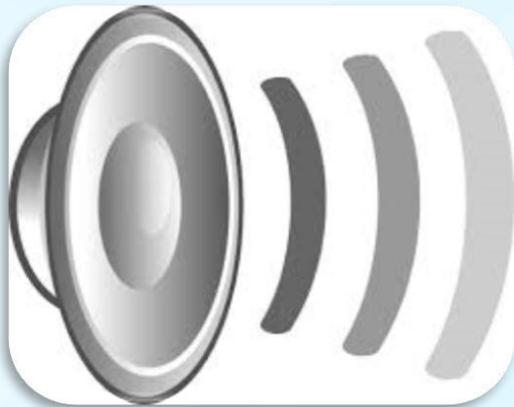
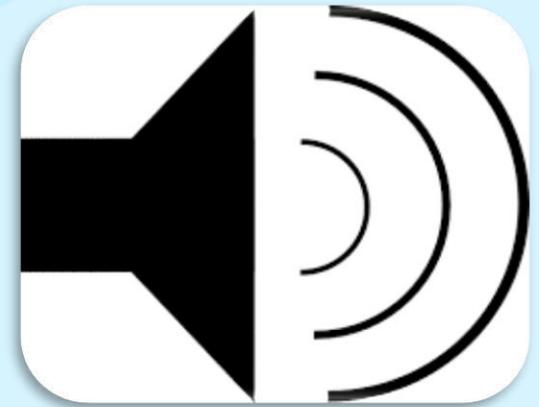


**Welcome to**  
***Sepsis Standard Work: Improving Compliance with Early  
Recognition and Management of Perinatal Sepsis***

**The audio for today's conference will be coming through your  
computer speakers. Please ensure your speakers are turned on  
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**Thank you!**



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# Continuing Education Information

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# Continuing Education Information

## **PROGRAM DESCRIPTION:**

This webinar will discuss the need for protocols for early recognition and management of maternal sepsis. The barriers and resistance of implementation of sepsis bundles must be addressed for our vulnerable pregnant population.

## **OBJECTIVES:**

- Describe infection control techniques that reduce the risk and spread of healthcare- associated infections (HAI).
- Identify unsafe practices that place patients at risk for HAIs.
- Describe best practices for infection control and prevention in daily practice in healthcare settings.
- Apply standards, guidelines, best practices, and established processes related to safe and effective medication use.

## **SPECIFIC OBJECTIVES FOR THIS ACTIVITY:**

- Effectively implement the OB sepsis screen in the perinatal setting using adjusted parameters for SIRs criteria in the pregnant population.
- Identify the importance of implementing protocols for early recognition and management of perinatal sepsis.
- Identify the barriers to implementation of sepsis bundles in early recognition and management of perinatal sepsis and how to overcome them.



**TUNE IN TO**  
**SAFE HEALTHCARE:**  
A CDC WEBINAR SERIES



**AWHONN**  
PROMOTING THE HEALTH OF  
WOMEN AND NEWBORNS

Society of  
Critical Care Medicine  
The Intensive Care Professionals



**ANA**  
AMERICAN NURSES ASSOCIATION

# *Sepsis Standard Work: Improving Compliance with Early Recognition and Management of Perinatal Sepsis*

May 17, 2017



## Before We Get Started...

### **To submit a question:**

- Use the “Chat” window, located on the lower left-hand side of the webinar screen.
- Questions will be addressed at the end of the webinar, as time allows.

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### **To hear the audio:**

- **Please ensure your speakers are turned on with the volume up -** the audio for today’s conference should be coming through your computer speakers.

***The speakers’ slides were e-mailed before the webinar and will also be provided to participants in a follow-up e-mail.***

# American Nurses Association

- Represents the interests of the nation's 3.6 million nurses
- Has long-standing involvement in infection prevention and control



**Dr. Seun Ross**

ANA, Director of Nursing  
Practice & Work  
Environment

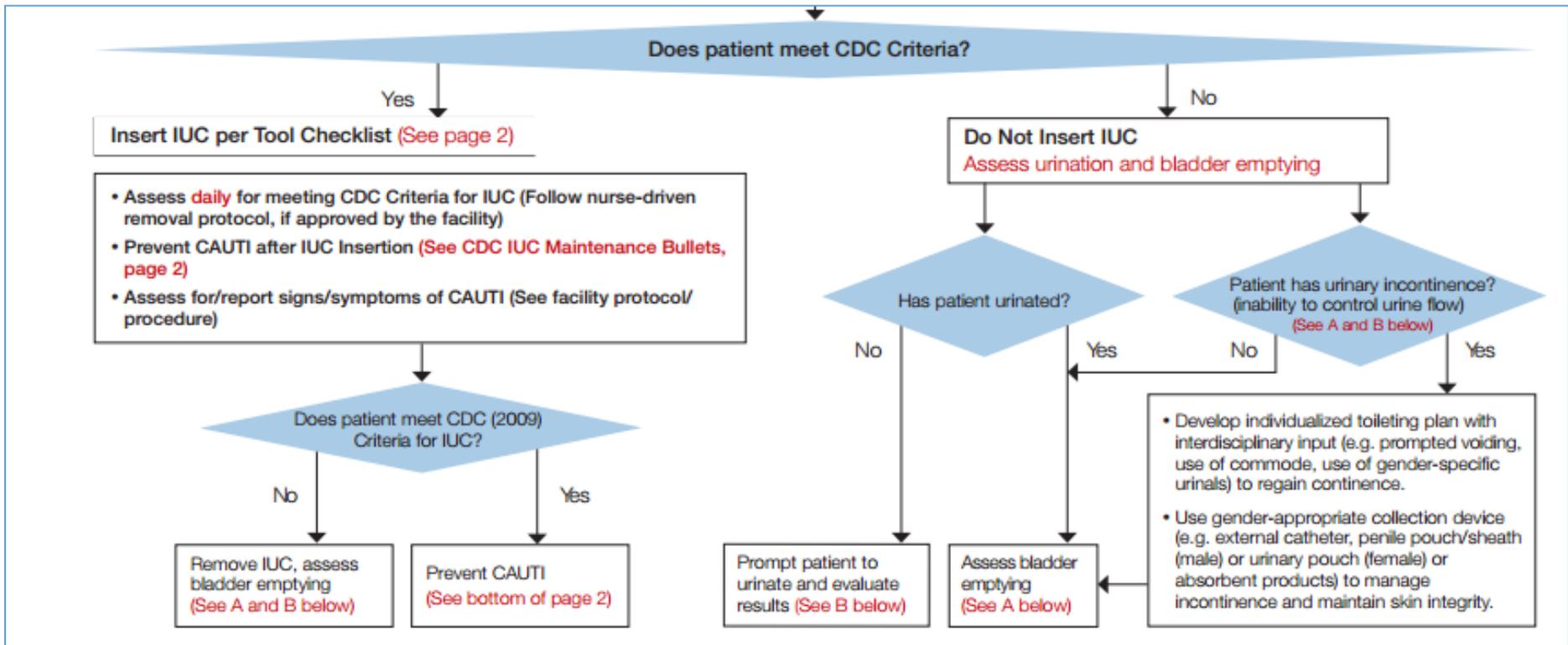
# Why are nurses significant in infection control?

- Uniquely qualified to recognize and prevent infections like sepsis.



# Preventing CAUTI—A Leading Cause of Sepsis

## NursingWorld.org/ANA-CAUTI-Prevention-Tool

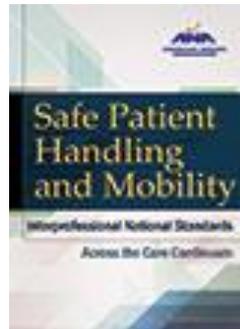


# Preventing Infections through Early Mobility

[NursingWorld.org/MainMenuCategories/Workplace/Safety/Healthy-Work-Environment/SafePatient](https://www.nursingworld.org/MainMenuCategories/Workplace/Safety/Healthy-Work-Environment/SafePatient)



[My ANA](#) | [Staff Nurses](#) | [Advanced Practice Nurses](#) | [Nurse Managers](#) | [Nursing Research](#) | [Student Nurses](#) | [Educators](#) | [What is Nursing?](#)



# Nurses on the Frontlines of Infection Prevention

[NursingWorld.org/ANA-APIC](https://www.nursingworld.org/ANA-APIC)



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Hospital-  
Acquired  
Infections



Personal  
Protective  
Equipment



Emerging  
Infections



Hand  
Hygiene

# NICE Network

## NursingWorld.org/InfectionPreventionControlEducation



My ANA | Staff Nurses | Advanced Practice Nurses | Nurse Managers | Nursing Research | Student Nurses | Educators | What is Nursing?



Infection Control  
Resources



In-Person Training  
Opportunities



Webinars

# Sepsis Standard Work:

## Improving Compliance with Early Recognition and Management of Perinatal Sepsis

**Elizabeth Rochin, PhD, RN, NE-BC**  
**Vice President, Nursing**  
**Association of Women's Health, Obstetric and**  
**Neonatal Nurses**  
**(AWHONN)**

AWHONN has sought to confirm the accuracy of the information presented today and to describe generally accepted practices. However, AWHONN is not responsible for errors or omissions or for any consequences from application of the information in this resource and makes no warranty, expressed or implied, with respect to the contents of this presentation.

