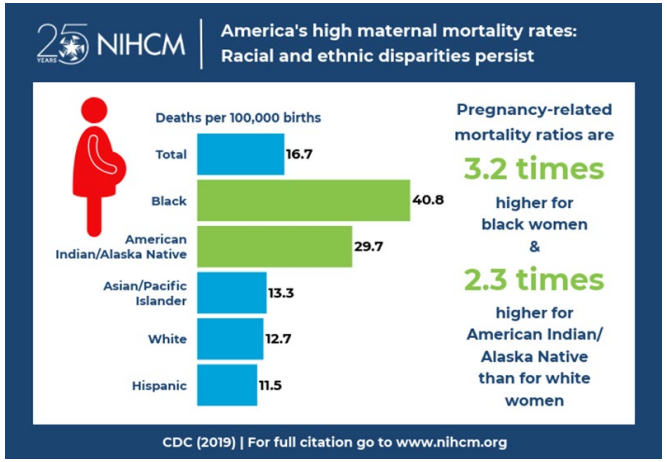
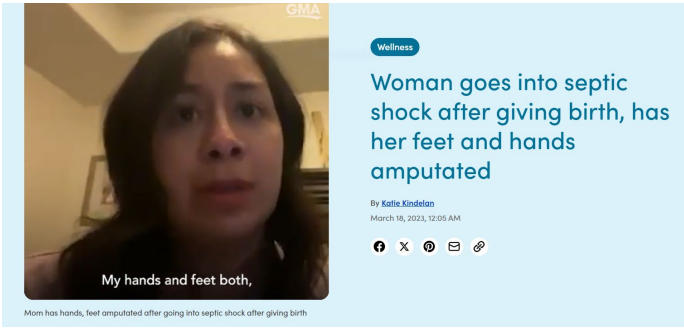
RECOGNITION & CLINICAL MANAGEMENT OF OBSTETRICAL SEPSIS

DR MCLEAN

DNP, FNP, RNC-MNN, RNC-OB, CHSE, NEA-BC, C-EFM

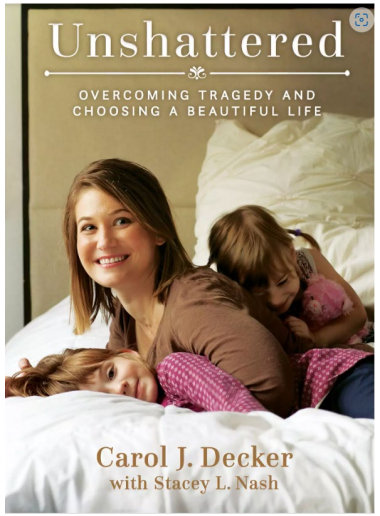

25 YEARS NIHCM
America's high maternal mortality rates:
Racial and ethnic disparities persist
Deaths per 100,000 births
Total 16.7
Black 40.8
American Indian/Alaska Native 29.7
Asian/Pacific Islander 13.3
White 12.7
Hispanic 11.5
Pregnancy-related mortality ratios are
3.2 times
higher for black women
&
2.3 times
higher for American Indian/ Alaska Native than for white women
CDC (2019) | For full citation go to www.nihcm.org


HEALTH
A woman's death after stillbirth is a reminder of the U.S.'s maternal mortality issue
AUGUST 13, 2024 · 6:31 PM ET
HEARD ON ALL THINGS CONSIDERED
By Bek Shackelford
3-Minute Listen
+ PLAYLIST
Krystal Anderson died of sepsis a few days after giving birth to a stillborn baby. It was her second bout of maternal sepsis. Even though she was in the care of specialists, she died.


GMA
My hands and feet both,
Mom has hands, feet amputated after going into septic shock after giving birth
Wellness
Woman goes into septic shock after giving birth, has her feet and hands amputated
By Katie Kindelan
March 18, 2023, 12:05 AM


"Educate yourself about maternal sepsis, the third leading cause of pregnancy-related death. If I had known about it, maybe things might have been different."
Read April's story and learn the signs at rorystauntonfoundation.org
#MaternalSepsisAwarenessWeek
THE RORY STAUNTON FOUNDATION
FOR SEPSIS PREVENTION


A Texas woman died after the hospital said it would be a crime to intervene in her miscarriage
Josseli Barnica is one of at least two pregnant Texas women who died after doctors delayed emergency care.


Unshattered
OVERCOMING TRAGEDY AND CHOOSING A BEAUTIFUL LIFE
Carol J. Decker
with Stacey L. Nash

OBJECTIVES

Review	Review maternal sepsis early warning signs and diagnostic criteria in alignment with contemporary critical care practices.
Discuss	Discuss identified common etiologies for maternal sepsis and suggested treatment approaches.
Discuss	Discuss the impact of implicit bias and social determinants and impact on care prognosis and health care delivery.
Summarize	Summarize interprofessional team strategies for improving care coordination and communication in the treatment of Obstetrical infections and improve outcomes.

