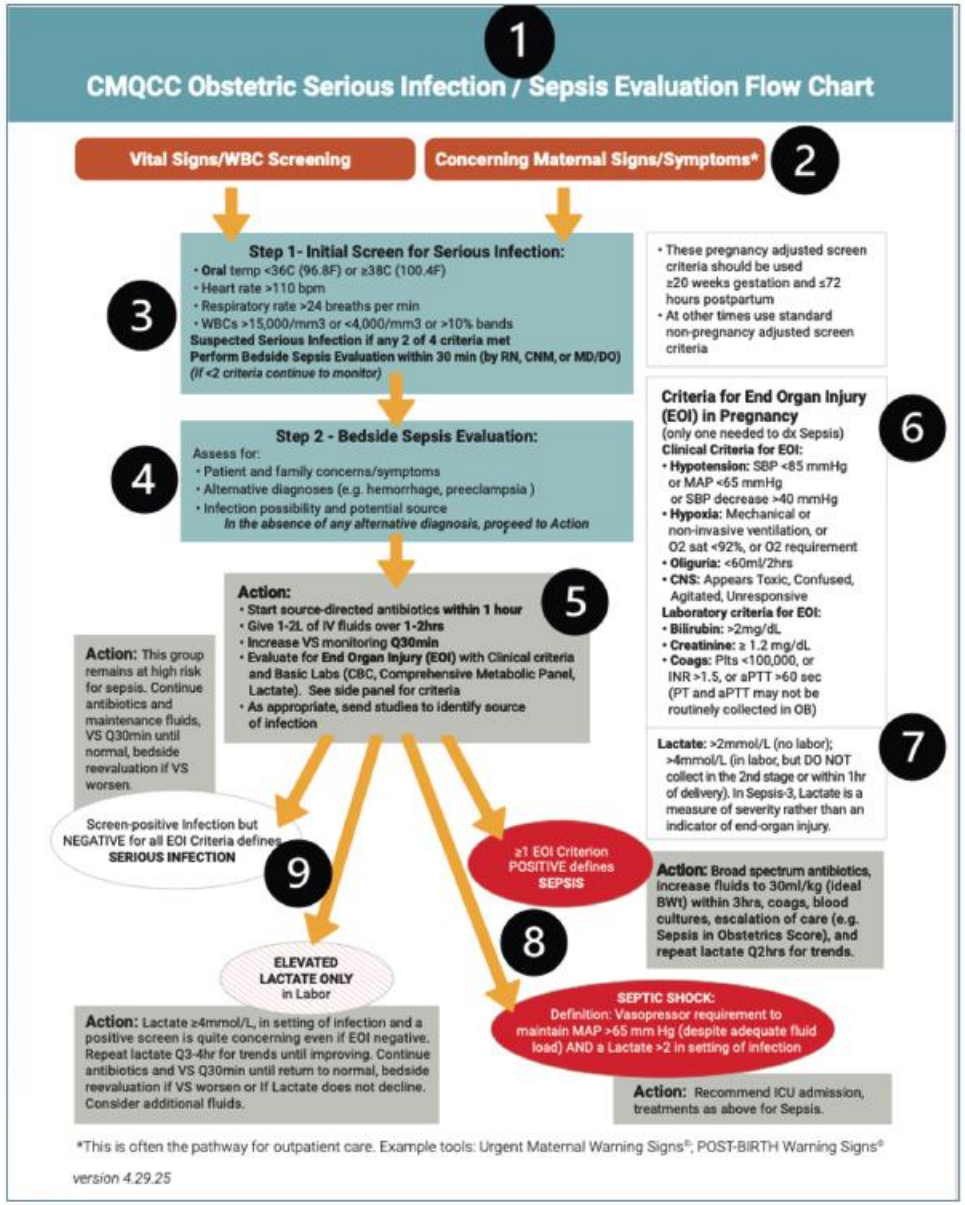
Action: Lactate ≥4mmol/L, in setting of infection and a positive screen is quite concerning even if EOI negative. Repeat lactate Q3-4hr for trends until improving. Continue antibiotics and VS Q30min until return to normal, bedside reevaluation if VS worsen or If Lactate does not decline. Consider additional fluids.

SEPTIC SHOCK:
Definition: Vasopressor requirement to maintain MAP >65 mm Hg (despite adequate fluid load) AND a Lactate >2 in setting of infection

Action: Recommend ICU admission, treatments as above for Sepsis.

*This is often the pathway for outpatient care. Example tools: Urgent Maternal Warning Signs®; POST-BIRTH Warning Signs®

Appendix E: Teaching Points For Obstetric Serious Infection/Sepsis Evaluation Flow Chart



Examples of Teaching Points

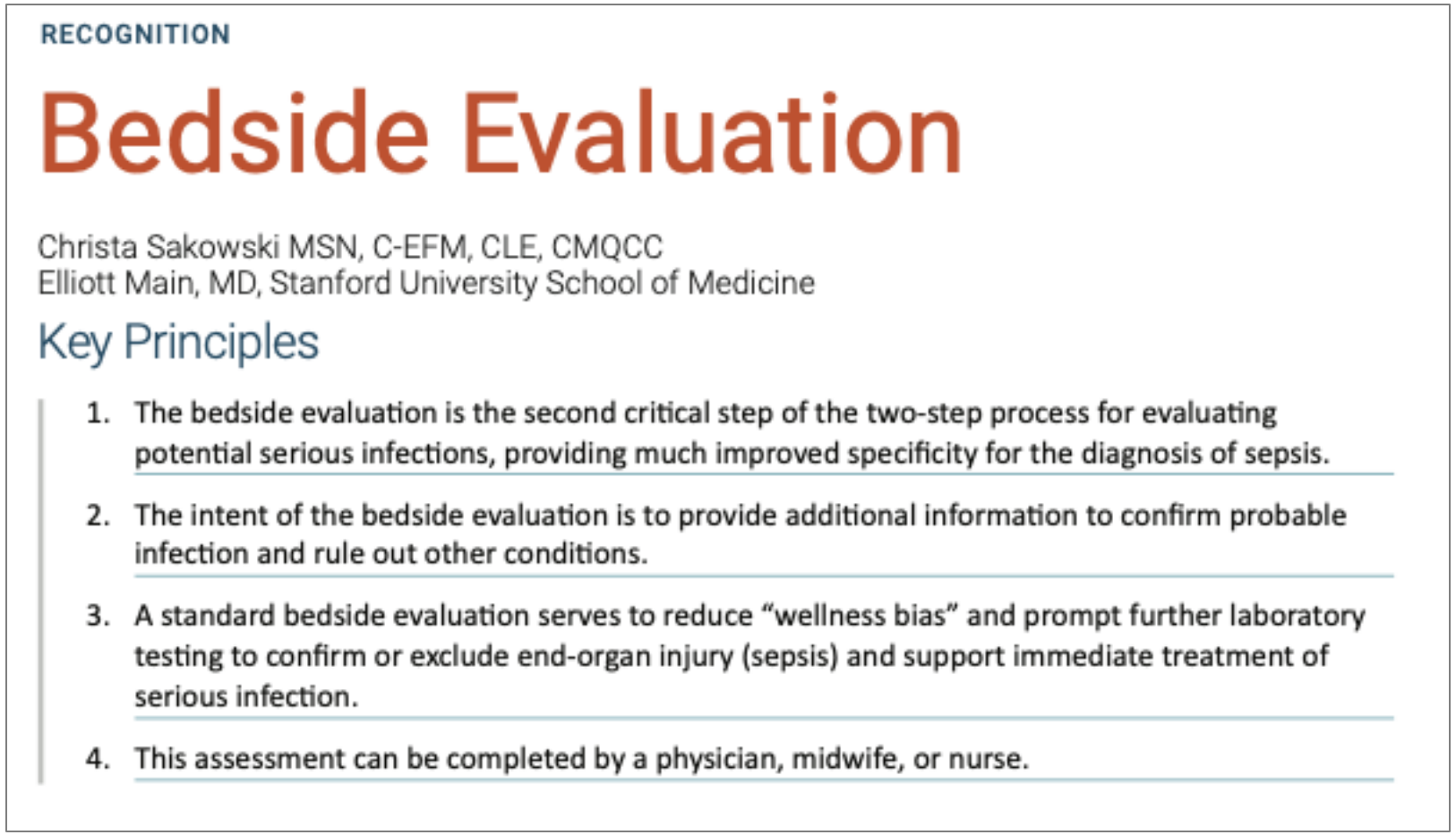
Lactic Acid Levels

- Sepsis-3 consensus recommend against the use of lactic acid for the diagnosis of sepsis. Lactate is more a measure of tissue perfusion (e.g. septic shock).
- Labor can be associated with high levels of lactic acid in the absence of serious infection, most likely due to anaerobic metabolism during prolonged physical exertion.
- Women not in labor or after an hour PP should not have a level >2mmol/L

Blood Cultures

- In the setting of sepsis, blood cultures are recommended before antibiotics.
- However, if antibiotics are started for an infection before the diagnosis of sepsis is made, blood cultures should be drawn at the point of diagnosis.
- Blood cultures are almost never positive in chorioamnionitis and may be postponed until and unless end-organ injury is identified.
- Studies indicate that the yield of BC after 1-2 hrs of ABX is still good

Christa Sakowski, MSN, C-EFM, CLE
Implementation Lead, CMQCC, Stanford University



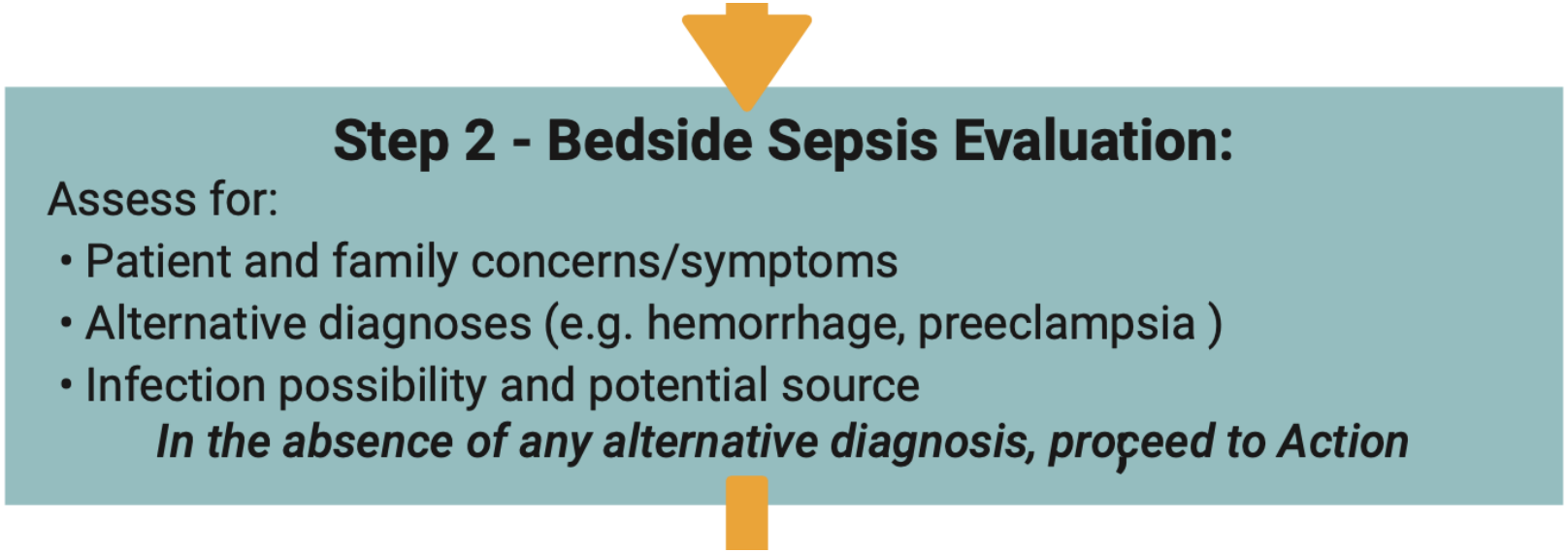
RECOGNITION

Bedside Evaluation

Christa Sakowski MSN, C-EFM, CLE, CMQCC
Elliott Main, MD, Stanford University School of Medicine

Key Principles

1. The bedside evaluation is the second critical step of the two-step process for evaluating potential serious infections, providing much improved specificity for the diagnosis of sepsis.
2. The intent of the bedside evaluation is to provide additional information to confirm probable infection and rule out other conditions.
3. A standard bedside evaluation serves to reduce "wellness bias" and prompt further laboratory testing to confirm or exclude end-organ injury (sepsis) and support immediate treatment of serious infection.
4. This assessment can be completed by a physician, midwife, or nurse.