# Maternal Sepsis on a Global Scale

Maternal sepsis is the leading cause of maternal death, accounting for 15% of maternal deaths worldwide<sup>1</sup>

In the United States and the United Kingdom, maternal sepsis is considered to be the leading cause of death in the Peripartum period<sup>2</sup>

Olvera, L. & Dutra, D. (2016). Early recognition and management of maternal sepsis. *Nursing for Women's Health*, 20(2), 182-196.

Padilla, C. & Palanisamy, A. (2017). Managing maternal sepsis: Early warning criteria to ecmo. *Clinical Obstetrics and Gynecology*, 60(2), 418-424.

# Associations for Sepsis in the Maternal Population

## Demographics

- Advanced Maternal Age
- African-American race
- Medicaid Insurance

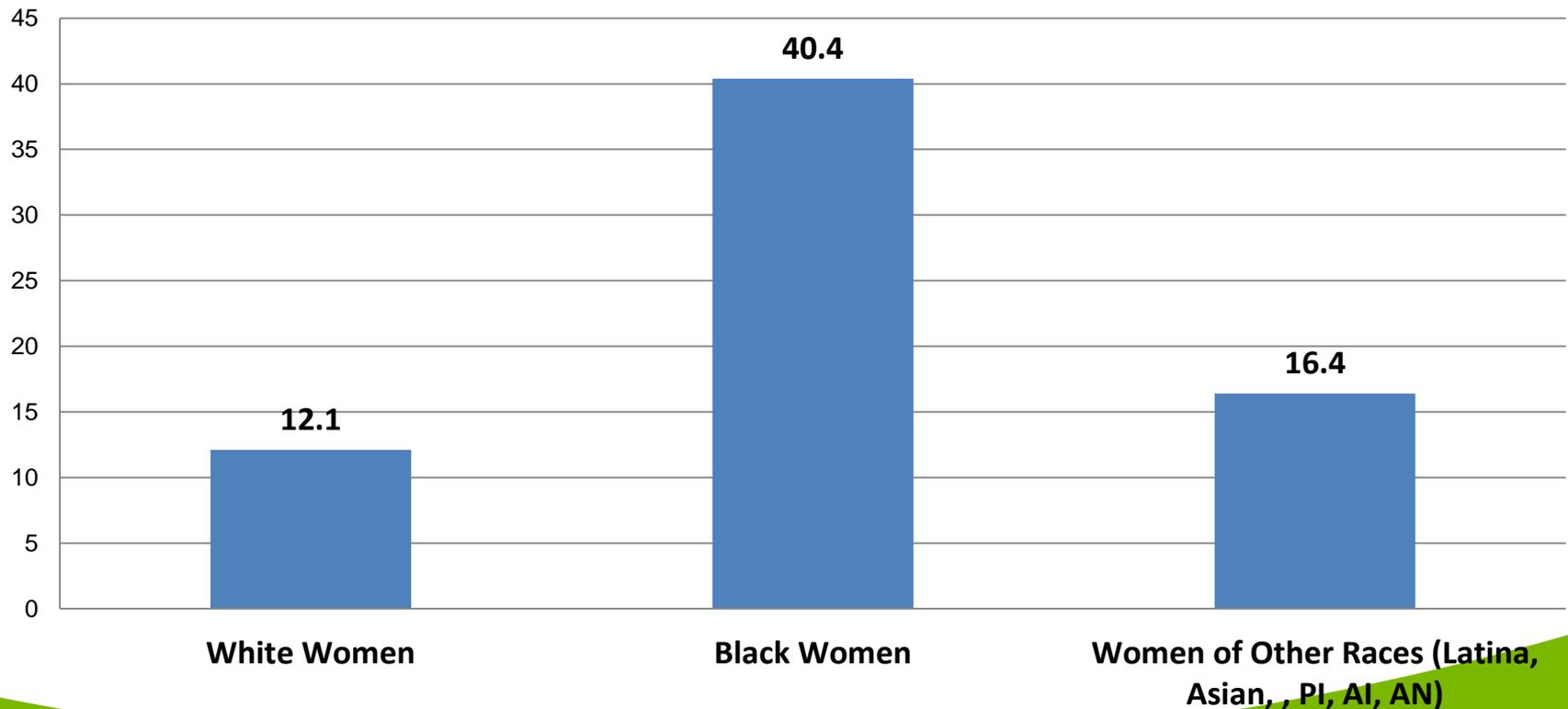
## History

- Preterm Delivery
- Postpartum Hemorrhage
- Stillbirth
- Cesarean Section
- Endometritis
- Cerclage
- Retained Products
- Multiple Gestation

Bauer, M.E., Bateman, B.T., Bauer, S.T., Shanks, A.M. & Mhyre, J.M. (2013). Maternal sepsis mortality and morbidity during hospitalization for delivery: Temporal trends and independent associations for sepsis. *Anesthesia & Analgesia*, 117(4), 944-950.

# CDC Pregnancy Mortality Surveillance System

Maternal Deaths (all cause) per 100,000 Live Births  
2011-2013



# Incidence of Maternal Sepsis in the United States

Stratified US National Inpatient Sample (NIS) 1998-2009

50,000,000 Obstetric visits were reviewed

No significant change pre-delivery

Rate of post-delivery sepsis increased **148%** between 1998-1999 and 2008-2009

Callaghan, W.M., Creanga, A.A. & Kuklina, E.V. (2012). Severe maternal morbidity among delivery and postpartum hospitalizations in the United States. *Obstetrics and Gynecology*, 120(5), 1029-1036.

# Postpartum Discharge Education: Early Detection of Potential Complications

**SAVE  
YOUR  
LIFE:**

## Get Care for These POST-BIRTH Warning Signs

Most women who give birth recover without problems. But any woman can have complications after the birth of a baby. Learning to recognize these POST-BIRTH warning signs and knowing what to do can save your life.

**POST-  
BIRTH  
WARNING  
SIGNS**

<p><b>Call 911</b> if you have:</p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Pain in chest</li> <li><input type="checkbox"/> Obstructed breathing or shortness of breath</li> <li><input type="checkbox"/> Seizures</li> <li><input type="checkbox"/> Thoughts of hurting yourself or your baby</li> </ul>
<p><b>Call your healthcare provider</b> if you have:</p> <p><small>(If you can't reach your healthcare provider, call 911 or go to an emergency room)</small></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Bleeding, soaking through one pad/hour, or blood clots, the size of an egg or bigger</li> <li><input type="checkbox"/> Incision that is not healing</li> <li><input type="checkbox"/> Red or swollen leg that is painful or warm to touch</li> <li><input type="checkbox"/> Temperature of 100.4°F or higher</li> <li><input type="checkbox"/> Headache that does not get better, even after taking medicine, or bad headache with vision changes</li> </ul>

**Trust your instincts.**  
ALWAYS get medical care if you are not feeling well or have questions or concerns.

**Tell 911 or your healthcare provider:**

"I had a baby on \_\_\_\_\_ and  
I am having \_\_\_\_\_"  
(Date) (Specific warning sign)

These post-birth warning signs can become life-threatening if you don't receive medical care right away because:

- Pain in chest, obstructed breathing or shortness of breath (trouble catching your breath) may mean you have a blood clot in your lung or a heart problem
- Seizures may mean you have a condition called eclampsia
- Thoughts or feelings of wanting to hurt yourself or your baby may mean you have postpartum depression
- Bleeding (heavy), soaking more than one pad in an hour or passing an egg-sized clot or bigger may mean you have an obstetric hemorrhage
- Incision that is not healing, increased redness or any pus from episiotomy or C-section site may mean you have an infection
- Redness, swelling, warmth, or pain in the calf area of your leg may mean you have a blood clot
- Temperature of 100.4°F or higher, bad smelling vaginal blood or discharge may mean you have an infection
- Headache (very painful), vision changes, or pain in the upper right area of your belly may mean you have high blood pressure or post birth preeclampsia

**GET HELP** My Healthcare Provider/Clinic: \_\_\_\_\_ Phone Number: \_\_\_\_\_  
Hospital Closest To Me: \_\_\_\_\_



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# Early Recognition is Key to Successful Treatment

- ✓ Prevention is key
- ✓ Sepsis may be difficult to identify early in pregnant women, particularly those in labor (symptoms may be similar)
  - ✓ Training and simulation
  - ✓ Strong interdisciplinary teamwork
- ✓ Communication strategies, such as Code Sepsis OB



# Making Health Care Safer

Think sepsis. Time matters.

**Vital**<sup>CDC</sup>signs™



## Lauren Epstein, MD MSc

Medical Officer, Epidemiology Research And Innovations Branch  
Division of Healthcare Quality Promotion

# CDC Vital Signs Report

AUGUST 2016

## Vital signs

### Making Health Care Safer

Think sepsis. Time matters.