OBSTETRICAL SEPSIS: A GLOBAL PANDEMIC?

Sepsis is a leading cause of maternal morbidity and mortality. According to the World Health Organization maternal sepsis refers to sepsis that results from infection during pregnancy, childbirth, post-abortion, or postpartum period

Globally, maternal sepsis is estimated at 5.7 million cases annually.

Increased global awareness is required to enable timely diagnosis and optimal management

In contrast to encouraging global trends, maternal mortality in the United States has been increasing in the past four decades, rising 140% between 1987 and 2013, and the United States has one of the highest pregnancy-related mortality rates of high-income countries

OBSTETRICAL SEPSIS

Sepsis is driving increases in pregnancy-related deaths in the U.S.5 (Pregnancy-related death is defined as the death of a woman while pregnant or within 1 year of the end of a pregnancy.)

According to the CDC, 12.5% of pregnancy-related deaths between 2011 and 2016 were due to infection or sepsis. That makes infection/sepsis the **third** leading cause of pregnancy-related death.

The New WHO Definition Of Maternal Sepsis

Maternal sepsis is a life-threatening condition defined as organ dysfunction resulting from infection during pregnancy, childbirth, post-abortion, or postpartum period

SIGNS & SYMPTOMS

PHYSIOLOGICAL CHANGES ATTRIBUTED TO SEPSIS

Pregnancy

Cardiovascular:
- ↓ Systemic vascular resistance (25–30%)
- ↓ Blood pressure
- ↑ Blood volume (40–45%)
- ↑ Heart rate (10–20 bpm)
- ↑ Cardiac output (40%)
- Aorto-caval compression

Respiratory:
- ↓ Pulmonary vascular resistance and plasma colloid pressure
- ↓ Residual volume
- ↓ Functional residual capacity
- ↑ Tidal volume
- ↑ Minute ventilation
- Compensated respiratory alkalosis

Renal:
- ↑ Renal plasma flow
- ↑ Glomerular filtration rate
- Renal collecting system dilatation

Coagulation
- ↑ Factors I, II, VII, VIII, IX, XII
- ↑ (x5) plasminogen activator inhibitors (PAI) I & II
- ↓ Protein S
- ←→ Anti-thrombin and Protein C

Sepsis

Cardiovascular:
- ↓ Systemic vascular resistance
- ↓ Blood pressure
- ↑ Heart rate
- Vasodilatation
- Myocardial depression

Respiratory:
- ↑ Pulmonary microvascular pressure and permeability
- Acute lung injury

Renal:
- Ischaemia
- Vasoconstriction
- Cytokine-mediated renal cell injury

Coagulation
- ↑ Procoagulant effects
- ↑ Thrombin production
- ↓ Activated Protein C
- Fibrinolysis (increased PAI I)