- "Eyes-on" history and physical assessment
- Default in absence of clear alternative diagnosis is action – treat infection and obtain more information
  - Closer observation
  - Simple labs
  - Full case discussion

Importance of Nursing Assessment

AMERICAN NURSES ASSOCIATION (ANA):
THE NURSING PROCESS ASSESSMENT

"An RN uses a systematic, dynamic way to collect and analyze data about a client, the first step in delivering nursing care. Assessment includes not only physiological data, but also psychological, sociocultural, spiritual, economic, and life-style factors as well. For example, a nurse's assessment of a hospitalized patient in pain includes not only the physical causes and manifestations of pain, but the patient's response—an inability to get out of bed, refusal to eat, withdrawal from family members, anger directed at hospital staff, fear, or request for more pain medication."

Components of Bedside Evaluation

*Evaluation be done by **RN**, CNM or Physician*

- If you've not already done so, review available labs
- Does patient/family report symptoms or observations?
- Perform a physical assessment:
  - Upon general observation of the patient, are abnormalities noted?
    - Shivering
    - Confusion
    - Clammy skin
    - Difficulty breathing
    - Grimacing/Guarding (Signs of pain)
    - Skin color associated with poor perfusion

Components of Bedside Evaluation

- Evaluate possible sources of infection
  - Incision/laceration
  - Breasts
  - Pain with urination, CVA tenderness, other signs of urinary/kidney infection
  - Cough, abnormal lung sounds
- Are there signs associated with alternate diagnosis?
  - Heavy bleeding or other signs of hemorrhage
  - HTN, edema, severe headache or other signs of preeclampsia

**If assessment performed by nursing, communication with the provider for orders should occur prior to moving to action steps if a nurse driven pathway is not the standard of care in the facility*

Communication

Use CUS (concerned, uncomfortable, safety issue) words if there is resistance to sepsis screening and you receive a response like the following examples:

- "We will continue to monitor her; sepsis screening is not necessary."
- "It is normal in pregnancy to have those vital sign changes; it is not sepsis."

Examples of CUS verbiage

- "I am uncomfortable with waiting to initiate the sepsis screening, and I would like to activate the order set so that we can promote early recognition and treatment if indicated."
- "Although vital signs are elevated in pregnancy, her current vital signs meet sepsis screening criteria. This is now a safety issue we must address."

AHRQ TEAMSTEPPS - https://www.ahrq.gov/teamstepps-program/index.html

Emphasis on Accurate Vital Sign Collection

- Respiratory Rate (RR) and Pulse: Frequently omitted, inaccurately measured, or not recorded. Dismissed due to pain.
  - Small change in RR of 3-5 breaths per min. could be an early sign of deterioration. RR outside of normal range should be monitored closely, the body will increase the RR to maintain oxygen delivery to the tissues.
- Temperature: Consider oral temp (increased accuracy) with any suspicion of infection or symptoms of fever. *However, 20-25% of septic patients never developed a fever.*
- Blood pressure: Most valuably used as a indicator of septic shock and not as a screening value. MAPs 65-90 raise concern and should be closely monitored.

Appendices G & H

Courtney Martin, DO, FACOG, MHA, Hoag Health

RECOGNITION

The Important Role of Nurse-Driven Care Pathways, Standing Orders, and Artificial Intelligence (AI) in the EMR

Courtney Martin, DO, MHA, Hoag Health

Key Principles

1. Implementation of well-designed best practice advisories (BPAs) and alerts are important in obstetric sepsis screening and treatment.
2. Nurse-driven care pathways and standing orders are practical for rapid recognition and treatment of intraamniotic infection/Chorioamnionitis, and in preventing, recognizing and treating sepsis.
3. Artificial Intelligence (AI) integration into the electronic medical record (EMR) has promise to further improve care for obstetric patients with uncommon conditions.

Building Safety Infrastructure: Keys to Success

🔑 Safety Infrastructure is Foundational

- Built layer by layer to support reliable, high-quality care.

🤝 Interdisciplinary Partnership

- Physician + Nursing Dyads at the center of collaboration.

💻 EHR & Decision Support

- Early recognition\
- Reduced time to treatment

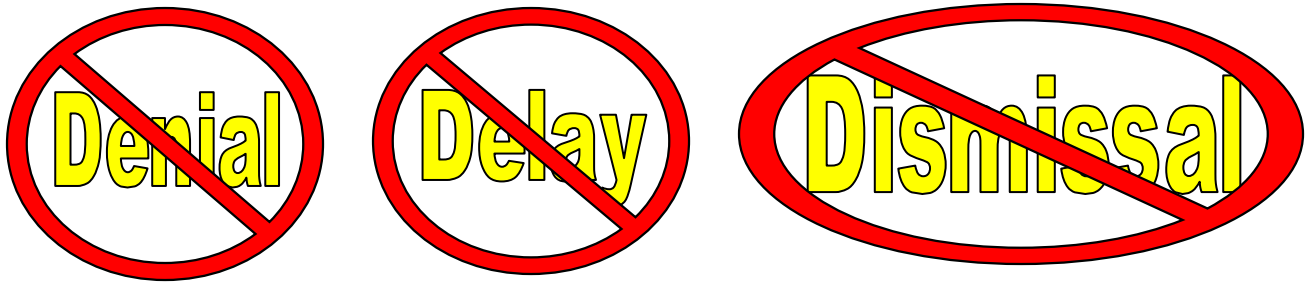
👩‍⚕️ Nurse-Driven Care

- Empowers recognition
- Accelerates care delivery

📚 Beyond Sepsis

- Expands knowledge
- Strengthens change management

3 Deadly D's:



Wellness Bias

- Symptoms dismissed due to patient's outward appearance of wellness
- Pregnancy-related optimism masks early warning signs

Normalization of Deviance

- Incremental deviations from norms (e.g., vitals, symptoms) become tolerated→ In OB, deviations without immediate harm are more easily normalized ***creates blind spots that delay recognition and treatment***

EHR Infrastructure: Mitigating Bias in Maternal Safety

Objective, Discrete Data

- Integrates risk of progression
- Calculates scores
- Produces actionable BPAs/OPAs

Early Recognition

- Warnings & alerts before EOI
- Triggers on trends (↑ respiratory rate, ↑ pregnancy-specific labs)

Bias Reduction Potential

- Limits reliance on subjective perception
- Helps counter: Wellness Bias; Pregnancy Bias; Race/Ethnicity Bias

Standardized Order Sets and Related EHR Tools

✅ Right Care, Right Time

- Supports timely, consistent management of complex maternal conditions.

🩸 Proven in Other Bundles

- Hemorrhage
- Hypertensive disorders

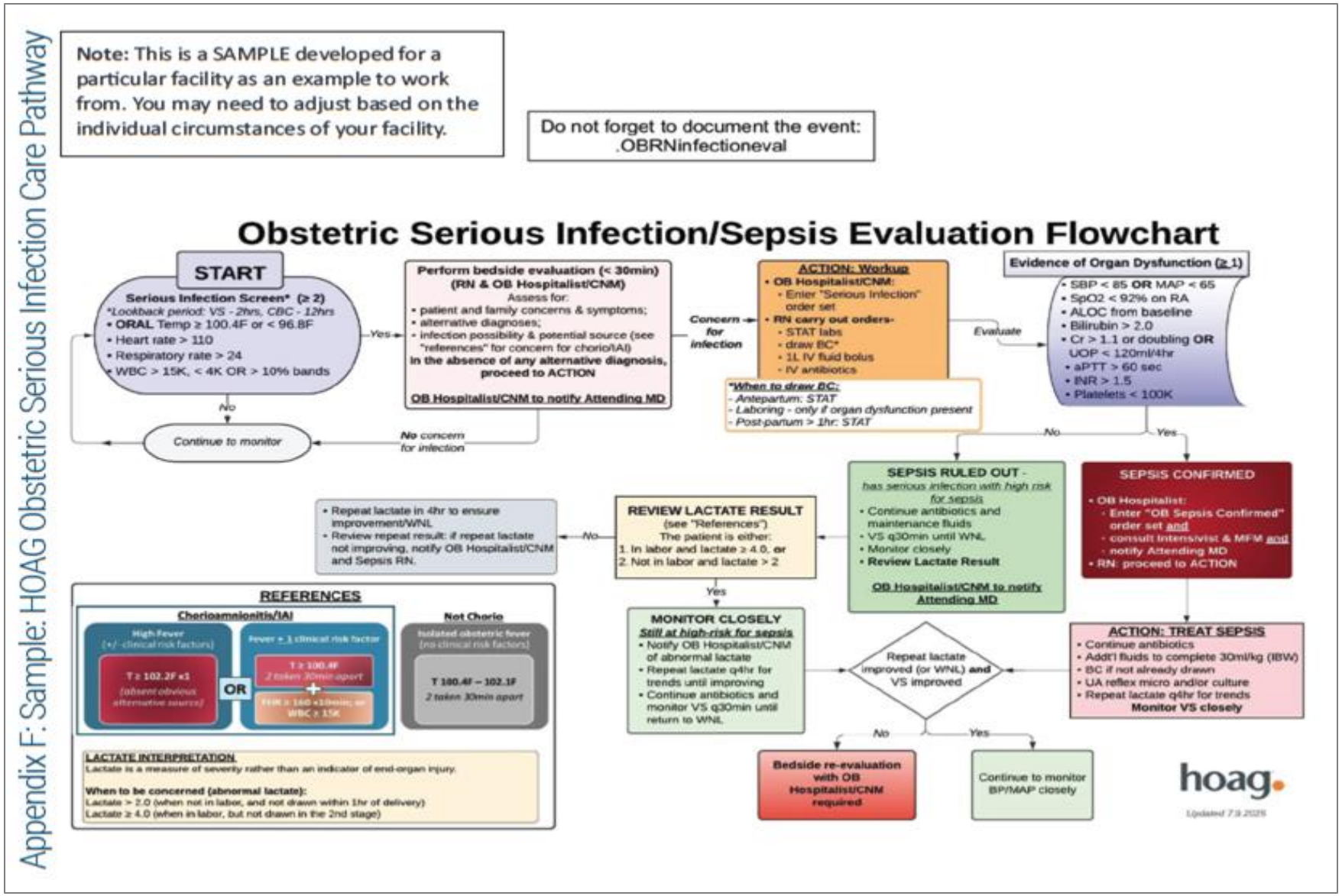
💻 EHR Tools for Sepsis

- Sepsis order sets
- Antibiotics (sepsis + chorio)
- Nursing protocols
- Care escalation tools (Sepsis in Obstetrics Score)
- Sepsis pathway