Sepsis is a complication caused by the body's overwhelming and life-threatening response to infection. It can lead to tissue damage, organ failure, and death. Sepsis is difficult to diagnose. It happens quickly and can be confused with other conditions early on. Sepsis is a medical emergency. Time matters. When sepsis is quickly recognized and treated, lives are saved. Healthcare providers are the critical link to preventing, recognizing, and treating sepsis.

**80%**  
Sepsis begins outside of the hospital for nearly 80% of patients.

**7 in 10**  
A CDC evaluation found 7 in 10 patients with sepsis had recently used health care services or had chronic diseases requiring frequent medical care.

**4**  
Four types of infections are most often associated with sepsis: lung, urinary tract, skin, and gut.

**Healthcare providers can:**

- Prevent infections.** Follow infection control requirements (e.g., hand hygiene) and ensure patients receive recommended vaccines (e.g., flu and pneumococcal).
- Educate patients and their families.** Stress the need to prevent infections, manage chronic conditions, and seek care if signs of severe infection or sepsis are present.
- Think sepsis.** Know sepsis signs and symptoms to identify and treat patients early.
- Act fast.** If sepsis is suspected, order tests to determine if an infection is present, where it is, and what caused it. Start antibiotics and other medical care immediately. Document antibiotic dose, duration, and purpose.
- Reassess patient management.** Check patient progress frequently. Reassess antibiotic therapy 24-48 hours or sooner to change therapy as needed. Be sure the antibiotic type, dose, and duration are correct.

Want to learn more? [www.cdc.gov/vitalsigns/sepsis](http://www.cdc.gov/vitalsigns/sepsis)



Centers for Disease Control and Prevention  
National Center for Emerging and Zoonotic Infectious Diseases

## Prevent sepsis and improve early recognition.

### Improve health conditions.

George is a 72-year-old man with diabetes. During his check-up, George's healthcare provider takes the opportunity to strengthen his chronic disease care (glucose control and skin care), provide recommended vaccines, and share information about symptoms that indicate an infection is worsening or sepsis is developing.



### Educate patients and their families.

One month later, George has a cut on his foot that might be infected. He calls his healthcare provider, who tells him how to take care of the cut and signs of infection. Two days later, his foot is worse and he becomes short of breath, his clammy skin, and is more tired than usual. He recognizes symptoms are worsening and it could be sepsis. He seeks medical attention immediately.



### Think sepsis. Act fast.

At the hospital, a healthcare provider recognizes the signs and symptoms of sepsis. She immediately orders tests to determine the source of infection and starts appropriate treatment, including antibiotics. She documents the dose, duration, and purpose of antibiotics.



### Reassess patient management.

Healthcare providers closely monitor George's progress and adjust therapy as needed. When George improves his providers transfer him to a rehabilitation facility to continue his recovery. The hospital care team discusses his treatment plan with the team at the new facility.



SOURCE: CDC Vital Signs, August 2016.

## Problem:

Sepsis is deadly when it's not quickly recognized and treated.



Certain people with an infection are more likely to get sepsis.

- CDC evaluation found more than 90% of adults and 70% of children who developed sepsis had a health condition that may have put them at risk.
- Sepsis occurs most often in people 65 years or older or younger than 1 year, with weakened immune systems, or with chronic medical conditions (e.g., diabetes).
- While less common, even healthy infants, children, and adults can develop sepsis from an infection, especially when not treated properly.

Certain infections and germs lead to sepsis most often.\*

- Four types of infections are often associated with sepsis: lung, urinary tract, skin, and gut.
- Common germs that can cause sepsis are *Staphylococcus aureus*, *Escherichia coli* (E. coli), and some types of *Streptococcus*.

\*Among patients in the evaluation with an identified source of infection; however, infectious source cannot be identified in many patients.

## Healthcare providers are key to preventing infections and illnesses that can lead to sepsis.

**EDUCATE** patients and their families about the early symptoms of severe infection and sepsis, and when to seek care for an infection, especially those at higher risk.

**REMNIND** patients that taking care of chronic illnesses helps prevent infections.

**ENCOURAGE** infection prevention measures, such as hand hygiene and vaccination against infections.

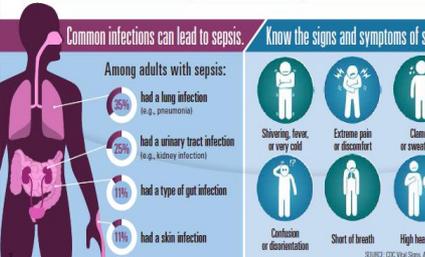
### Common infections can lead to sepsis.

Among adults with sepsis:

- 55% had a lung infection (e.g., pneumonia)
- 20% had a urinary tract infection (e.g., kidney infection)
- 11% had a type of gut infection
- 11% had a skin infection

### Know the signs and symptoms of sepsis.

- Shivering, fever, or very cold
- Extreme pain or discomfort
- Clammy or sweaty skin
- Confusion or disorientation
- Short of breath
- High heart rate



SOURCE: CDC Vital Signs, August 2016.

## What Can Be Done?

### The Federal government is

- Working with partners to promote and align public health efforts, including: infection prevention, vaccinations, chronic disease management, appropriate antibiotic use, and sepsis prevention and early recognition.
- Investigating causes of sepsis to identify new prevention strategies and at-risk populations.
- Supporting development of new sepsis tests and treatments.
- Developing more accurate tracking methods to evaluate progress in preventing and treating patients with sepsis.

### Healthcare providers can

- Prevent infections.** Follow infection control requirements (e.g., hand hygiene) and ensure patients receive recommended vaccines (e.g., flu and pneumococcal).
- Educate patients and their families.** Stress the need to prevent infections, manage chronic conditions, and seek care if signs of severe infection or sepsis are present.
- Think sepsis.** Know sepsis signs and symptoms to identify and treat patients early.
- Act fast.** If sepsis is suspected, order tests to determine if an infection is present, where it is, and what caused it. Start antibiotics and other medical care immediately. Document antibiotic dose, duration, and purpose.
- Reassess patient management.** Check patient progress frequently. Reassess antibiotic therapy 24-48 hours or sooner to change therapy as needed. Be sure the antibiotic type, dose, and duration are correct.

### Health care facility CEOs/administrators can

- Make infection control a priority. Ensure a strong link between infection control and prevention, sepsis early recognition, and appropriate antibiotic use programs.
- Train healthcare providers and front-line staff to quickly recognize and treat sepsis.
- Collaborate with health departments and other health care facilities within your area to improve infection control.

### State and local health departments can

- Promote sepsis prevention and early recognition, vaccination, chronic disease management, and infection prevention in health care facilities and community settings.
- Review actions other states and organizations have taken to improve sepsis early recognition and treatment. <http://jgim.sagepub.com>

### Patients and their families can

- Learn sepsis signs and symptoms. Know if you are at higher risk. If sepsis is suspected, get immediate medical attention. Ask, "Could it be sepsis?"
- Talk to a healthcare provider about managing chronic conditions and getting vaccines.
- Practice good hygiene, such as handwashing.

1-800-CDC-INFO (232-4636)  
TTY: 1-888-232-6348  
[www.cdc.gov](http://www.cdc.gov)

Centers for Disease Control and Prevention  
1600 Clifton Road, NE, Atlanta, GA 30333  
Publication date: 08/23/2016



COMBIA

# Vital Signs: Epidemiology of Sepsis: Prevalence of Health Care Factors and Opportunities for Prevention

Shannon A. Novosad, MD<sup>1,2</sup>; Mathew R.P. Sapiano, PhD<sup>2</sup>; Cheri Grigg, DVM<sup>1,2</sup>; Jason Lake, MD<sup>1,2</sup>; Misha Robyn, DVM<sup>1,4</sup>; Ghinwa Dumyati, MD<sup>3</sup>; Christina Felsen, MPH<sup>3</sup>; Debra Blog, MD<sup>4</sup>; Elizabeth Dufort, MD<sup>4</sup>; Shelley Zansky, PhD<sup>4</sup>; Kathryn Wiedeman, MPH<sup>2</sup>; Lacey Avery, MA<sup>2</sup>; Raymund B. Dantes, MD<sup>2</sup>; John A. Jernigan, MD<sup>2</sup>; Shelley S. Magill, MD<sup>2</sup>; Anthony Fiore, MD<sup>2</sup>; Lauren Epstein, MD<sup>2</sup>

*On August 23, 2016, this report was posted as an MMWR Early Release on the MMWR website (<http://www.cdc.gov/mmwr>).*

## Abstract

**Background:** Sepsis is a serious and often fatal clinical syndrome, resulting from infection. Information on patient demographics, risk factors, and infections leading to sepsis is needed to integrate comprehensive sepsis prevention, early recognition, and treatment strategies.

**Methods:** To describe characteristics of patients with sepsis, CDC and partners conducted a retrospective chart review in four New York hospitals. Random samples of medical records from adult and pediatric patients with administrative codes for severe sepsis or septic shock were reviewed.