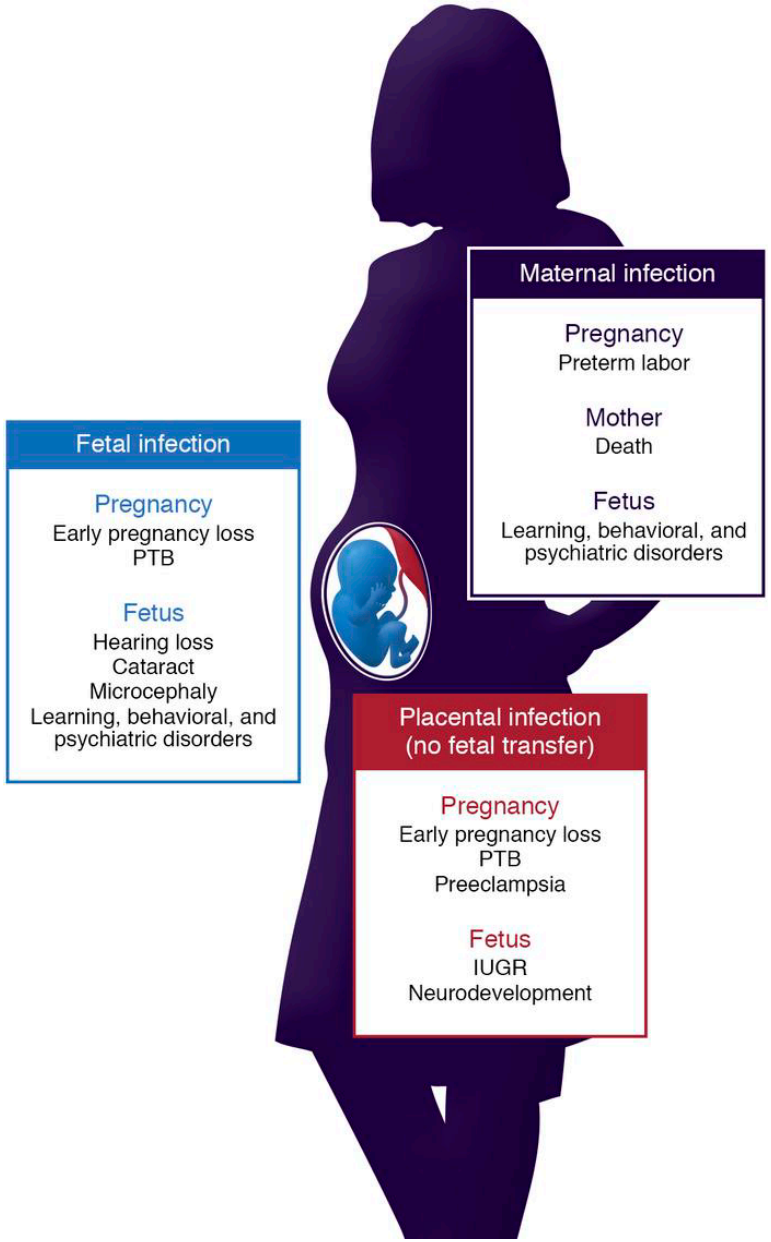
Cumulative effect

Cardiovascular	Respiratory	Renal	Coagulation
Rapid haemodynamic collapse	• Susceptibility to pulmonary oedema • Rapid decrease in oxygenation • Adult respiratory distress syndrome • Decreased ability to compensate for metabolic acidosis	Acute kidney injury	• Increased microvascular thrombus formation • Microcirculation dysregulation • Tissue hypoperfusion • End-organ dysfunction

RISK FACTORS FOR MATERNAL SEPSIS

SEPSIS MAY BE ASSOCIATED WITH EARLY PREGNANCY LOSS, INTRAUTERINE DEATH, AND FETAL HEART RATE ABNORMALITIES.

TEMPERATURE ALONE IS NOT A RELIABLE INDICATOR OF SEPSIS, THOUGH FEVER IS OFTEN PRESENT AS THE FIRST CHANGED VITAL SIGN. IN THE PRESENCE OF INFLAMMATORY MARKERS, OXYGEN EXTRACTION CAPABILITIES ARE REDUCED, AND TISSUE HYPOPERFUSION LEADS TO AN ABRUPT INCREASE IN BLOOD LACTATE CONCENTRATIONS, INDICATING THE DEVELOPMENT OF ANAEROBIC METABOLISM STRATEGIES



Contributing Factors and Risks for Maternal Sepsis

Obstetric causes

Genital tract causes

- Chorioamnionitis
- Endometritis
- Septic abortion
- Wound infection following caesarean section/episiotomy/ vaginal tear

Non-genital tract causes

- Lower urinary tract infection
- Pyelonephritis
- Breast infection – abscess/mastitis
- Septic pelvic thrombophlebitis

Non-obstetric causes

- Human immunodeficiency virus
- Pneumonia
- Tuberculosis
- Malaria

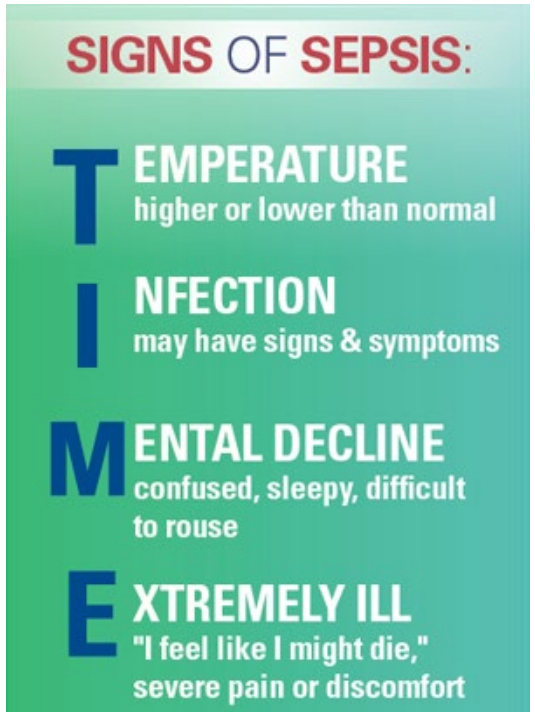
Additional Obstetrical Risk Factors

- peripartum and postnatal interventions,
- cesarean section and instrumental birth
- Intrauterine/ vaginal tamponade for obstetric hemorrhage

Non-obstetric causes of maternal sepsis

the most common are urinary tract infections and respiratory tract infections

IDENTIFICATION OF THE OBSTETRICAL CLIENT WITH SEPSIS



High temperature or fever over 38°C. → Low body temperature. → Fast heartbeat. → Chills and shivering.

Severe muscle, abdominal or chest pain. → Feeling dizzy or faint. → Diarrhea, nausea or vomiting. → Abnormal or unpleasant vaginal discharge.

Productive cough. → Sudden onset of UTI symptoms → Acting confused or slurring speech. → Skin feels cold or clammy.

normal, or mottled with lighter patches on dark skin, or → does not fade when you roll a glass over it (similar to → Difficulty breathing, breathlessness or breathing very fast → Loss of consciousness.