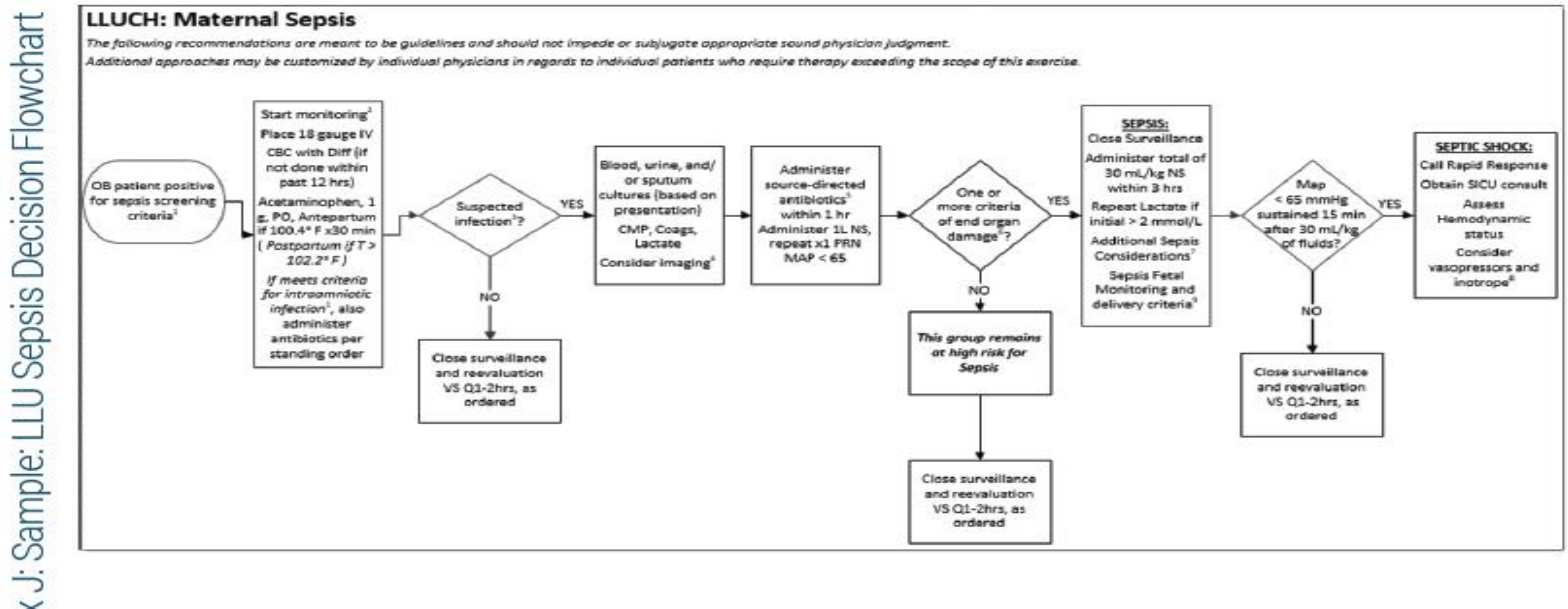
➡️ Next Phase: Decision Support

- Integration of advanced alerts, predictive models, and real-time guidance

Example Flowchart of New CMQCC Sepsis 2-Step Process



Example Decision Support of Previous CMQCC Sepsis 2 Step Process



Why Nursing Standing Orders?

- Ensure treatments remain within RN scope of practice
- Allow EHR decision support to trigger timely interventions

Example: Sepsis Standing Orders

- Standard evaluation: vitals, labs, cultures
- Automatic triggers → Sepsis pathway activated
- Nurse-driven antibiotic delivery per order set
- Escalation protocol if criteria met (Sepsis in Obstetrics Score, EOI, abnormal labs)

Impact

- Protects RN scope of practice
- Reduces delays in treatment
- Strengthens consistency & safety

Appendix K: Sample: LLU Nursing Standard Order Set

LOMA LINDA UNIVERSITY CHILDREN'S HOSPITAL

STANDING ORDERS

Note: This is a SAMPLE developed for a particular facility as an example to work from. You may need to adjust based on the individual circumstances of your facility.

DEPARTMENT: MATERNITY SERVICES
SUBJECT: MATERNAL SEPSIS

CODE: CH-MAT-9
EFFECTIVE: 01/2024
REPLACES: 07/2022
PAGE: 1 of 2

The following shall be initiated by the Maternity Services Registered Nurses (RN) for pregnant patients and patients up to six weeks postpartum that are positive for at least two initial sepsis screening criteria within 6 hours of each other OR patient meets criteria for intraamniotic infection. See definitions below.

- Initial sepsis screening criteria (must meet at least two within 6 hours of each other):
  - Oral Temp < 96.8° F **OR** ≥ 100.4° F
  - Heart Rate > 110 beats per minute
  - Respiratory Rate > 24 breaths per minute
  - WBC > 15,000/mm^3 **OR** < 4,000/mm^3 **OR** > 10% bands
  - MAP < 65 mmHg sustained for 15 minutes
- Criteria for intraamniotic infection:
  - The patient is in labor with a temperature greater than 102.2° F
    OR
  - The patient has a temperature between or equal to 98.6° F to 102.2° F with fetal tachycardia (160 bpm or greater) AND leukocytes greater than 15 or less than 4

1. **Insert a peripheral IV catheter**
2. **Draw CBC with differential, if not done in the last 12 hrs**
3. **Draw lactate Q4hrs until lactate below 2 mmol/L or shock index is less than 0.9**
4. **Administer Acetaminophen:**
   - 4.1. **Antepartum: 650 mg, PO, PRN once if temperature sustained ≥ 100.4° F for 30 minutes. If NPO, administer 650 mg, PR.**
   - 4.2. **Postpartum: 650 mg, PO, PRN once for temperature ≥ 102.2° F. If NPO, administer 650 mg, PR.**

Continued

Reduce Clinical Practice Variation

- Ensure consistency across clinicians
- Provide a structured, evidence-based pathway

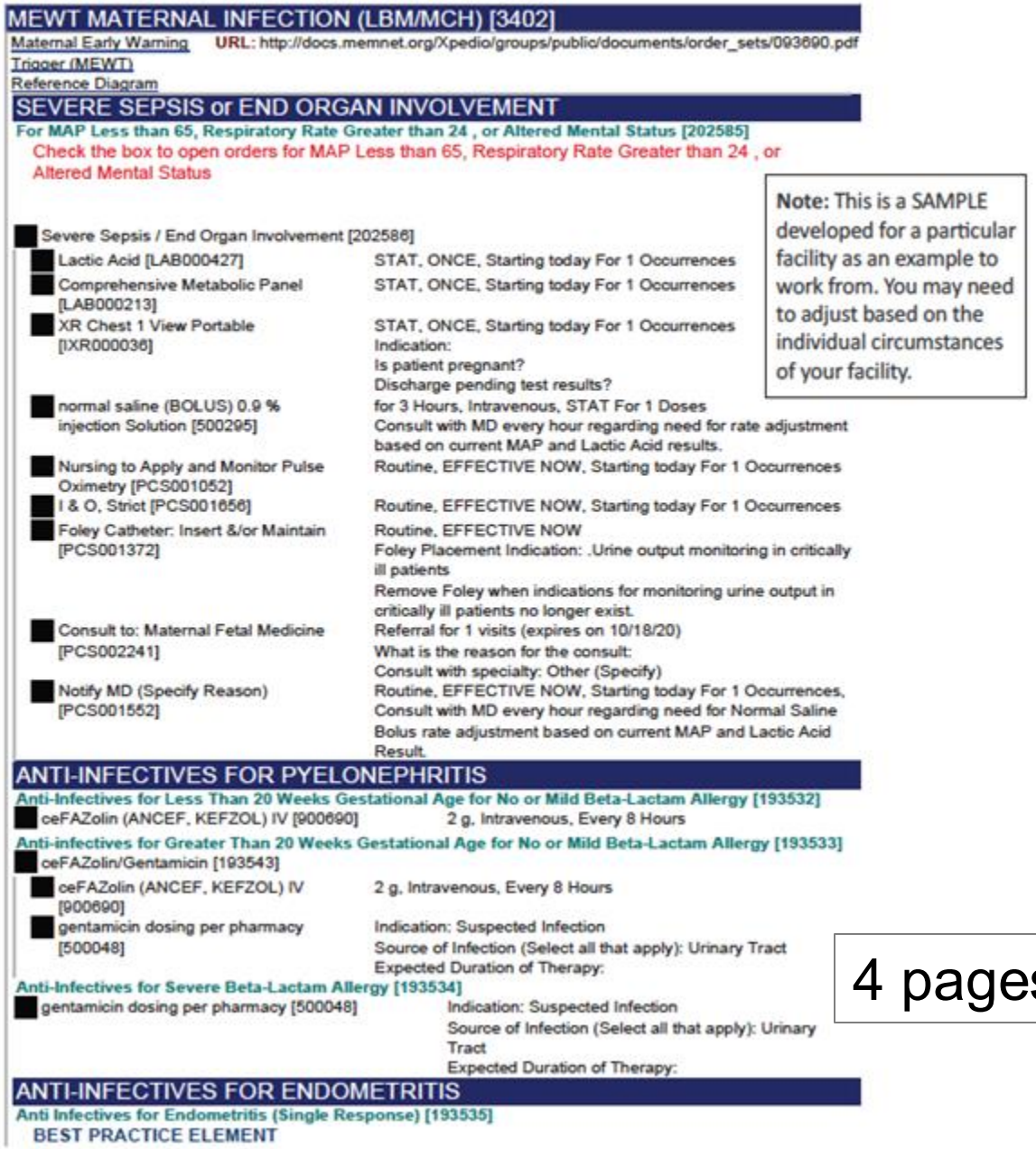
Infrastructural Safety

- Build in critical safety items often forgotten in “a la carte” ordering
- Embed checklists, default settings, and safeguards

Behind-the-Scenes Safety

- Faster medication administration
- Automatic pharmacy alerts
- Paging/notification of team members
- Continuous awareness processes

Appendix P: Sample: Miller Sepsis/Chorio Order Sets



MEWT MATERNAL INFECTION (LBM/MCH) [3402]

Maternal Early Warning Trigger (MEWT) Reference Diagram — URL: http://docs.memnet.org/Xpedio/groups/public/documents/order_sets/093690.pdf

SEVERE SEPSIS or END ORGAN INVOLVEMENT

For MAP Less than 65, Respiratory Rate Greater than 24 , or Altered Mental Status [202585]

Check the box to open orders for MAP Less than 65, Respiratory Rate Greater than 24 , or Altered Mental Status

Note: This is a SAMPLE developed for a particular facility as an example to work from. You may need to adjust based on the individual circumstances of your facility.

Severe Sepsis / End Organ Involvement [202586]	
Lactic Acid [LAB000427]	STAT, ONCE, Starting today For 1 Occurrences
Comprehensive Metabolic Panel [LAB000213]	STAT, ONCE, Starting today For 1 Occurrences
XR Chest 1 View Portable [IXR000036]	STAT, ONCE, Starting today For 1 Occurrences Indication: Is patient pregnant? Discharge pending test results?
normal saline (BOLUS) 0.9 % injection Solution [500295]	for 3 Hours, Intravenous, STAT For 1 Doses Consult with MD every hour regarding need for rate adjustment based on current MAP and Lactic Acid results.
Nursing to Apply and Monitor Pulse Oximetry [PCS001052]	Routine, EFFECTIVE NOW, Starting today For 1 Occurrences
I & O, Strict [PCS001656]	Routine, EFFECTIVE NOW, Starting today For 1 Occurrences
Foley Catheter: Insert &/or Maintain [PCS001372]	Routine, EFFECTIVE NOW Foley Placement Indication: .Urine output monitoring in critically ill patients Remove Foley when indications for monitoring urine output in critically ill patients no longer exist.
Consult to: Maternal Fetal Medicine [PCS002241]	Referral for 1 visits (expires on 10/18/20) What is the reason for the consult: Consult with specialty: Other (Specify)
Notify MD (Specify Reason) [PCS001552]	Routine, EFFECTIVE NOW, Starting today For 1 Occurrences, Consult with MD every hour regarding need for Normal Saline Bolus rate adjustment based on current MAP and Lactic Acid Result.

ANTI-INFECTIVES FOR PYELONEPHRITIS

Anti-Infectives for Less Than 20 Weeks Gestational Age for No or Mild Beta-Lactam Allergy [193532]

ceFAZolin (ANCEF, KEFZOL) IV [900690]	2 g, Intravenous, Every 8 Hours

Anti-infectives for Greater Than 20 Weeks Gestational Age for No or Mild Beta-Lactam Allergy [193533]

ceFAZolin/Gentamicin [193543]	
ceFAZolin (ANCEF, KEFZOL) IV [900690]	2 g, Intravenous, Every 8 Hours
gentamicin dosing per pharmacy [500048]	Indication: Suspected Infection Source of Infection (Select all that apply): Urinary Tract Expected Duration of Therapy:

Anti-Infectives for Severe Beta-Lactam Allergy [193534]

gentamicin dosing per pharmacy [500048]	Indication: Suspected Infection Source of Infection (Select all that apply): Urinary Tract Expected Duration of Therapy:

ANTI-INFECTIVES FOR ENDOMETRITIS

Anti Infectives for Endometritis (Single Response) [193535]

BEST PRACTICE ELEMENT

4 pages

Start the Clock!!!