**Results:** Medical records of 246 adults and 79 children (aged birth to 17 years) were reviewed. Overall, 72% of patients had a health care factor during the 30 days before sepsis admission or a selected chronic condition likely to require frequent medical care. Pneumonia was the most common infection leading to sepsis. The most common pathogens isolated from blood cultures were *Escherichia coli* in adults aged  $\geq 18$  years, *Klebsiella* spp. in children aged  $\geq 1$  year, and *Enterococcus* spp. in infants aged  $< 1$  year; for 106 (33%) patients, no pathogen was isolated. Eighty-two (25%) patients with sepsis died, including 65 (26%) adults and 17 (22%) infants and children.

**Conclusions:** Infection prevention strategies (e.g., vaccination, reducing transmission of pathogens in health care environments, and appropriate management of chronic diseases) are likely to have a substantial impact on reducing sepsis. CDC, in partnership with organizations representing clinicians, patients, and other stakeholders, is launching a comprehensive campaign to demonstrate that prevention of infections that cause sepsis, and early recognition of sepsis, are integral to overall patient safety.

# CDC *Vital Signs* Report

- Sepsis **most often occurs** in people:
  - Over the age of 65, or infants less than one year of age.
  - With chronic diseases (such as diabetes) or weakened immune systems.
- Sepsis is most often associated with **infections of the lung, urinary tract, skin, or gut.**
- Common pathogens that cause sepsis are *Staphylococcus aureus*, *E. coli*, and some types of *Streptococcus*.
- Even **healthy infants, children and adults can develop sepsis** from an infection, especially if it is not treated properly.

## **CDC *Vital Signs* Report**

- Sepsis begins outside of the hospital for **nearly 80% of patients.**
- **7 in 10 patients** with sepsis had recently interacted with healthcare providers or had chronic diseases requiring frequent medical care.
- *Vital Signs* report demonstrates that there are opportunities to better prevent infections and recognize sepsis early to save lives.

# What Can Healthcare Providers do?

## Sepsis Prevention

Healthcare providers are key to preventing infections and illnesses that can lead to sepsis.

**EDUCATE** patients and their families about the early symptoms of severe infection and sepsis, and when to seek care for an infection, especially those at higher risk.

**REMIND** patients that taking care of chronic illnesses helps prevent infections.

**ENCOURAGE** infection prevention measures, such as hand hygiene and vaccination against infections.

## Sepsis Recognition and Treatment

- **Think sepsis** by knowing sepsis signs and symptoms to identify and treat patients early.
- **Act fast** if sepsis is suspected.
- **Reassess** patient management and antibiotic therapy.

Know the signs and symptoms of sepsis.

Shivering, fever, or very cold

Extreme pain or discomfort

Clammy or sweaty skin

Confusion or disorientation

Short of breath

High heart rate

If suspected, get medical care immediately.

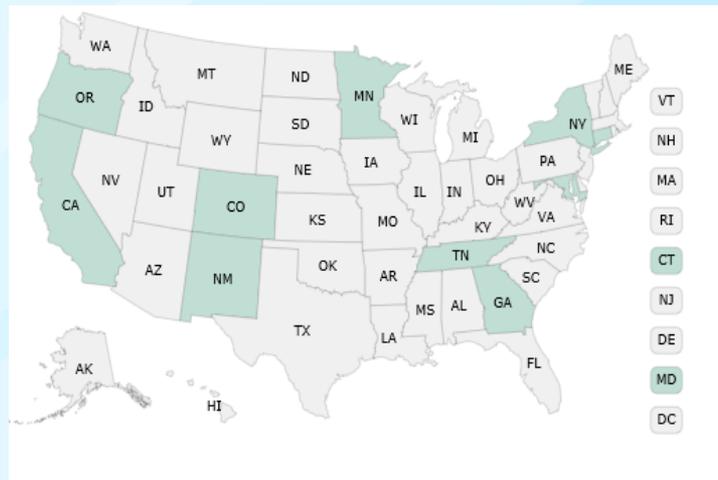
SOURCE: CDC Vital Signs, August 2016 #VitalSigns

**VitalSigns**<sup>™</sup>  
<http://www.cdc.gov/vitalsigns/sepsis>



# Next Steps

- Expanding the project to 10 sites throughout the US using CDC's Emerging Infections Program Network.
  - Data collection is currently underway.
  - Further characterize underlying characteristics of patients with sepsis and septic shock.



# Next Steps

- A national sepsis educational effort to improve sepsis prevention, early suspicion/recognition, and timely treatment.
- **Launch: Fall 2017**
- Anticipated outcomes:
  - Increase awareness of sepsis and importance of infection prevention.
  - Increase awareness of need for rapid recognition and prompt treatment.

# Thank You

<https://www.cdc.gov/vitalsigns/sepsis/index.html>

**Lauren Epstein, MD MSc**

Medical Officer, Epidemiology Research and Innovations Branch

Division of Healthcare Quality Promotion

Email: [xdd0@cdc.gov](mailto:xdd0@cdc.gov)

**For more information, please contact Centers for Disease Control and Prevention**

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Visit: [www.cdc.gov](http://www.cdc.gov) | Contact CDC at: 1-800-CDC-INFO or [www.cdc.gov/info](http://www.cdc.gov/info)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.



## Featured Speakers

### **Katarina Lanner-Cusin, MD**

**Medical Director Women's Services, Sutter Health,  
Alta Bates Summit Medical Center, Berkeley,  
California**



### **Lori Olvera, DNP, RNC-OB, EFM-C**

**Bedside Nurse, Anderson Lucchetti Women's and  
Children Hospital; Sutter Health**



# EARLY RECOGNITION OF MATERNAL SEPSIS

Presented by:

Dr. Katarina Lannér-Cusin

Lori Olvera DNP, RNC-OB, EFM-C

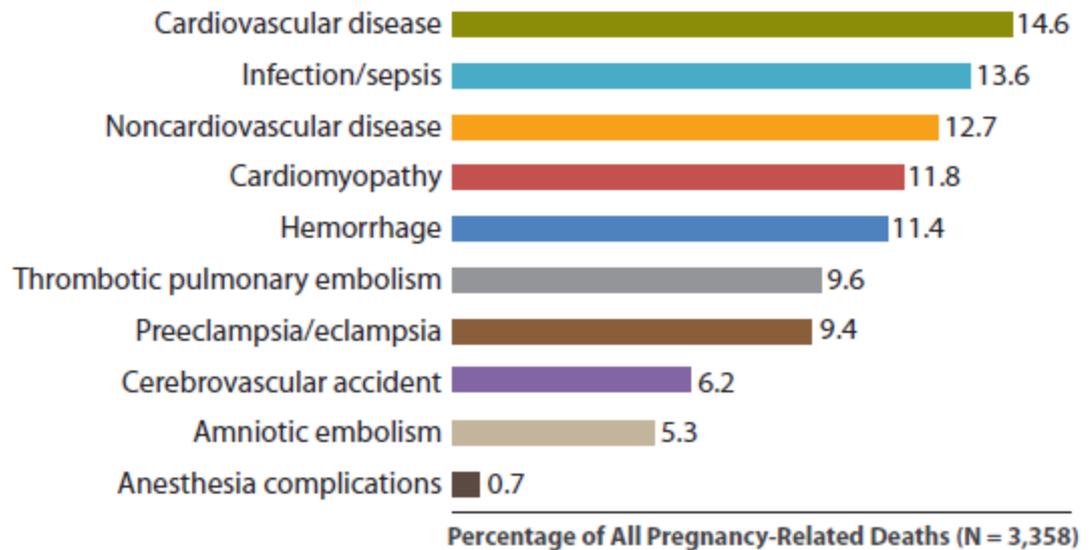
# Objectives

1. Effectively implement the OB Sepsis Screen in the perinatal population using adjusted parameters for Systemic Inflammatory Response (SIR)
2. Identify the importance of implementing protocols for early recognition and management of perinatal sepsis
3. Identify the barriers to implementation of sepsis bundles in early recognition and management of perinatal sepsis and how to overcome them