> Although blood cultures are the gold standard for diagnosing sepsis, they may be negative in 28–49% of septic patients

DIAGNOSTIC TESTING

Measure and reassess lactate if initial value 2 mmol/l.

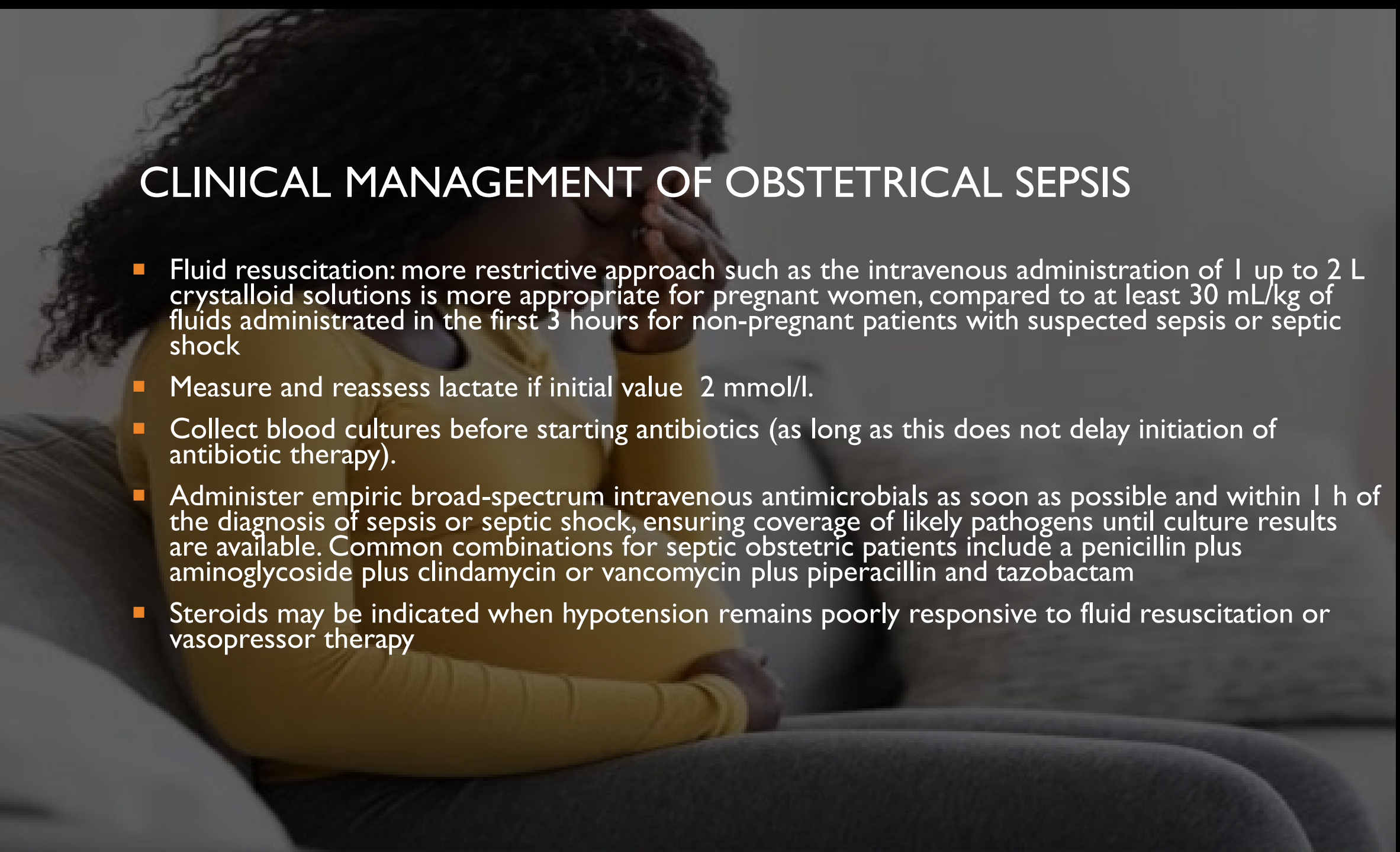
Collect blood cultures before starting antibiotics (as long as this does not delay initiation of antibiotic therapy).

Labs: CBC, CMP Monitor for leukocytosis, thrombocytopenia; increased risk for DIC (Disseminated Intravascular coagulation). White blood cell count (WBC) > 12,000/cu mmOR WBC < 4,000/cu mm

OR (band forms) immature WBC > 10%

Procalcitonin is a biomarker of response to infection that has been used to individualize antibiotic therapy. However, procalcitonin-guided protocols do not consistently decrease mortality, or ICU and hospital length of stay.