Urgent Language Matters

- Aligns with national sepsis standards
- Establishes 'time zero' for recognition and care

EHR Integration

- Visible countdown clock in the chart
- Reinforces urgency at the bedside and across teams

Why It Matters

- Creates a shared sense of urgency
- Reduces delays in antibiotics and interventions
- Every minute counts in maternal sepsis

Time Zero Trigger

It is also important to establish a time zero trigger to monitor time to treatment for every patient. This means starting a clock visible in the patient chart to encourage timely administration, as well as generating BPAs that alert providers and nursing teams. See the accompanying box for an example of how such a timer can work.

Time Zero Triggers

The serious infection timer can display within the patient's chart in storyboard.

- **Time provider documented YES to *'Do you suspect infection?'* in BPA/Navigator**

OR

- **Time or RN initial BPA firing/antibiotics ordered *(if provider has not yet documented infection)***

OR

- **Any time a laboring patient has a temp greater than 102.2°F (one time without any other criteria)**

OR

- **A pregnant patient has a temperature of 100.4°F - 102.1°F (sustained x2 values over 30 min) with fetal tachycardia (160 bpm or greater) AND leukocytes >15 or <4**

Elliott K. Main, MD, Stanford University
Kathleen Andonian, PharmD, Sharp Mary Birch Hospital
Lauren Puckett, PharmD, Stanford Medicine Children's Health

Response

This section is designed to aid clinicians in the treatment of sepsis and severe infections during pregnancy and postpartum. The chapters cover multiple practical aspects of antibiotic treatment, sepsis bundles for supportive care, direction for escalation of care, as well as a detailed discussion of source control for serious infections during pregnancy.

In this section you will find the following chapters:

- Fundamentals in the Care of Sepsis during Pregnancy
- Source Control for Serious Infections during Pregnancy and Postpartum
- Antibiotics for Obstetric Sepsis and Serious Infections
- Chorioamnionitis/Intraamniotic Infections
- Prophylactic Antibiotics on Labor and Delivery
- Management of Patients with Beta-Lactam (Penicillins and Cephalosporins) Allergies

Fluid Management

- Sepsis and septic shock leads to low circulating intravascular volume. Adequate tissue perfusion is vital for both cellular and bodily function.
- 2021 SSC guidelines recommends an initial fluid bolus of 30 mL/kg of crystalloid within the first three hours for patients with septic shock.
- KEY: this refers to IBW NOT actual weight
- For those with serious infection but no end-organ injury, a more modest fluid load of 500-1,000 ml is recommended.

TABLE 2. Ideal Body Weight Table to Calculate IV Fluid Load Volume in Sepsis

Height	Ideal Body Weight (Kg)	Fluid Load (ml) for 30mL/kg
5'0"	45.5	1,365
5'1"	47.8	1,434
5'2"	50.1	1,503
5'3"	52.4	1,572
5'4"	54.7	1,641
5'5"	57.0	1,710
5'6"	59.3	1,779
5'7"	61.6	1,848
5'8"	63.9	1,917
5'9"	66.2	1,986
5'10"	68.5	2,055
5'11"	70.8	2,124
6'0"	73.1	2,193

Table 4. The Sepsis in Obstetrics Score - A score of 6 suggests need for ICU care

	High Abnormal Range				Normal	Low Abnormal Range			
Variable	**+4**	**+3**	**+2**	**+1**	**0**	**+1**	**+2**	**+3**	**+4**
Temp (°C)	>40.9	39-40.9		38.5-38.9	36-38.4	34-35.9	32-33.9	30-31.9	<30
SBP (mm Hg)					>90		70-90		<70
HR (beats per minute)	>179	150-179	130-149	120-129	<119				
RR (breaths per minute)	>49	35-49		25-34	12-24	10-11	6-9		<6
SpO2					≥92%	90-91%		85-89%	<85%
WBC (white blood cell count 10^9/L)	>39.9		25-39.9	17-24.9	5.7-16.9	3-5.6	1-2.9		<1
% Bands			≥10		<10				
Lactic Acid (Mmol/L)			≥4		<4				

SBP, systolic blood pressure; HR, heart rate; RR, respiratory rate; SpO2, peripheral oxygen saturation; WBC, white blood count; Bands, immature neutrophils.

RESPONSE

Chorioamnionitis/ Intraamniotic Infection

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Key Principles:

1. The clinical criteria for chorioamnionitis/intra-amniotic infection (IAI) are widely debated. However, the variations in definitions minimally affect maternal and neonatal outcomes.
2. Newer antibiotic combinations may offer advantages, particularly for cesarean birth but choices need to be based on the local antibiogram.
3. Source control, particularly vaginal delivery, remain a key component of care.

Table 2. Division of Intraamniotic Infection (IAI) into Three Categories for Treatment

Uncomplicated Intraamniotic Infection	Intraamniotic Infection with Serious Features	Intraamniotic Infection with Sepsis
Intraamniotic infection progressing to a vaginal delivery and not qualifying for serious features	Maternal fever of ≥ 39.0°C (Any one of the following): • Intraamniotic infection with a positive screen for serious infection (e.g. CMQCC screen) but without criteria for sepsis or septic shock • Intraamniotic infection with a persistent temperature ≥ 39°C • Intraamniotic Infection with a cesarean delivery	Intraamniotic infection with end-organ injury signs or symptoms consistent with sepsis
Treatment: routine antibiotics (see table 4) that generally do not need to be continued following vaginal delivery; cooling measures, acetaminophen for treatment of fever	**Treatment:** antibiotic regimen that includes anaerobic coverage (see Table 4), consider a minimum of 24-48 hours following a cesarean; supplemental IV fluids; cooling measures, acetaminophen for treatment of fever	**Treatment:** Change antibiotics to Sepsis regimen (see Table 4); additional fluids; enhanced clinical care

What bacteria do we need to cover in Chorioamnionitis/IAI?

Primary pathogens: Group A and B Streptococci (GAS and GBS), *Escherichia coli* and other enteric gram negatives.

Anaerobic coverage is necessary for cesarean delivery or more serious infections.

***Enterococcus* spp.** is a less common pathogen in routine chorioamnionitis; however, empiric coverage should be added if the patient fails to respond adequately to the initial antibiotic regimen and should be considered for endomyometritis readmissions.

Choice of optimal hospital antibiotic regimen is driven by the local antibiogram and in consultation with Infectious Diseases and Maternal-Fetal Medicine specialists, and pharmacists specializing in antibiotic stewardship.

Antibiogram and ID Team are Key!

Antibiotic Considerations

Three newer choices should receive attention depending on local antibiograms: ceftriaxone, metronidazole, and piperacillin-tazobactam

Table 3. Antibiotic Considerations for Chorioamnionitis/Intraamniotic Infection

Antibiotic	Discussion
Aminoglycosides (gentamicin, tobramycin)	Difficult pharmacokinetics in pregnancy (i.e. hard to achieve adequate blood levels); weight-based dosing requires pharmacy preparation with potential delays; rising resistance of gram-negative bacteria; risks for nephrotoxicity and ototoxicity; needs to be part of a triple drug regimen to be most effective for chorioamnionitis followed by cesarean. Not ideal in sepsis and septic shock and may impart no added survival benefit.
Ampicillin	Narrow in spectrum, covers *Streptococcus* spp. well, but little else; must be part of a triple drug regimen to be most effective for chorioamnionitis followed by cesarean.
Ampicillin-Sulbactam	Covers gram-positive bacteria and anaerobes (due to addition of sulbactam); typically needs the addition of an aminoglycoside based on local antibiogram gram-negative bacteria susceptibility patterns.
Cefoxitin	Growing resistance among gram-negative bacteria; facilities should check local antibiogram to guide use. Not ideal for Group B *Streptococcus* and no enterococcal coverage. May include coverage of pelvic anaerobes (not first line).
Ceftriaxone	Similar coverage for gram-negative bacteria as aminoglycosides without the safety and monitoring concerns; good gram-positive coverage, needs second drug for anaerobes (often metronidazole); does not cover *Enterococcus* nor *Pseudomonas aeruginosa*. Daily dosing (2g) is advantageous.[13]
Clindamycin	Substantial resistance is developing among pelvic anaerobes (especially *Bacteroides* spp.). May have beneficial anti-inflammatory and anti-endotoxin effects when used for an infection due to *Streptococcus* spp. and *Staphylococcus* spp. (i.e. necrotizing fasciitis or STSS).
Metronidazole	Broad anaerobic coverage; inexpensive; oral is equivalent to IV. Historical concerns were raised on its use in lactating women. However, current information indicates that breastfeeding need not to be interrupted during the short peripartum course of metronidazole. See below for further discussion of this issue.
Piperacillin-tazobactam	Broad in spectrum; excellent anaerobic coverage and likely sufficient coverage of gram-positive and gram-negative genitourinary pathogens depending on local antibiogram. Can replace ampicillin/aminoglycoside/clindamycin triple regimen with a single drug and may present cost savings.[14,15] When given as an extended infusion, the first dose is infused over 30 min and then 4 hours later start a 4-hour infusion (extended infusion may be beneficial for patients with sepsis). Concerns for IV-line access and compatibility during the extended infusions.
Vancomycin	Added to a chorioamnionitis regimen to provide coverage for MRSA, if needed due to colonization, historical infection, or risks factors (i.e. IV drug use, incarceration, multiple dental carries, health-care worker within a facility with high MRSA rates). Can cover *Enterococcus* spp.

Empiric Management of Chorioamnionitis/ Endomyometritis

- Currently 4 reasonable options
- Amp + gent may no longer be the leading option
- Ceftriaxone and metronidazole combination is gathering positive experience and may be ideal for Type 1 PCN allergies and in more serious infections
- Piperacillin-tazobactam offers a single drug, broad-spectrum option

Appendix Q: Empiric Management of Chorioamnionitis/ Endomyometritis

Setting	Preferred Regimens	Type I Allergy to Penicillin (immediate hypersensitivity-hives, wheezing, anaphylaxis)	Type I Allergy to Cephalosporins OR Type II-IV Allergy to Penicillin[4]
Uncomplicated Chorioamnionitis/ Endomyometritis	Ampicillin 2g IV q6h **AND** Aminoglycoside[a] **IF having a cesarean, ADD** Metronidazole 500mg PO/IV q8h)[b] **OR** Clindamycin 900mg IV q8h	Ceftriaxone 2g IV q24h **AND** Metronidazole 500mg PO/IV q8h	Ertapenem 1g IV q24 hours[e] **OR** Meropenem 1g IV q8 hours[f]
	OR Piperacillin-tazobactam 4.5g IV q8h, 4-h infusion[c]		
	OR Ceftriaxone 2g IV q24h **AND** Metronidazole 500mg PO/IV q8h		
	OR Ampicillin-sulbactam 3g IV q6h **AND** Aminoglycoside[a]		
Serious Illness (signs of end-organ injury) **(If different from the routine chorioamnionitis regimen above, replace with one of these regimens)**	Piperacillin-tazobactam 4.5g IV q8h, 4-h infusion[c]	Ceftriaxone 2g IV q24h **AND** Metronidazole 500mg PO/IV q8h	Meropenem 1g IV q8 hours[f]
	OR Ceftriaxone 2g IV q24h **AND** Metronidazole 500mg PO/IV q8h		
Critical Illness (requiring broad spectrum coverage)	**Refer to Appendix L: Antibiotic Considerations for Sepsis of Unknown Source or Septic Shock**		

Note that the combination of ceftriaxone and metronidazole are leading choices in 4 categories