# History of Sepsis and the Perinatal Population

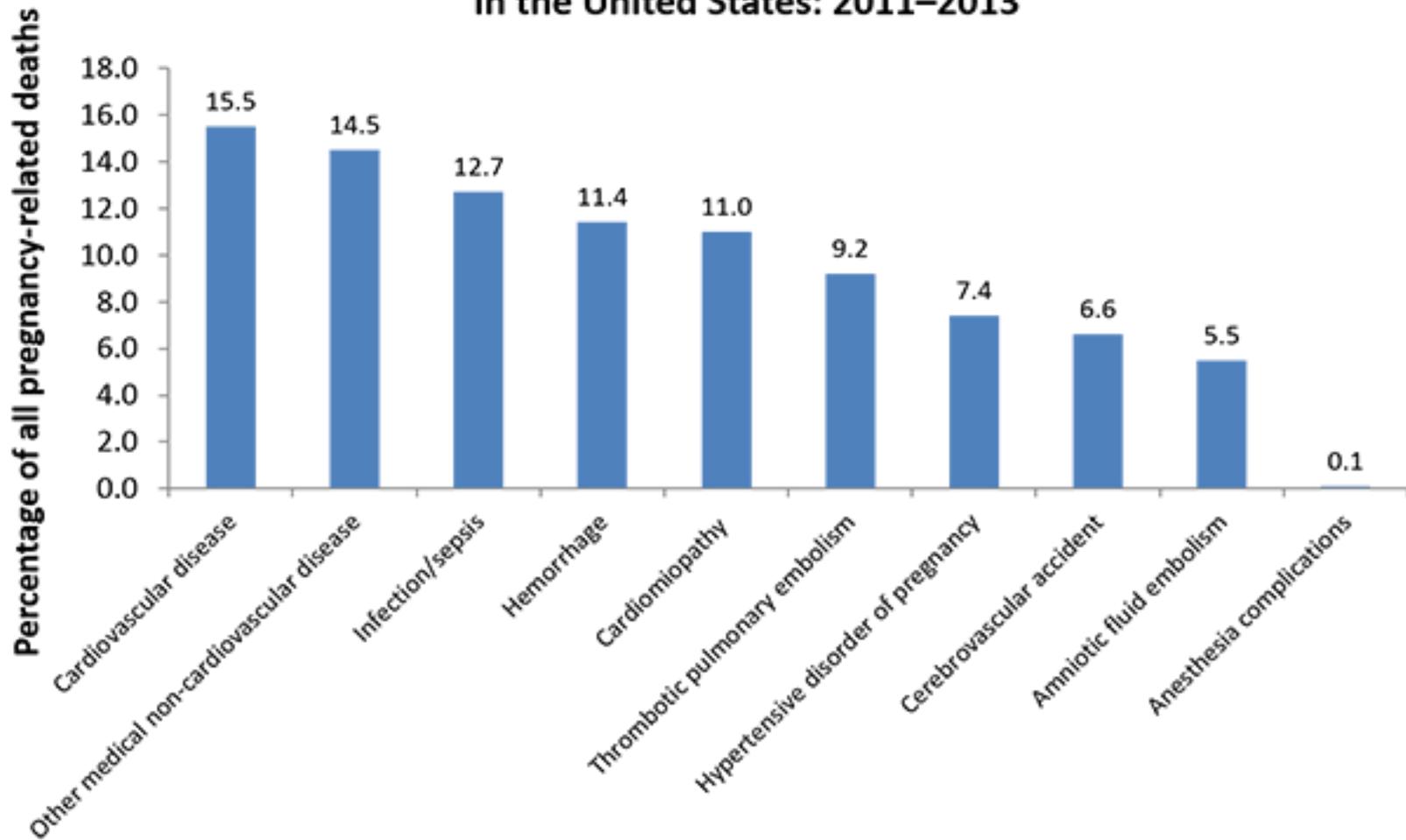
- ✓ 2001 Rivers Study
- ✓ 2004 Sepsis Guidelines
- ✓ The Perinatal Population
- ✓ CMS Measure

Causes of Pregnancy-Related Death In the United States, 2006-2010

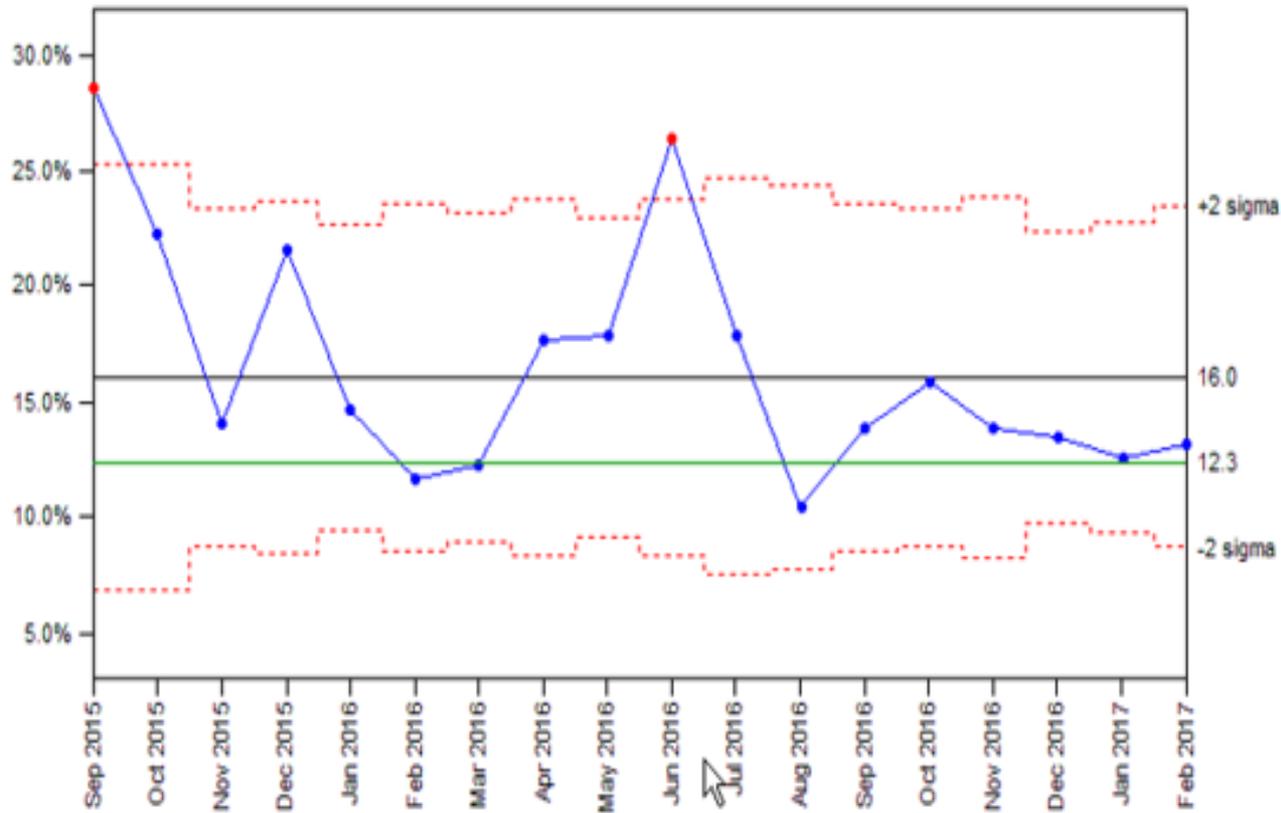


Notes: The cause of death is unknown for 4.7% of all pregnancy-related deaths. "Noncardiovascular disease" refers to endocrine, hematologic, immunologic, and renal conditions.

## Causes of pregnancy-related death in the United States: 2011–2013



# Severe Sepsis and Septic Shock Adult population Sutter Sacramento Implementation of Sepsis Screening



# Pregnancy and Sepsis

## Incidence:

- Septic Shock is rare in pregnancy 0.002-0.01%
  - Of all septic patients, 0.3-0.6% are pregnant
- Overall increase in severe sepsis and septic shock due to changes in demographics of pregnant women:
  - Advanced maternal age
  - Obesity
  - Diabetes
  - Placental abruption
  - Placental abnormalities
  - Assisted Reproductive Technology (ART)
  - Emerging Infections Diseases

Barton & Sibai (2012). Severe Sepsis & Septic Shock in Pregnancy. *Obstetrics & Gynecology*

## Pregnant Patients need to be included in our Sepsis Protocols!

**“Pregnancies complicated by severe sepsis and septic shock are associated with increased rates of preterm labor, fetal infection, and preterm delivery. Sepsis onset in pregnancy can be insidious and patients may appear deceptively well before rapidly deteriorating with the development of severe shock, multiple organ dysfunction syndrome, or death. The outcome and survivability in severe sepsis and septic shock in pregnancy are improved with early detection, prompt recognition of the source of infection, and targeted therapy”**

Barton & Sibai (2012). Severe Sepsis & Septic Shock in Pregnancy. *Obstetrics & Gynecology*



# What does the literature say.....



- Sepsis is one of the top four causes of maternal mortality
- Pregnant women are more vulnerable to infection and susceptible to serious complications
- Screening protocols are needed for early recognition and management of maternal sepsis
- All perinatal staff must be trained on early recognition and management of maternal sepsis

Acosta, Kurinczuk, Lucas, Tufnell, Sellers & Knight (2014). Severe maternal sepsis in the U.K., 2011-2012: A national case-control study.