Monitor blood glucose; concerned for hyperglycemia with history of Diabetes



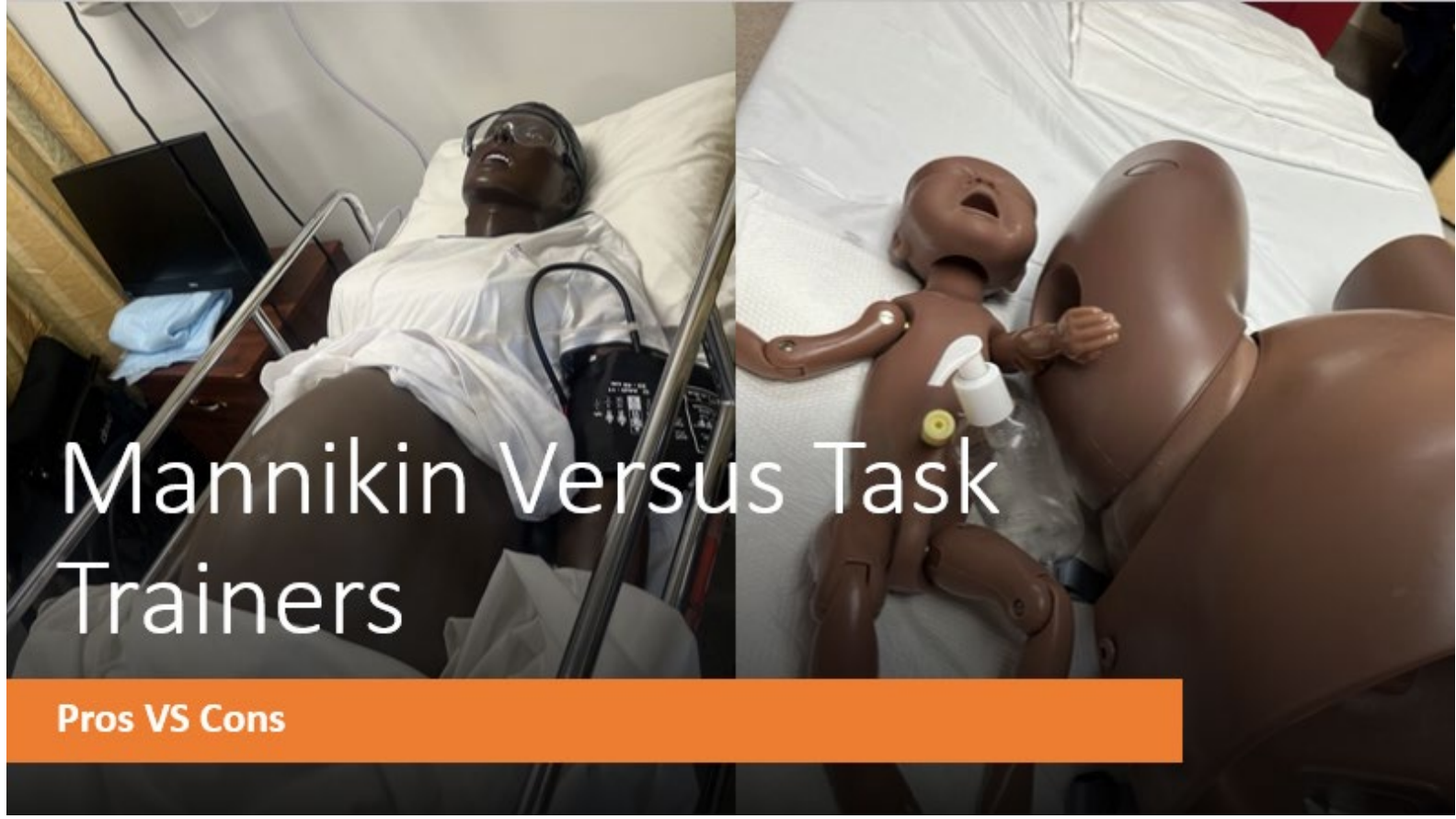
CLINICAL MANAGEMENT OF OBSTETRICAL SEPSIS

- Fluid resuscitation: more restrictive approach such as the intravenous administration of 1 up to 2 L crystalloid solutions is more appropriate for pregnant women, compared to at least 30 mL/kg of fluids administrated in the first 3 hours for non-pregnant patients with suspected sepsis or septic shock
- Measure and reassess lactate if initial value 2 mmol/l.
- Collect blood cultures before starting antibiotics (as long as this does not delay initiation of antibiotic therapy).
- Administer empiric broad-spectrum intravenous antimicrobials as soon as possible and within 1 h of the diagnosis of sepsis or septic shock, ensuring coverage of likely pathogens until culture results are available. Common combinations for septic obstetric patients include a penicillin plus aminoglycoside plus clindamycin or vancomycin plus piperacillin and tazobactam
- Steroids may be indicated when hypotension remains poorly responsive to fluid resuscitation or vasopressor therapy

THE "GOLDEN" HOUR

The "**Golden hour of sepsis**" highlights the correlation between early initiation of interventions