Antibiotics for Sepsis of Both Known and Unknown Origin

- Guidance in toolkit is provided for both situations when the origin is unknown or known
- Antibiotics should be administered within one hour of diagnosis
- Highlights also include GAS Bacteremia, necrotizing fasciitis, treatment durations, antibiotic step-down considerations, and source control
- Empiric antibiotic choices should be guided by the local antibiogram and may vary among sites
- Order sets are important to achieve the above

Appendix L: Antibiotic Considerations for Sepsis of Unknown Source or Septic Shock

See footnotes for further explanation

Antibiotic Choices[a] *Empiric coverage for sepsis of unknown source or for septic shock should include coverage for gram-negative bacteria, gram-positive bacteria (including MRSA), and anaerobic bacteria.*	**Duration**
Piperacillin/tazobactam 4.5 g IV q8h[b] **AND** Vancomycin – per institutional protocol (target AUC_{24} 400-600)[c,d]	7-10 days is adequate for most infections[k] 14 days may be indicated in patients who were critically ill (see also source control section)
For Type I Penicillin Allergy (immediate hypersensitivity-hives, wheezing, anaphylaxis)[e]: Cefepime 2 g IV q8h[f] **AND** Metronidazole 500 mg IV/PO q8h **AND** Vancomycin – per institutional protocol (target AUC_{24} 400-600)[c,d]	
For Type I Cephalosporin Allergy[e]: Meropenem 1 g IV q8h (extended infusion) **OR** 500 mg IV q6h[g] **AND** Vancomycin – per institutional protocol (target AUC_{24} 400-600)[c,d]	
For Severe Type II-IV allergy to penicillins or cephalosporins (example: hemolytic anemia, toxic epidermal necrolysis (TEN), Steven's Johnson Syndrome (SJS), interstitial nephritis)[e]: Aztreonam 2 g IV q6h-q8h[h] **AND** Metronidazole 500 mg IV/PO q8h **AND** Vancomycin - per institutional protocol (target AUC_{24} 400-600) [c,d] **OR** Meropenem 1g IV q8h (extended infusion) OR 500 mg IV q6h[g] **AND** Vancomycin – per institutional protocol (target AUC_{24} 400-600) [c,d]	
FOR ALL OF THE ABOVE SCENARIOS: **ADD clindamycin for suspected or known STSS:** Clindamycin 900 mg IV q8h[i] **Risk of Fungemia:** Empiric Antifungal & Consult Infectious Diseases[j]	

Lactation Safety of ABX

- Most recommendations are the same with the exception of metronidazole--now considered acceptable

Appendix N: Lactation Safety of Antimicrobials Used for Treatment of Sepsis (Continued)

Medication	Breastfeeding Category	Comments
Imipenem	Acceptable	Limited Information. In general, beta-lactams have very low levels in milk and are acceptable.
Levofloxacin	Acceptable	No information is available on the clinical use of levofloxacin during breastfeeding. However, amounts in breastmilk appear to be far lower than the infant dose and would not be expected to cause any adverse effects in breastfed infants.
Linezolid	Probably acceptable	Amounts in milk <10% of an infant dose.
Meropenem	No information	In general, beta-lactams have very low levels in milk and are acceptable.
Metronidazole	Acceptable	While older laboratory experiments showed a potential risk of mutagenesis in bacteria, subsequently no evidence of mutagenicity has been found in humans including a large study of maternal use in the 1st trimester. Metronidazole is a recommended choice by ACOG and SMFM for chorioamnionitis with cesarean delivery, endometritis, and sepsis. CDC recommends the use of metronidazole for the treatment of bacterial vaginosis during pregnancy. The National Health System UK Medicines Information Service notes: "The balance of current evidence and clinical experience, and the consensus of specialist opinion, is that there is no established mutagenic or carcinogenic risk to infants breastfeeding from mothers receiving routine short-course treatment with metronidazole by any route." Currently, metronidazole is used for maternal treatment in the postpartum period, without restrictions on breastfeeding, by multiple large centers in California.
Oseltamivir	Acceptable	Limited information
Penicillin G	Acceptable	
Piperacillin/ tazobactam	Acceptable	Limited information. In general, beta-lactams have very low levels in milk and are acceptable.
Tobramycin	Acceptable	Tobramycin is poorly excreted into breastmilk and poorly absorbed by infants, except in newborns who may absorb small amounts.
Vancomycin	Acceptable	Poorly absorbed orally.

Prophylactic ABX Chapter: Topics Covered

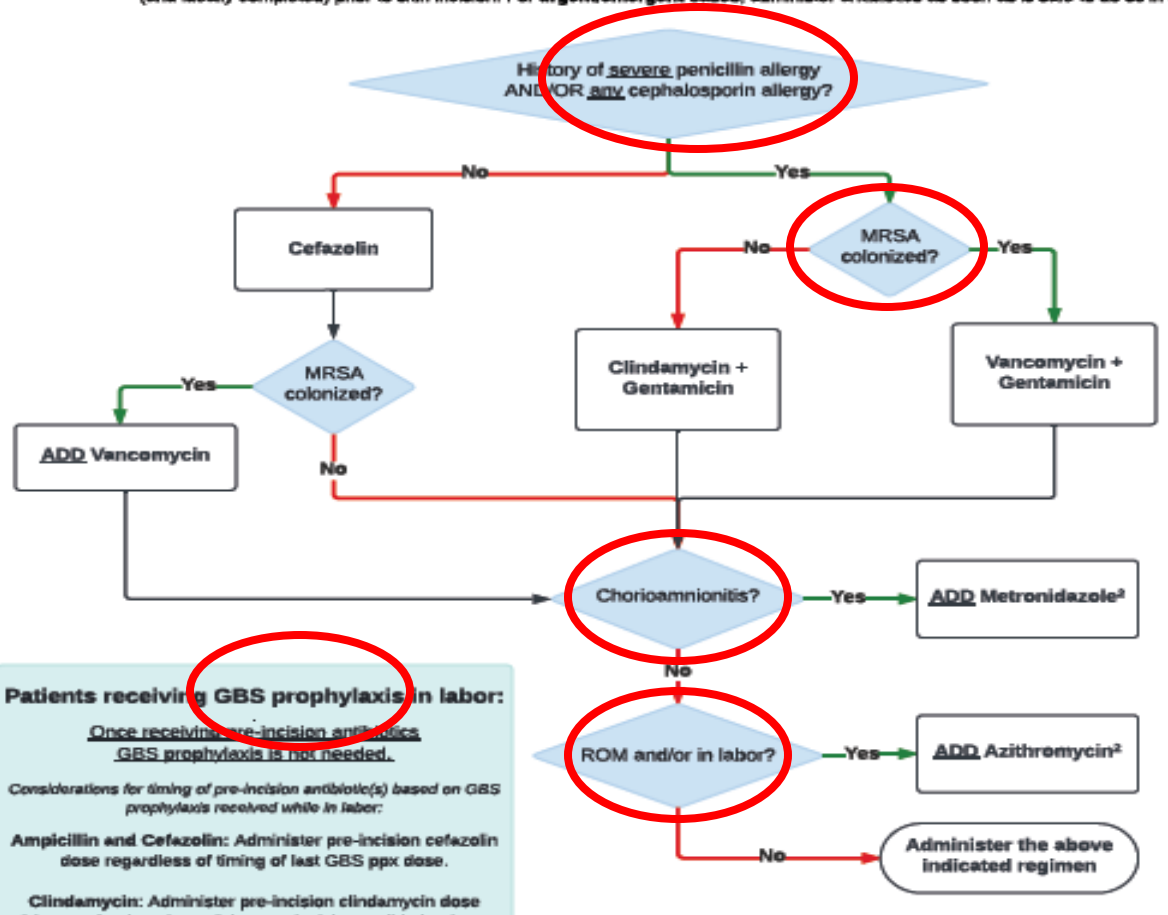
- Cesarean Delivery
  - Optimal dose of cefazolin? Adjust for weight/BMI?
  - Azithromycin for patients in labor or ROM
  - What about those already on ABX? Chorio? GBS?
  - Penicillin allergy?
- 3rd and 4th Degree Perineal lacerations
- PPROM Latency

Appendix T: Example Flow Chart For Prophylactic Antibiotics At Cesarean Delivery

Pre-Incision Antibiotics for Cesarean Delivery Algorithm

Stanford MEDICINE Children's Health

For scheduled cases, antibiotics administered via a bolus should be administered prior to skin incision, and antibiotics administered via an infusion should be initiated (and ideally completed) prior to skin incision. For **urgent/emergent cases**, administer antibiotics as soon as is safe to do so in the course of clinical care.



Antibiotic Dosing		Infusion Time
Azithromycin	500 mg IV	60 min
Cefazolin	< 120 kg: 2 g IV ≥ 120 kg: 3 g IV	3 – 5 min
Clindamycin	900 mg IV	30 min
Gentamicin	< 120 kg: 240 mg IV ≥ 120 kg: 360 mg IV	30 min
Metronidazole	500 mg IV	30 min
Vancomycin	< 80 kg: 1 g IV 80 – 99 kg: 1.25 g IV 100 – 199 kg: 1.5 g IV ≥ 120 kg: 2 g IV	60 min/ 1 g

Antibiotic Redosing

REDOSE **cefazolin** q4h intra-op or if QBL > 1500 mL
REDOSE **clindamycin** q6h intra-op or if QBL > 1500 mL
REDOSE antibiotics if due for chorio treatment while intra-op
Azithromycin, metronidazole, and vancomycin (for pre-incision ppx) do NOT require redosing

Patients receiving GBS prophylaxis in labor:

Once receiving pre-incision antibiotics GBS prophylaxis is not needed.

Considerations for timing of pre-incision antibiotic(s) based on GBS prophylaxis received while in labor:

Ampicillin and Cefazolin: Administer pre-incision cefazolin dose regardless of timing of last GBS ppx dose.

Clindamycin: Administer pre-incision clindamycin dose 6 hours after last dose. Other pre-incision antibiotics (e.g., gentamicin) can be administered regardless of timing of last GBS ppx dose.

Vancomycin: Administer pre-incision antibiotics regardless of timing of last GBS ppx dose.

Footnotes
[1] Cephalosporins can safely be used in patients with an allergic reaction to penicillins that is not an IgE-mediated reaction (e.g., anaphylaxis, urticaria, bronchospasm) or exfoliative dermatitis (Stevens-Johnson syndrome, toxic epidermal necrolysis).
[2] Azithromycin is not indicated if metronidazole is administered for chorioamnionitis.

Link to Redcap Decision Support Tool

Last Updated 2/25/25, T.Ng, N.Aziz, K.Fedoruk, G.Abir, D.Lyell, Y.El-Sayed, L.Puckett

RESPONSE

Management of Patients with Beta-Lactam (Penicillins and Cephalosporins) Allergies

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Natali Aziz, MD, MS, Stanford University School of Medicine
Elliott K. Main, MD, Stanford University School of Medicine

Key Principles:

1. While many persons report a penicillin class allergy, less than 1% are truly allergic.
2. An important task during prenatal care is to re-assess and "de-label" persons with reported allergies determined to be inaccurate or intolerances.
3. Most cephalosporins are safe to use in patients with Type I immediate hypersensitivity reactions (i.e. anaphylaxis).

Kayleigh Summers, LCSW, The Birth Trauma Mama Therapy & Support Services

RESPECTFUL AND SUPPORTIVE CARE

Initiating Healing After a Severe Maternal Event

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Key Principles

1. Patients who have experienced a severe maternal event will greatly benefit from supportive care.
2. Words matter, review the "Words Not to Say and Why" document.
3. A pre-discharge discussion with the patient and their family describing what happened and what to expect next is an important step in healing.