# Why do we need Protocols for Early Recognition?

- **Early recognition and treatment of maternal sepsis will improve survival, decrease length of stay, and length of stay in the ICU**
- **Delay in diagnosis and treatment of sepsis has been shown to increase mortality**

Barton & Sibai (2012). Severe Sepsis & Septic Shock in Pregnancy. *Obstetrics & Gynecology*

# The Sutter Health Sepsis Initiative

## Perinatal Population

### Goal:

**Reduce morbidity and mortality from severe sepsis and septic shock**

### Strategies:

- **Early recognition and treatment**
- **Prevent mother and baby harm: A chance to alter outcome**
- **Use of Standard Work**-An approach adopted from manufacturing to healthcare to reduce
  - 1) variation in care (“I like 3 lactates in 4 hours”)
  - 2) errors of omission (“I forgot to order a repeat lactate”)

# What Can We Do?

**Improve recognition of sepsis in the Perinatal population**

**Adopt best practices**

**Provide recommended care**

## **BEST PRACTICES:**

- **Based on organizations with lowest sepsis mortality**
- **Protocol driven, early recognition, ICU level care**

# Code Sepsis in OB: Let's Intervene before it hits!

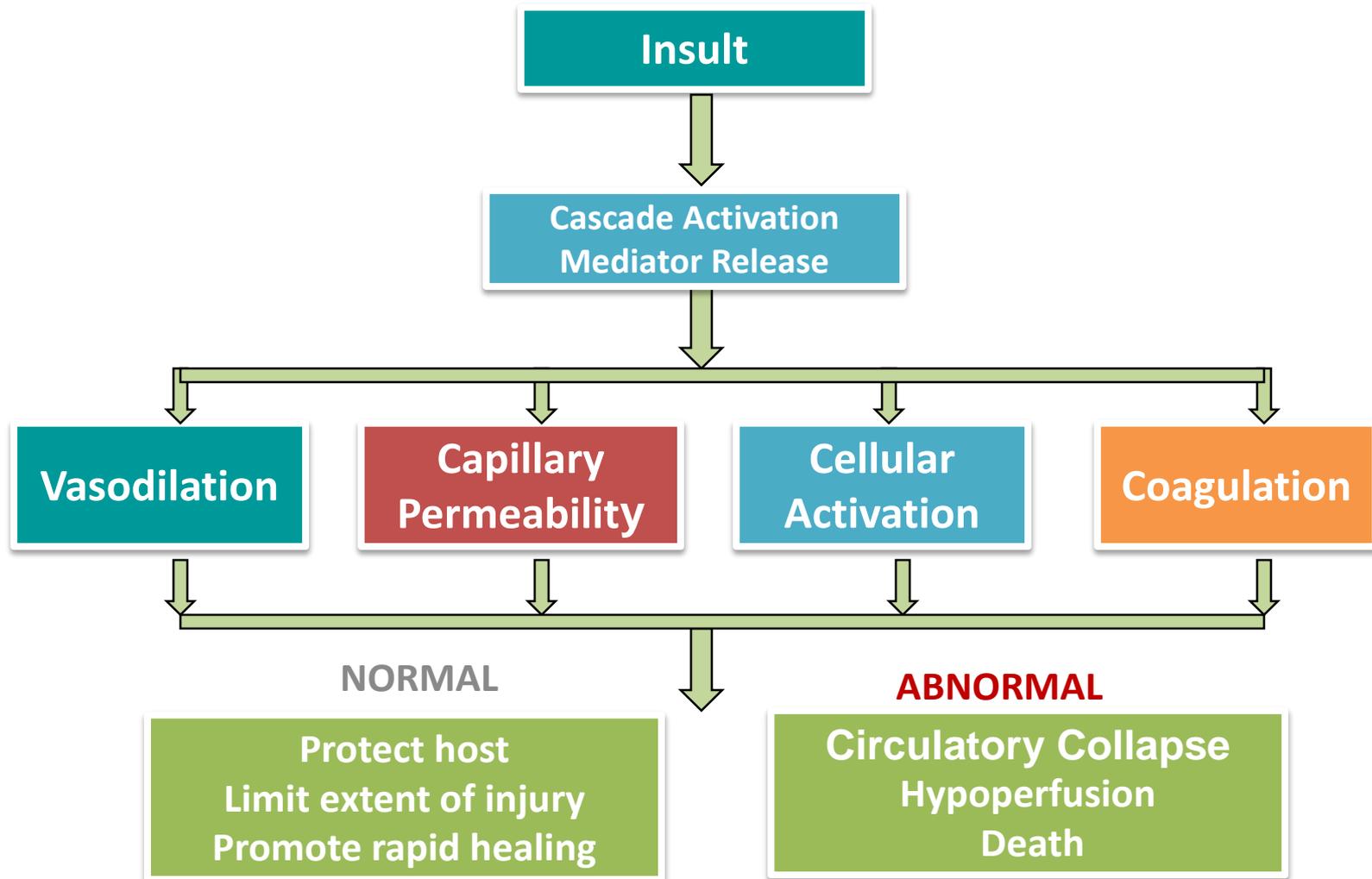


# Systemic Inflammatory Response

## Definition

A clinical manifestation resulting from an insult, infection, or trauma, that includes a body-wide activation of immune and inflammatory cascades

# Why SIRS can KILL in Sepsis\*



# Perinatal Parameters

**Because of the physiology of pregnancy, the screening criteria was adjusted for perinatal population**

- **Increase in blood volume increases maternal heart rate by 10-20 bpm**
- **Minute volume (RR x Tidal Volume) increases 50% due to an increase in respiratory rate and tidal volume**
- **The position of the diaphragm decreases lung volume and increases the respiratory rate**
- **Increase in WBC (leukocytosis) in labor and immediate postpartum**
- **Increase in perfusion to the kidneys causes a decrease in the creatinine level**

# SIRS CRITERIA Comparison



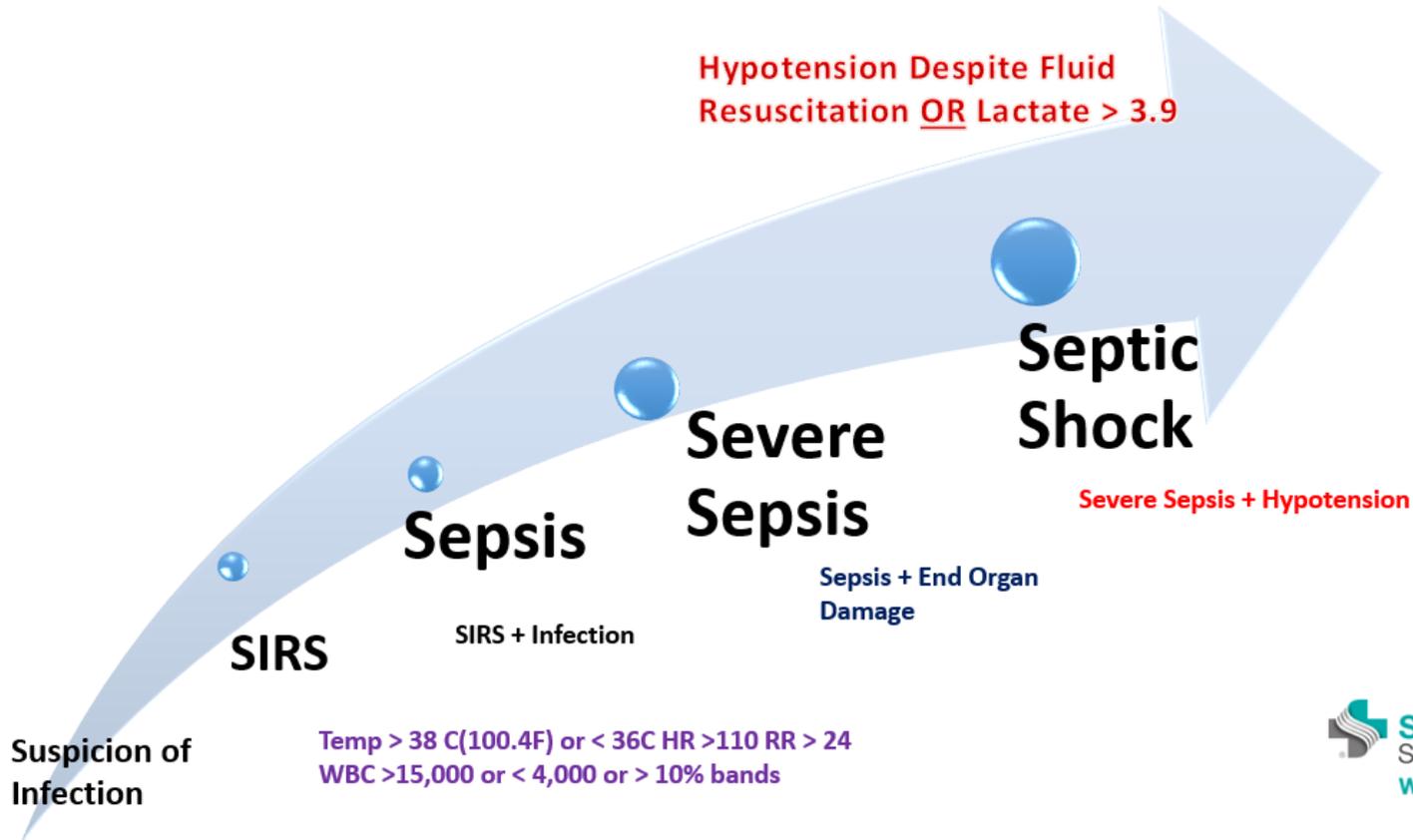
## Adult Screening Criteria

- Temp  $> 38^{\circ}\text{C}$  ( $100.4^{\circ}\text{F}$ ) or  $< 36^{\circ}\text{C}$  ( $96.8^{\circ}\text{F}$ )
- *HR  $> 90$  bpm*
- *Resp Rate  $> 20$  breaths/minute*
- WBC  $> 12,000$ ,  $< 4,000$  or  $> 10\%$  *immature neutrophils*
- Blood glucose  $> 140$  mg/dl in the absence of diabetes
- *New mental status change*