- . Measurement of serum lactate levels. If serum lactate level is more than 2 mmol/L, then recheck it.
- Use of broad-spectrum antibiotics.
- Send blood culture prior to administration of antibiotics.
- Use of intravenous crystalloid 30 mL/kg for hypotension or lactate level≥4 mmol/L. *In instances of of hypotension, use a vasopressor to maintain mean arterial pressure more than 65 mmHg*



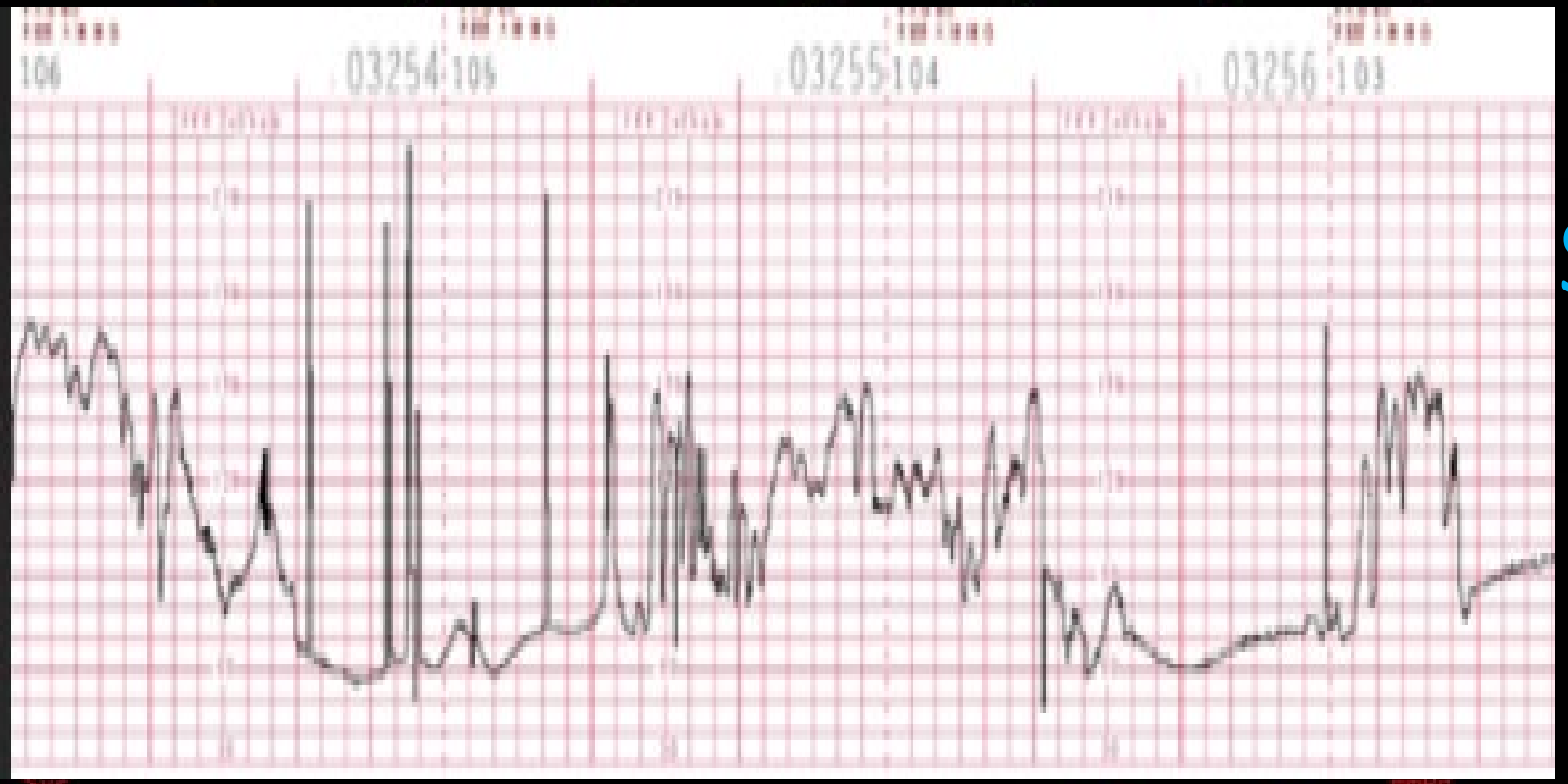
Mannikin Versus Task Trainers

Pros VS Cons

SIMULATION

Bed 3 | Simulation EVE | Adult | 10:53 | 3 Waves

After Turtle sign



HR 120

SPO2 98%

Temp 98.0

RR 26

122/82 (89)

The PEARLS Healthcare Debriefing Tool

	Objective	Task	Sample Phrases
1 Setting the Scene	Create a safe context for learning	State the goal of debriefing; articulate the basic assumption*	"Let's spend X minutes debriefing. Our goal is to improve how we work together and care for our patients." "Everyone here is intelligent and wants to improve."
2 Reactions	Explore feelings	Solicit initial reactions & emotions	"Any initial reactions?" "How are you feeling?"
3 Description	Clarify facts	Develop shared understanding of case	"Can you please share a short summary of the case?" "What was the working diagnosis? Does everyone agree?"
4 Analysis	Explore variety of performance domains	See backside of card for more details	**Preview Statement** *(Use to introduce new topic)* "At this point, I'd like to spend some time talking about [insert topic here] because [insert rationale here]" **Mini Summary** *(Use to summarize discussion of one topic)* "That was great discussion. Are there any additional comments related to [insert performance gap here]?"
Any Outstanding Issues/Concerns?			
5 Application/ Summary	Identify take-aways	Learner centered	"What are some take-aways from this discussion for our clinical practice?"
		Instructor centered	"The key learning points for the case were [insert learning points here]."