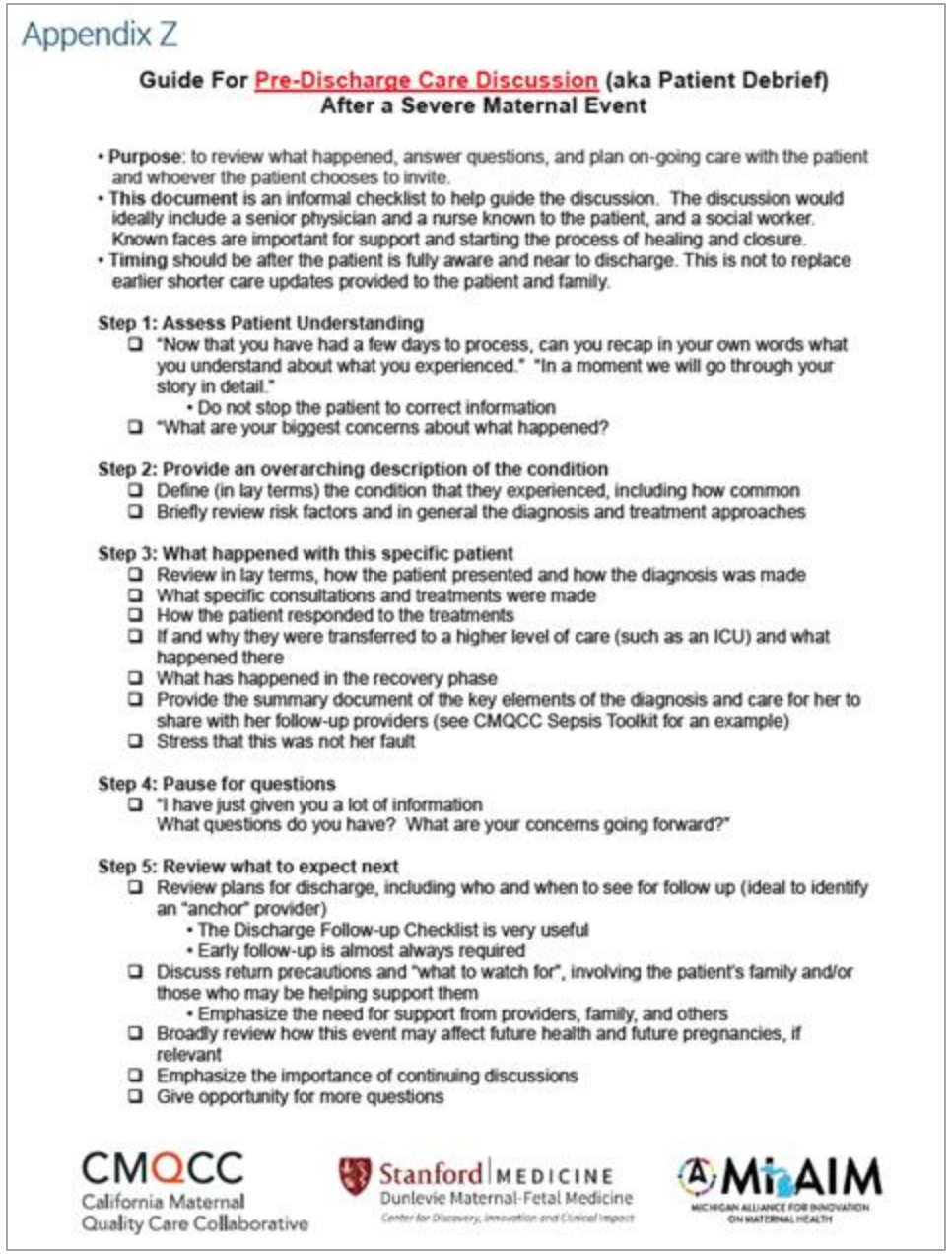
Why is this important? A patient's expected outcome for their birth often lies in stark contrast to the experience of almost dying, making this reality difficult for most to comprehend, increasing the risk for trauma and poor mental health outcomes.

The Goal: Mitigate further trauma and put patients on a trajectory toward healing.

How do we get there? Acknowledgment and debrief.

Pre-Discharge Care Discussion

- Too many patients leave the hospital with little to no understanding of what happened to them.
- This guide walks through the 5 crucial steps of a pre-discharge discussion.
- Allows space for patient questions.



Appendix Z

Guide For Pre-Discharge Care Discussion (aka Patient Debrief)
After a Severe Maternal Event

- **Purpose**: to review what happened, answer questions, and plan on-going care with the patient and whoever the patient chooses to invite.
- **This document** is an informal checklist to help guide the discussion. The discussion would ideally include a senior physician and a nurse known to the patient, and a social worker. Known faces are important for support and starting the process of healing and closure.
- **Timing** should be after the patient is fully aware and near to discharge. This is not to replace earlier shorter care updates provided to the patient and family.

Step 1: Assess Patient Understanding
- ❑ "Now that you have had a few days to process, can you recap in your own words what you understand about what you experienced." "In a moment we will go through your story in detail."
  - Do not stop the patient to correct information
- ❑ "What are your biggest concerns about what happened?

Step 2: Provide an overarching description of the condition
- ❑ Define (in lay terms) the condition that they experienced, including how common
- ❑ Briefly review risk factors and in general the diagnosis and treatment approaches

Step 3: What happened with this specific patient
- ❑ Review in lay terms, how the patient presented and how the diagnosis was made
- ❑ What specific consultations and treatments were made
- ❑ How the patient responded to the treatments
- ❑ If and why they were transferred to a higher level of care (such as an ICU) and what happened there
- ❑ What has happened in the recovery phase
- ❑ Provide the summary document of the key elements of the diagnosis and care for her to share with her follow-up providers (see CMQCC Sepsis Toolkit for an example)
- ❑ Stress that this was not her fault

Step 4: Pause for questions
- ❑ "I have just given you a lot of information
  What questions do you have? What are your concerns going forward?"

Step 5: Review what to expect next
- ❑ Review plans for discharge, including who and when to see for follow up (ideal to identify an "anchor" provider)
  - The Discharge Follow-up Checklist is very useful
  - Early follow-up is almost always required
- ❑ Discuss return precautions and "what to watch for", involving the patient's family and/or those who may be helping support them
  - Emphasize the need for support from providers, family, and others
- ❑ Broadly review how this event may affect future health and future pregnancies, if relevant
- ❑ Emphasize the importance of continuing discussions
- ❑ Give opportunity for more questions

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What Not to Say and Why

The way medical teams speak to patients after an SME is a piece of their story that they will take with them for the rest of their lives.

This documents helps guide the words and phrases and can make a big impact.

This should be shared with all clinicains

Appendix Y

Supportive Communication After a Severe Maternal Event:
What Not to Say and Why

Your words matter after a severe maternal event. Patients are in an incredibly vulnerable state given what they've just experienced. The words you use and the statements you make have the potential to stick with patients for the rest of their lives, for better or worse. Providers have the power to mitigate further trauma and start patients on the path toward healing after a severe maternal event.

Phrases To Avoid After a Severe Maternal Event:

Instead of: "You almost died, but we were able to save you"
Try: "You were quite sick, but your body is tough and resilient."
Why: No matter how hard the team may have worked, this comment is self-aggrandizing and takes away from the patient's strength and agency which will be needed to the patient to recover.

Instead of: "All that matters is a healthy mom and healthy baby."
Try: "I know this wasn't the birth experience you expected. It's okay to have feelings about that."
Why: A healthy mom and baby matter, but so does the patient's experience of their birth. This statement dismisses any feelings they might be having about almost dying.

Instead of: "I can't believe you're alive" or "You are very lucky to be alive" or "Thank God, you're OK".
Try: Provide a brief overview of what happened to the patient and the interventions used.
Why: After a Severe Maternal Event, most patients feel unsafe in the world. They wonder when the next time the rug will be pulled out from underneath of them, and they will almost die again. When someone on their medical team expresses disbelief at their survival, it further compounds this lack of safety and dismisses the on-going trauma.

Instead of: "Everything happens for a reason."
Try: "This wasn't your fault. Here's what we know about why this may have happened to you."
Why: This phrase is a platitude that attempts to put a positive spin on what is often a devastating experience. It is dismissive of the grief and trauma the patient has experienced.

Instead of: Anything that begins with "at least"
Try: "You've been through a lot. You are probably going to feel many complicated and conflicting emotions. That's normal after an event like this."
Why: The term "at least" uses comparison to dismiss a patient's experience. Something can always be worse, but that doesn't mean it's not traumatic.

Instead of: "You should be so grateful."
Try: "I know this might be scary and a lot to process. What questions can I help you answer?"
Why: There is nothing wrong with expressing gratitude, but forced gratitude is unhelpful, particularly after a severe maternal event. The provider's experience of this event often differs greatly from the patient's. For most patients, they walked into the hospital to have a baby and go home, instead they and/or their baby almost lost their lives. They are likely grateful to be alive, but they also need the space and permission to feel sad, angry, and devastated that this happened to them.

Summary For Why Not To Use These Phrases:
These statements are said with the intention to improve patient outcomes by helping patients move past the experience. Unfortunately, the impact can be the opposite, and these statements often dismiss or minimize a patient's experience. When a patient feels dismissed after trauma, especially by someone in a position of authority, they feel their experience of the birth and the emotions that come with it are not valid. This often leads to ignoring or suppressing emotions and inevitably delaying psychological recovery. When a patient is instead offered validation and empathy, the door is opened to access support and treatment for their experience, leading to better outcomes postpartum and longer term.

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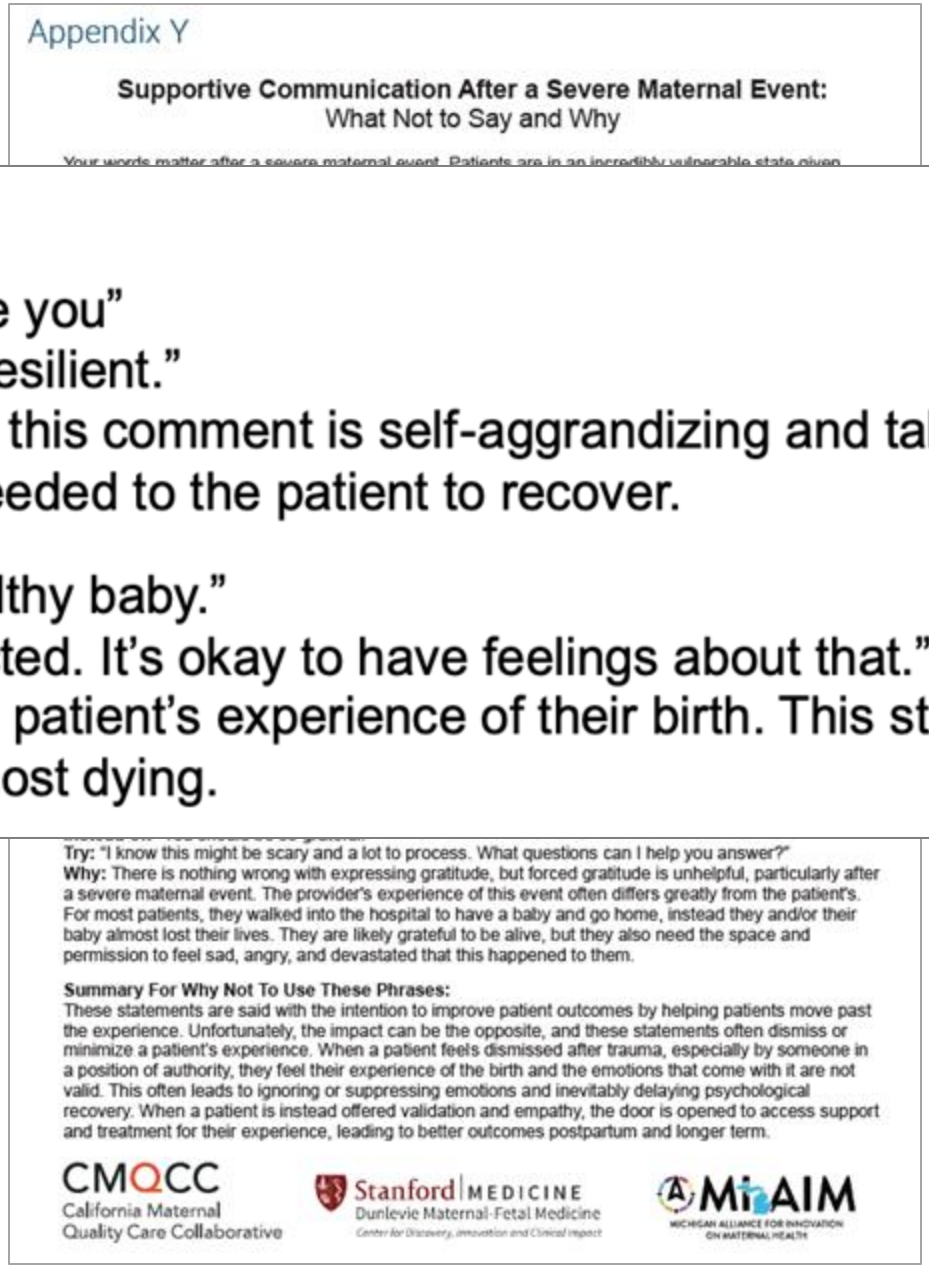
What Not to Say and Why



Appendix Y

Supportive Communication After a Severe Maternal Event:
What Not to Say and Why

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Instead of: "All that matters is a healthy mom and healthy baby."
Try: "I know this wasn't the birth experience you expected. It's okay to have feelings about that."
Why: A healthy mom and baby matter, but so does the patient's experience of their birth. This statement dismisses any feelings they might be having about almost dying.