## Perinatal Screening Criteria

- Temp  $> 38^{\circ}\text{C}$  ( $100.4^{\circ}\text{F}$ ) or  $< 36^{\circ}\text{C}$  ( $96.8^{\circ}\text{F}$ )
- *HR  $> 110$  bpm*
- *Resp Rate  $> 24$  breaths/minute*
- *WBC  $> 15,000$  or  $< 4,000$  or  $> 10\%$  immature neutrophils*
- Blood glucose  $> 140$  mg/dl in absence of diabetes
- *Mental status change*

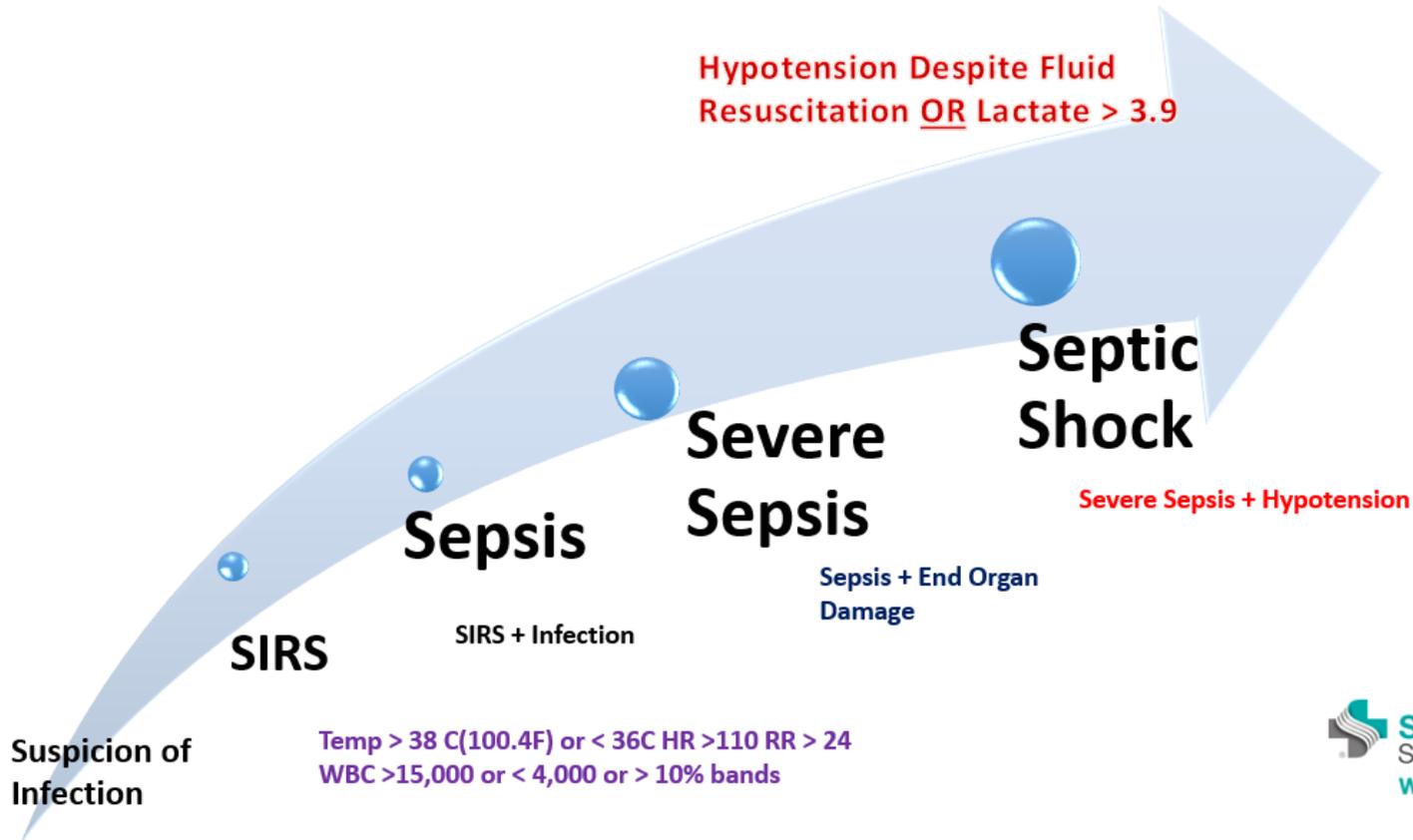
# Sepsis Syndrome



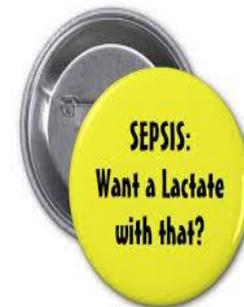
# COMMUNITY STANDARD FOR ADJUSTING SIRS CRITERIA

	Sutter Health	Dignity	ACOG
Temperature	>38/100.4 or < 36/96.8F	> 38/100.4F or <36/96.8F	>38/100.4 or < 36/96.8F
FHR		>160 BPM	
Maternal Heart Rate	> 110 bpm	>110 bpm	> 110 bpm
Respiratory Rate	> 24 breaths per min	>24 breaths per min	> 24 breaths per min
White Blood Cell Count	> 15,000 < 4,000 10% Bands	>15,000 <4,000 10% Bands	No recommended value
Altered Mental Status	AMS present	AMS present	AMS present
Glucose	>140 in absence of DM	>140 in absence of DM	No recommended value