*Basic assumption, Copyright © Center for Medical Simulation. Used with permission.

HEALTH SCHOLARS

PATIENT CARE SIMULATION	Case: VTE IN-SITU Deep Vein Thrombosis/Pulmonary Embolism
Scenario File: Venous Thromboembolism in Pregnancy Typed by: K. McLean Reviewer: **Maternal Mortality Reduction Program: Yusaf, Grueso, Campbell-Taylor, Harford**	Patient Name: **Shalene Wilson** Age: **35** DOB:**01/06/1988** Gender: **female** Race: Caribbean Ethnicity **Black** Culture/Religion: **Catholic**
Discipline:	Learner Level:

Learning Objectives:

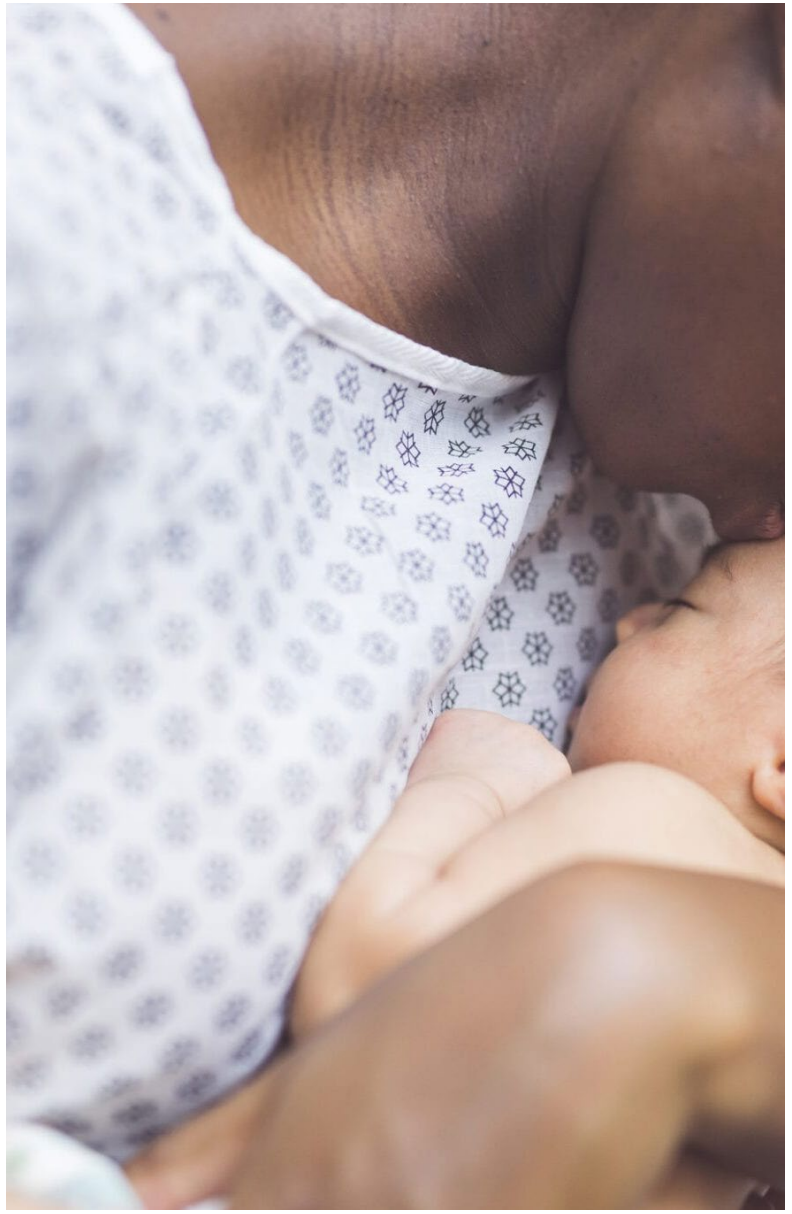
1. **Learners will be able to recognize signs and symptoms of deep vein thrombosis and pulmonary embolism after appropriate assessment.**
2. **Learners will escalate and initiate emergency response team and develop a management plan.**
3. **Learners shall request appropriate diagnostic and treatment options for management of VTE Events.**
4. **Learners shall demonstrate in a multidisciplined approach utilizing Team Stepps**