Try: "I know this might be scary and a lot to process. What questions can I help you answer?"
Why: There is nothing wrong with expressing gratitude, but forced gratitude is unhelpful, particularly after a severe maternal event. The provider's experience of this event often differs greatly from the patient's. For most patients, they walked into the hospital to have a baby and go home, instead they and/or their baby almost lost their lives. They are likely grateful to be alive, but they also need the space and permission to feel sad, angry, and devastated that this happened to them.

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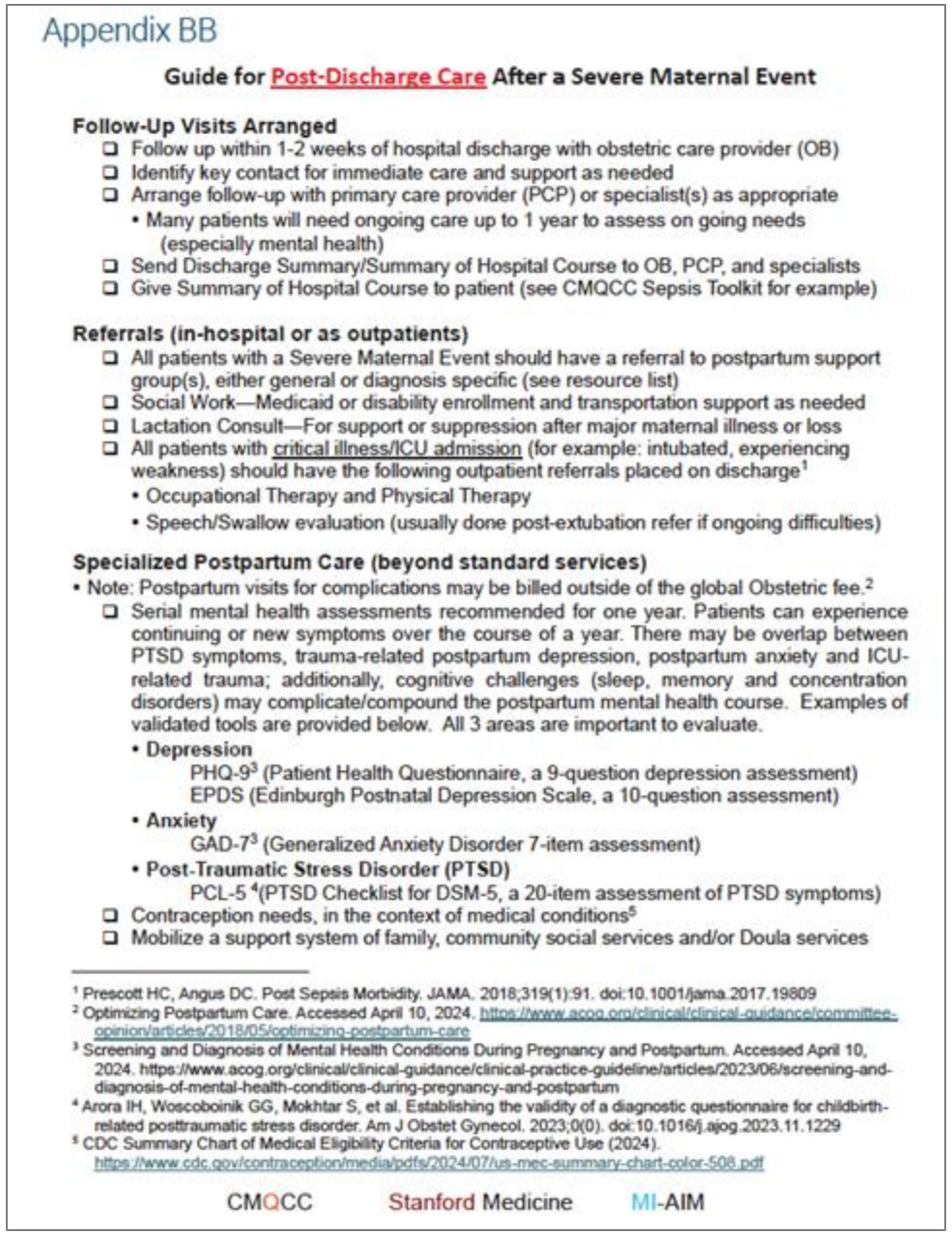
The way medical teams speak to patients after an SME is a piece of their story that they will take with them for the rest of their lives.

Post-Discharge Care Guide

- Closing the gaps in coordination of care after SME
- Includes check-list for follow up appointments, assessments, and referrals including mental health.
- Assess for social supports



Appendix BB

Guide for Post-Discharge Care After a Severe Maternal Event

Follow-Up Visits Arranged
- ❑ Follow up within 1-2 weeks of hospital discharge with obstetric care provider (OB)
- ❑ Identify key contact for immediate care and support as needed
- ❑ Arrange follow-up with primary care provider (PCP) or specialist(s) as appropriate
  - Many patients will need ongoing care up to 1 year to assess on going needs (especially mental health)
- ❑ Send Discharge Summary/Summary of Hospital Course to OB, PCP, and specialists
- ❑ Give Summary of Hospital Course to patient (see CMQCC Sepsis Toolkit for example)

Referrals (in-hospital or as outpatients)
- ❑ All patients with a Severe Maternal Event should have a referral to postpartum support group(s), either general or diagnosis specific (see resource list)
- ❑ Social Work—Medicaid or disability enrollment and transportation support as needed
- ❑ Lactation Consult—For support or suppression after major maternal illness or loss
- ❑ All patients with critical illness/ICU admission (for example: intubated, experiencing weakness) should have the following outpatient referrals placed on discharge[1]
  - Occupational Therapy and Physical Therapy
  - Speech/Swallow evaluation (usually done post-extubation refer if ongoing difficulties)

Specialized Postpartum Care (beyond standard services)
- Note: Postpartum visits for complications may be billed outside of the global Obstetric fee.[2]
- ❑ Serial mental health assessments recommended for one year. Patients can experience continuing or new symptoms over the course of a year. There may be overlap between PTSD symptoms, trauma-related postpartum depression, postpartum anxiety and ICU-related trauma; additionally, cognitive challenges (sleep, memory and concentration disorders) may complicate/compound the postpartum mental health course. Examples of validated tools are provided below. All 3 areas are important to evaluate.
  - **Depression**
    PHQ-9[3] (Patient Health Questionnaire, a 9-question depression assessment)
    EPDS (Edinburgh Postnatal Depression Scale, a 10-question assessment)
  - **Anxiety**
    GAD-7[3] (Generalized Anxiety Disorder 7-item assessment)
  - **Post-Traumatic Stress Disorder (PTSD)**
    PCL-5 [4](PTSD Checklist for DSM-5, a 20-item assessment of PTSD symptoms)
- ❑ Contraception needs, in the context of medical conditions[5]
- ❑ Mobilize a support system of family, community social services and/or Doula services

[1] Prescott HC, Angus DC. Post Sepsis Morbidity. JAMA. 2018;319(1):91. doi:10.1001/jama.2017.19809
[2] Optimizing Postpartum Care. Accessed April 10, 2024. https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2018/05/optimizing-postpartum-care
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CMQCC Stanford Medicine MI-AIM

Summary of Care Form

- Physical aid for continuity of care
- To be filled out by a member of the team and provided to the patient
- Provides patient with information about their care to act as a communication tool between care providers.

Appendix AA

Patient Summary: Severe Maternal Event				
Patient Name				
Event Type & Date				
Attending Provider		**Office Phone**		
Other Key Provider		**Office Phone**		
Other Key Provider		**Office Phone**		
Follow-Up	☐ Subspecialist_____ ☐ Subspecialist_____ ☐ Support Group / Social Worker_____ ☐ Other: _____			
Clinical Summary				
Surgeries / Procedures	*Date* *Type*	*Date* *Type*	*Date* *Type*	*Date* *Type*
	Type	*Type*	*Type*	*Type*
Blood Transfusion	*Type and Number of Units of Blood Products*			
	Red Blood Cells ____ units	Platelets ____ units	Plasma ____ units	Fibrinogen/Cryo ____ units
ICU Admission	☐ No ☐ Yes Dates_____ *Notes:* _____			
Key Medications				
Patient Friendly Brief Narrative Summary (e.g., What happened?, Why did I need these interventions?, What was the final diagnosis? Anything else of importance?)				
Coordinating Resource Person		**Phone**		
This is a **person designated to be a point of contact for the patient after discharge. This individual may provide resources, answer questions, and help the patient in navigating and processing their experience.*				

Appendix DD

Life after Experiencing Sepsis

Use this tool to learn what to expect and to identify topics you would like more information on.

Key points about Sepsis

- Sepsis is caused by an infection that can occur anywhere in your body. Sepsis can cause your body to respond to the infection in a way that can damage many different organs.
- The most common types of infection during pregnancy and postpartum are:
  - Infections of the uterus
  - Infections of the urinary tract
  - Wound infections including in the vagina

Bonding and feedir

- Because of the need to provide you with more intensive care, you may have been separated from your newborn while your condition was being stabilized. You may have missed out on skin-to-skin time and initial breastfeeding. However, you will still be able to bond with their baby and it's common for it to take time after a severe maternal event.
- Due to the physiologic and metabolic stress that your body has experienced, establishing breast feeding can be very difficult after a severe obstetric illness.
- If you are still hoping to breastfeed here is what you can do:
  - Talk to your healthcare team about being able to have your baby brought to you for skin to skin and bonding time.
  - Ask to meet with a Lactation Consultant to assist you with your unique breastfeeding needs. These services are also often available after discharge.
  - Request a breast pump with a demonstration so that you can establish your milk supply.
  - If your baby is in the Neonatal Intensive Care Unit, request that you receive daily updates on your newborn's condition and for photographs of your newborn be provided to you.