# Sepsis Syndrome

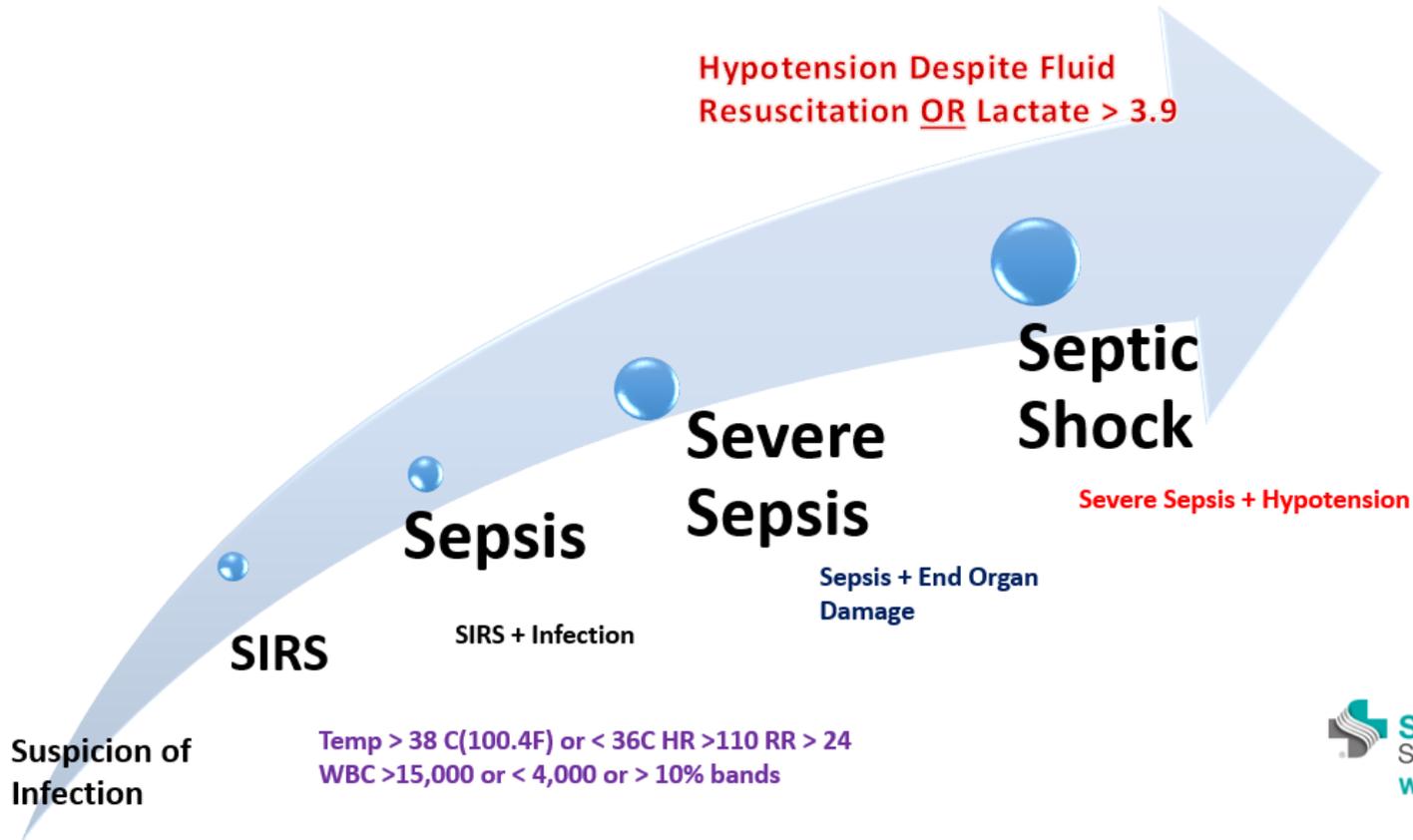


# Organ Dysfunction



	<u>Surviving Sepsis Campaign</u>	<u>Sutter Health Parameters</u>
<b>Respiratory</b>	<b>Respiratory: ↑ O2 requirements to maintain SpO2 &gt;90% or PaO2/FiO2 ratio &lt;300</b>	<b>SpO2 &lt;92%</b>
<b>Urine Output</b>	<b>Low Urine Output &lt;0.5 ml/kg/hr. &gt;2 hours</b>	<b>≤30 ml/hour for 2 hours</b>
<b>Creatinine</b>	<b>Creatinine &gt;2.0 mg/dl</b>	<b>Creatinine &gt;1.5 mg/dl</b>
<b>Altered Mental Status</b>	<b>Altered Mental Status</b>	<b>Altered Mental Status</b>
<b>Blood Pressure MAP</b>	<b>SBP &lt; 90mmHg or 40mmHg below the base line or MAP &lt;65 mmHg</b>	<b>SBP &lt;90mmHg or 40mmHg below the base line or MAP &lt;65 mmHg</b>
<b>Platelets</b>	<b>Platelet &lt;100,000</b>	<b>Platelet count &lt;100,000</b>
<b>Lactate</b>	<b>Lactate &gt;2</b>	<b>Lactate &gt;2</b>
<b>Bilirubin</b>	<b>Bilirubin &gt;2 mg/dl</b>	<b>Bilirubin &gt;2 mg/dl</b>
<b>Coagulopathy</b>	<b>Coagulopathy (INR &gt;1.5 or PTT &gt;60 secs)</b>	<b>Coagulopathy (INR &gt;1.5 or PTT &gt;60 secs)</b>

# Sepsis Syndrome



# Dismissing Abnormal SIRS as a Decoy

1. Abnormal SIRS criteria are often seen and disregarded in postpartum states
2. **Fever** due to elevated metabolic demand
3. **Tachycardia** due to relative hypovolemia
4. **Leukocytosis** due to stress of delivery
5. Even mild *hypotension* can be dismissed in the possibly **hypovolemic**, young woman with physiologically low blood pressure





**How did we implement early recognition as part of our standard work?**

# Implementation of Standard Workflow

- ❖ **A Multidisciplinary Team**
- ❖ **Physician Education First**
- ❖ **Inter-professional Education**
- ❖ **A new perinatal sepsis physician order set**
- ❖ **Physician & RN Champions**



# Perinatal Sepsis Standard Work

**Initiate Sepsis screening every shift (Nursing Staff)**

**Create Protocols with SIRS criteria for Maternal Sepsis**

**Early intervention implemented for all patients who screen positive**

**Arrival of Rapid Response Team, intensivist evaluation as needed**

**OB physician notification**

# Standard Work



## Standard Work Instruction Sheets Sepsis: Perinatal Area

Who must adopt this process: PBX Operator, RRT Team (RRT RN & RCP), OB MD, OB RN, OB Charge nurse, Intensivist, Lab, Pharmacy
Goal: Utilizing evidence based practice, standard work flow and intra/inter-dept collaboration to achieve early identification of septic patient and on-time completion of sepsis/severe sepsis and septic shock bundles

STEP NO.	OPERATOR	TASK DESCRIPTION	TOOLS/ SUPPLIES REQUIRED
1	OB RN	<ul style="list-style-type: none"> <li>Take vitals per order and record in EHR</li> </ul>	<ul style="list-style-type: none"> <li>EHR</li> </ul>
	OB RN	<ul style="list-style-type: none"> <li><b>Complete Sepsis Screen for the following:</b> <ul style="list-style-type: none"> <li>On Admission/OB Triage</li> <li>Perform Shift Assessment and document screening                             <ul style="list-style-type: none"> <li>L&amp;D/AP-Within 2 hrs of shift start</li> <li>Postpartum-Within 4 hrs of shift start</li> </ul> </li> <li>BPA fire</li> <li>Change in patient condition (change vital signs, new SIRS criteria, new organ dysfunction including altered mental status, new S/Sx, lab test)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>EHR Sepsis Summary</li> </ul>
2 <i>Positive Sepsis Screen/Sepsis Alert</i>	OB RN	<ul style="list-style-type: none"> <li><b>Screen positive</b> for Sepsis/Severe Sepsis (i.e. criteria 1+2 or 1+2+3 or 1+3)                             <ol style="list-style-type: none"> <li>Suspected infection</li> <li>2 or more signs of SIRS</li> <li>New sign of organ dysfunction</li> </ol> </li> <li>OB RN call PBX operator; Operator page RRT RN and RT (Activate Sepsis Alert)</li> <li>Call OB Charge nurse</li> <li>RRT arrives at bedside (ICU RN/Resp Therapy)</li> </ul>	<ul style="list-style-type: none"> <li>EHR Sepsis Summary</li> </ul>
3	OB RN	<ul style="list-style-type: none"> <li><b>OB RN Give report to RRT Nurse</b>                              S = New positive sepsis screen with or without hypotension                              B = Name of patient, age, admit dx, hospital day number, hx, code status                              A = Vital signs, level of consciousness (LOC), labs, physical symptoms                              R = Recommend to validate positive sepsis screen</li> </ul>	
	RRT RN	<ul style="list-style-type: none"> <li><b>RRT RN performs the following</b></li> </ul>	<ul style="list-style-type: none"> <li>EHR Sepsis</li> </ul>

# Sepsis Alert

Infection  
+ Sepsis  
Screen



Call Sepsis  
Alert



## Rapid Response Team at Bedside

- Lab tests: CBC, CMP, lactate, blood culture
- Broad spectrum antibiotics
- IVF (30ml/kg), if hypotensive
- Radiology and Pharmacy on alert
- Notify OB, ICU physician



SEVERE  
SEPSIS  
Bundle



- Rapid Response Team at Bedside
- Broad spectrum antibiotics, if not already administered
  - IV Fluids 30ml/kg for Lactate 2 – 3.9
  - Repeat lactate every 3 hours until lactate < 2
  - Urinary catheter for Strict I&O
  - SpO2 and oxygen per protocol

If SBP <90 or lactate >3.9



Code Sepsis  
6 Hour Bundle



ICU

# Code Sepsis 6 Hour Bundle

**RN  
Notifies  
OB-  
Physician**

**OB  
Physician  
assesses for  
criteria for  
septic shock**

**SEPTIC  
SHOCK  
Present**

**OB  
Physician  
notifies  
ICU  
Physician**

**Consult  
for ICU  
transfer**

**OB and ICU  
Physicians  
coordinate  
transfer**

**Patient to  
ICU**

# **Sutter Health Maternal Sepsis**

**The impact of implementation at Sutter Medical  
Center Sacramento and Central Valley Sutter Health**



# The Source of Infection in Perinatal Patients Diagnosed with *Sepsis* during Pregnancy Sutter Medical Center Sacramento April 2014-January 2015

	Frequency (N=99)	Percent
Chorioamnionitis	45	46.4 %
Pyelonephritis	14	14.4 %
Endometritis	5	5.2 %
Urinary Tract Infection	5	5.2 %
Unknown	29	29 %

# Sepsis, Severe Sepsis and Septic Shock

## Sutter Medical Center Sacramento

April 2014-January 2015

	Observation		Observation
Sepsis Screen Positive	0.024% 99/4000	→	Screen Positive, confirmed 98% 97/99
Severe Sepsis	0.012% 47/4000	→	Severe Sepsis Screen Positive 48.5% 47/97
Septic Shock	0.002% 7/4000	→	Septic Shock Screen Positive 7.2% 7/97

# Addressing the Barriers



**Our patients are young and healthy, did not look septic**

**The bundles would result in over-treatment**

**Risk of Pulmonary of Edema**

**Women with epidurals have fevers**

**Lactate is normally elevated in the laboring woman**

**No Sepsis Screening during second stage of labor**

# Let's Begin the Campaign to promote Early Recognition and Management of Maternal Sepsis



Think  
**Sepsis.**  
Save a  
**Life.**

# Any Questions?

Think  
**Sepsis.**  
Save a  
**Life.**

# References

- Acosta, C. Kurinczuk, J. Lucas, Nuala, D.L., Tuffnell, D. Sellers, S. Knight, M. (2014). Severe maternal sepsis in the U.K., 2011-2012: A national case- control study. *Plos Medicine*, 11(7), 1-15.
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- CDC (2017). Retrieved from <https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pmss.html>
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## **Question and Answer Session**

**Please submit your questions via the chat window, located on the lower left-hand side of the webinar screen.**

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  - [www.cdc.gov/tceonline](http://www.cdc.gov/tceonline); Access Code: **WC0517**
  - If you are listening to this webinar as a recording, please check the Tune in to Safe Healthcare webinar page for instructions for claiming continuing education.
- If you exit out of the webinar prior to taking the post-test and evaluation, you can access the continuing education information in an email that will be sent to you following today's webinar.

**THANK YOU**