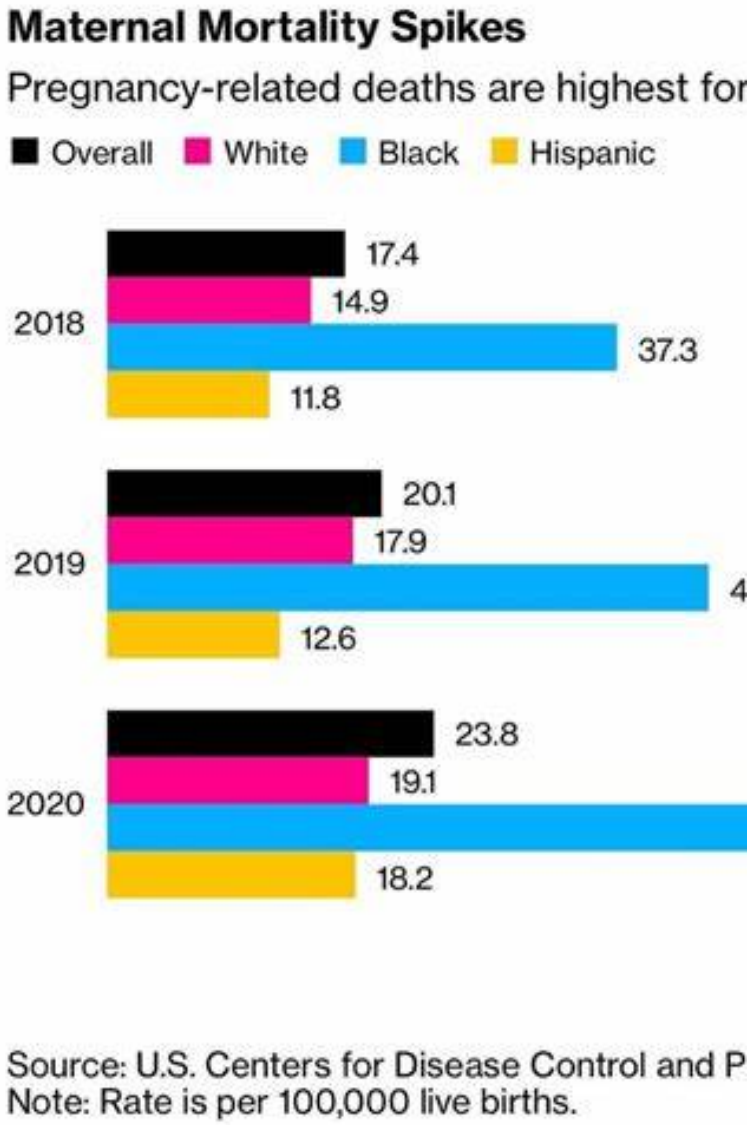
CREATING SIMULATION SCENARIOS

IMPLICIT BIAS IMPACT ON OBSTETRICAL SEPSIS

Black maternal patients have more than twice the risk of severe maternal sepsis as compared to their white counterparts (CDC, 2024).

In the U.S., Black women are 3.3 times more likely to die from pregnancy-related causes, and American Indian and Alaskan Native women 2.5 times more likely, than white women.





PREVENTION IS KEY

Limit unnecessary interventions i.e. frequent vaginal examinations for treatment or unwarranted rupture of membranes

Implementation of tailored bundles and adherence to policies

Initiatives like the Maternity Early Warning Score and Sepsis Six symptom cards provided by the UK Sepsis Trust (2024) can help ‘eff actively predict morbidity in maternity patients and reduce inpatient mortality, respectively

Emphasize the importance of obstetric prophylactic interventions like skin preparation and vaginal cleansing before caesarean section. Limited studies to support chlorhexidine outpatient.

Implementation of antibiotics prophylaxis for cesarean cases

each hour of delay in antibiotic treatment the chance of sepsis survival is reduced by 7.6% [

REFERENCES

Chen, H.-H., Wu, C.-L., & Chao, W.-C. (2024). Analysis of the impact of maternal sepsis on pregnancy outcomes: a population-based retrospective study. *BMC Pregnancy & Childbirth*, *24*(1), 1–10. https://doi-org.adelphi.idm.oclc.org/10.1186/s12884-024-06607-8

Nieuwoudt, C., White, S. E., Heine, R. P., & Widelock, T. M. (2024). Maternal Sepsis. Clinical Obstetrics & Gynecology, 67(3), 589–604. https://doi-org.adelphi.idm.oclc.org/10.1097/grf.0000000000000881

Ribeiro, do-Valle, C. C., Luz, A. G., Pacagnella, R. C., & Cecatti, J. G. (2024). Surviving maternal sepsis: Clinical, laboratory, and treatment features. *International Journal of Gynecology & Obstetrics*, *166*(2), 753–759. https://doi-org.adelphi.idm.oclc.org/10.1002/ijgo.15440