Appendix DD: Life After Experiencing Sepsis (Continued)

Emotional Recovery

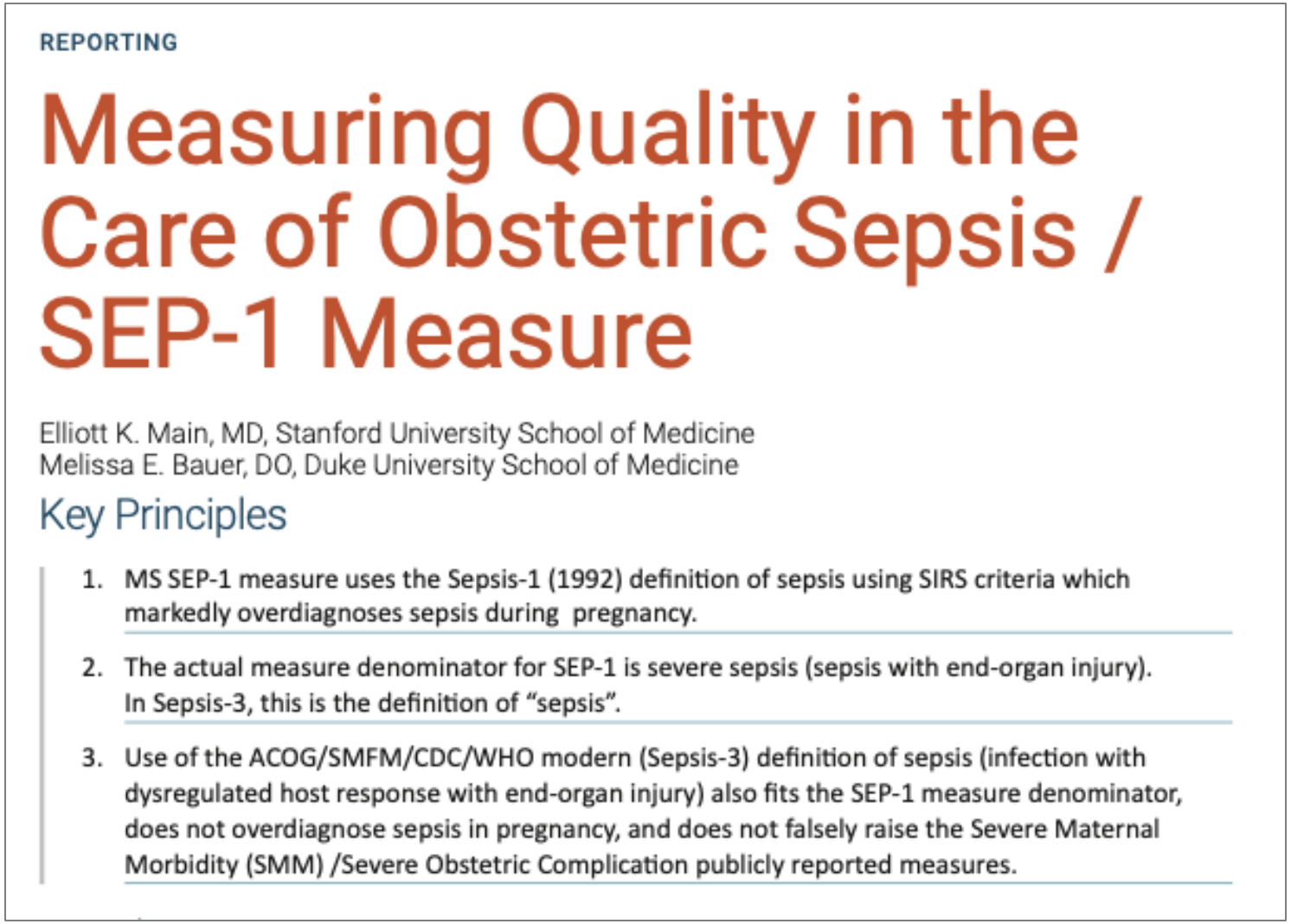
- Up to 50% of sepsis survivors are left with a condition called Post-Sepsis Syndrome which includes:
  - Insomnia, difficulty getting to sleep or staying asleep
  - Nightmares, hallucinations and panic attacks
  - Muscle and joint pains
  - Overwhelming tiredness
  - Trouble concentrating
  - Decreased mental functioning
  - Loss of self-esteem and self-belief
- The "baby blues" and postpartum depression and anxiety can affect anyone. You may be more likely to have postpartum depression, anxiety or even post-traumatic stress disorder

- If you have foul smelling bleeding from your vagina or incision site
- If you are urinating less than usual, or not at all.
- If you are breathing faster than normal, or your heart is beating faster than
- If you feel like something is wrong and you just don't feel right
- If you have questions or concerns about your condition or care
- If you become confused, sleepy or lethargic
- If your heart feels like it's racing or pounding
- If you are suddenly short of breath and feel lightheaded or have trouble breathing
- If you have sudden chest pain
- If you have thoughts of injuring yourself or your newborn

Some patients find it helpful to speak with their healthcare provider about the events surrounding their sepsis experience after they have had time to heal. Having this opportunity after you leave the hospital can help you fill in gaps of time you don't remember and allow for answers to questions that didn't come up until after you spent some time at home. If you would like an opportunity to meet with your healthcare provider, we encourage you to call his or her office to schedule an appointment when the time feels right to you. Be sure to let the scheduler or your provider's nurse know what information you would like to receive during the appointment, so that your healthcare provider can come prepared to answer your questions.

Life After Experiencing Sepsis is an educational document to be provided to patients that describes key points about sepsis and includes information about both physical and emotional recovery.

Elliott K. Main, MD
Clinical Professor, OB&GYN, Stanford University



REPORTING

Measuring Quality in the Care of Obstetric Sepsis / SEP-1 Measure

Elliott K. Main, MD, Stanford University School of Medicine
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Key Principles

1. MS SEP-1 measure uses the Sepsis-1 (1992) definition of sepsis using SIRS criteria which markedly overdiagnoses sepsis during pregnancy.
2. The actual measure denominator for SEP-1 is severe sepsis (sepsis with end-organ injury). In Sepsis-3, this is the definition of "sepsis".
3. Use of the ACOG/SMFM/CDC/WHO modern (Sepsis-3) definition of sepsis (infection with dysregulated host response with end-organ injury) also fits the SEP-1 measure denominator, does not overdiagnose sepsis in pregnancy, and does not falsely raise the Severe Maternal Morbidity (SMM) /Severe Obstetric Complication publicly reported measures.

"Severe Sepsis" is the denominator in SEP-1 and is the equivalent of the modern consensus definition of Sepsis used by CMQCC and all professional bodies:
(infection with end-organ injury)

Table 3. Establishment of the Diagnosis of Severe Sepsis: SEP-1 Compared to CMQCC Criteria

SEP-1 Specifications Manual[9]	CMQCC Obstetric Serious Infection Evaluation Flow Chart
To establish the presence of severe sepsis by clinical criteria, all three clinical criteria (a), (b), and (c) must be met within six hours of each other. The three clinical criteria do not need to be documented in any particular order.	CMQCC uses the Sepsis-3 definition that requires sepsis to have end-organ injury. This equates sepsis with severe sepsis, but the three clinical criteria are identical to SEP-1. In the flow chart, (b) often comes before (a) as pregnancy modified SIRS criteria in (b) can be used for screening.
(a) Documentation of an infection.	(a) Identification of a probable infection and exclusion of other causes during bedside evaluation for the abnormal screen.
(b) Two or more manifestations of systemic infection according to the Systemic Inflammatory Response Syndrome (SIRS) criteria: Note different SIRS criteria are used in pregnancy ≥20 weeks of gestation through day 3 post-delivery (see Table 4 below).	(b) Any two or more criteria of the pregnancy-modified SIRS for pregnancies ≥20 weeks of gestation through day 3 post-delivery (see Table 4 below).
(c) Organ dysfunction evidenced by any one from the Table 5 below. Note: do not use the abnormal value if caused by another condition or medication (documented).	(c) End-organ Injury evidenced by any one from the Table 5 below. Note: do not use the abnormal value if caused by another condition or medication.

CMQCC Serious Infection Flow Chart uses the same criteria for End-Organ Injury as SEP-1

Table 5. Criteria for Organ Dysfunction/End-Organ Injury: SEP-1 Compared to CMQCC Criteria

SEP-1 Specifications Manual		CMQCC Obstetric Serious Infection Evaluation Flow Chart
Non-Pregnant Patients*	**Pregnant 20 weeks through Day 3 Post-delivery Patients**	**Pregnant 20 weeks through Day 3 Post-delivery Patients**
Hypotension: SBP <90 mmHg or MAP <65mmHg or SBP decrease >40 mmHg **Respiratory:** New mechanical or non-invasive ventilation (e.g. CPAP, BiPAP)	**Hypotension:** SBP <85 mmHg or MAP <65mmHg or SBP decrease >40 mmHg **Respiratory:** New mechanical or non-invasive ventilation (e.g. CPAP, BiPAP)	**Hypotension:** SBP <85 mmHg or MAP <65mmHg or SBP decrease >40 mmHg **Respiratory:** New mechanical or non-invasive ventilation (e.g. CPAP, BiPAP, or O2 sat <92%, or O2 requirement)
Renal: Creatinine >2.0 mg/dL or Urine Output <0.5ml/kg/hour for two consecutive hours **Liver:** Total Bilirubin >2 mg/dL **Coagulation:** Platelet count <100,000, or INR >1.5, or aPTT >60 sec **Lactate:** >2mmol/L	**Renal:** Creatinine >1.2 mg/dL or Urine Output <0.5ml/kg/hour for two consecutive hours **Liver:** Total Bilirubin >2 mg/dL **Coagulation:** Platelet count <100,000, or INR >1.5, or aPTT >60 sec **Lactate:** >2mmol/L (NOTE: Do not use lactate obtained during active labor through delivery)	**Renal:** Creatinine >1.2 mg/dL or Urine Output <60ml for two consecutive hours **Liver:** Total Bilirubin >2 mg/dL **Coagulation:** Platelet count <100,000, or INR >1.5, or aPTT >60 sec (PT and aPTT may not be routinely collected in obstetrics) **Lactate:** >2mmol/L (NOTE: Do not use lactate obtained during active labor through one hour postpartum). In Sepsis-3, Lactate is a measure of severity rather than an indicator of end-organ injury.

**Includes pregnant patients <20 weeks and after 3 days post-delivery*

SEP-1 Numerator criteria is the same as CMQCC treatment recommendations.

Note that Lactate is not required for the diagnosis but is required once the diagnosis of severe sepsis is made

SEP-1 Numerator–Patients who received ALL of the following[9]:

1. Within three hours of presentation of severe sepsis:
   - Initial lactate level measurement
   - Broad spectrum or other antibiotics administered
   - Blood cultures drawn prior to antibiotics

AND

2. Received within six hours of presentation of severe sepsis. ONLY if the initial lactate is elevated:
   - Repeat lactate level measurement

AND

3. Within three hours of initial hypotension:
   - Resuscitation with 30 mL/kg crystalloid fluids
   - OR within three hours of septic shock:
   - Resuscitation with 30 mL/kg crystalloid fluids

AND

4. Within six hours of septic shock presentation, ONLY if hypotension persists after fluid administration:
   - Vasopressors are administered

AND

5. Within six hours of septic shock presentation, if hypotension persists after fluid administration or initial lactate >= 4 mmol/L:
   - Repeat volume status and tissue perfusion assessment is performed

Summary of SEP-1 in Obstetrics

- The denominator for SEP-1 is “Severe Sepsis” which is the same as the current consensus definition of Sepsis (infection with end-organ injury)
- Otherwise, the remaining criteria are the same
- Using the older definition of sepsis (infection with SIRS) leads to very high rates of sepsis in OB. This now has significant consequences as sepsis is part of the publicly reported CMS/Joint Commission measure of Severe Obstetric Complications and Birthing Friendly designation

Key Elements of Sepsis Toolkit Applicable for **All Severe Maternal Events**

1. Improving Patient Education for Maternal Warning Signs
2. Improving Patient-Clinician Communications Listening and Advocacy Tools
3. Vital Sign Screening and Bedside Evaluation
4. Standardized Order Sets and Related EHR Tools
5. Healing After Severe Maternal Events-Trauma Informed Care

Summary: Key Implementation Steps

1. Patient Education Tools for Maternal Warning Signs, Listening and Advocacy Tools
2. Screening For Serious Infection: VS and Bedside Evaluation Flow Chart
3. EHR: Standardized Sepsis Order Sets, Screening, and Education Tools
4. Reevaluation of Antibiotic Treatment and Prophylaxis Protocols
5. Tools for Healing After Sepsis and other Severe Maternal Events
6. Measures for Performance (including SEP-1) and Implementation

Questions?

For additional resources, previously recorded webinars on Sepsis, and to Download the Toolkit and all Appendices please visit:

https://www.cmqcc.org/toolkits-quality-improvement/sepsis

We are considering doing a Sepsis Implementation Sprint (~3 months long) in early 2026. Let us know if you may be interested: RNath@stanford.edu

Contact Us





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