



**Indiana Patient
Safety Center**

of the Indiana Hospital Association

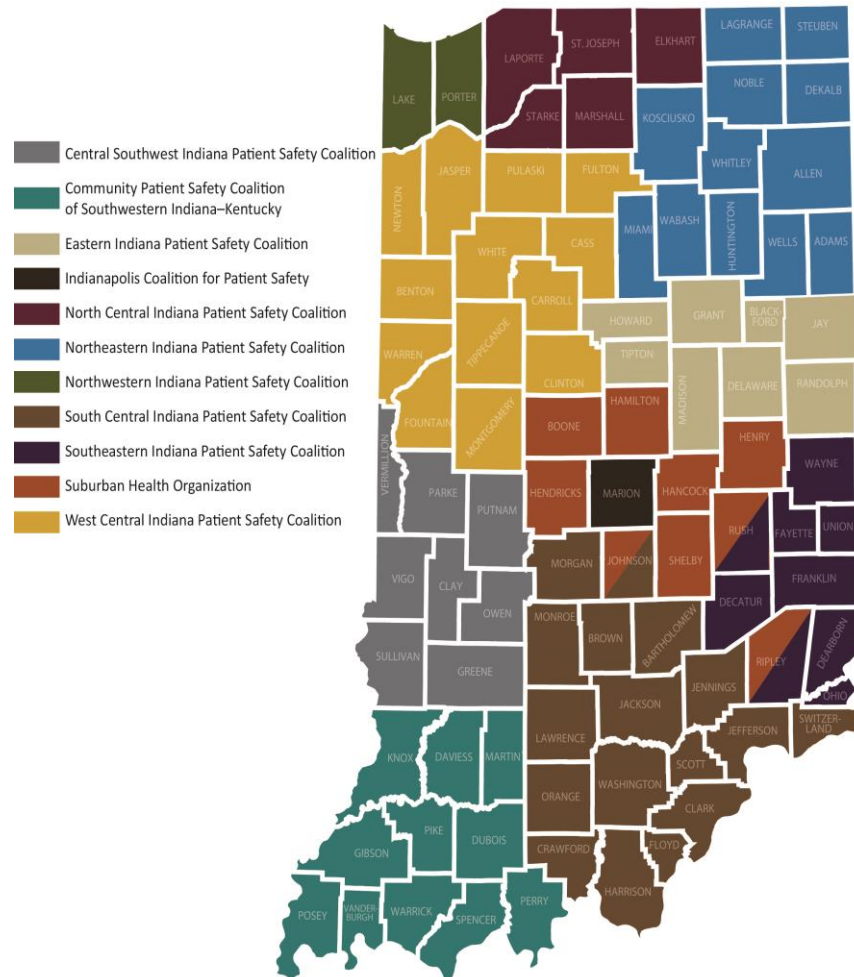
Sepsis Awareness Month:
Back & to the Future:
Maternal Sepsis

Brittany Waggoner, RN, MSN
IHA Maternal and Infant Quality Improvement Advisor

Sept. 22, 2022

IHAconnect.org/Quality-Patient-Safety

Our Mission



Advancing Health in Indiana

- Engage and inspire health care providers
- Create safe cultures
- Create reliable systems of care
- Prevent patient harm in Indiana

PREVENT PATIENT HARM

To create high reliability organizations who collaborate and engage in continuous improvement to achieve best in class outcomes

IMPROVE COMMUNITY HEALTH

To partner with communities and stakeholders to develop, plan, and coordinate initiatives that span the prevention and care continuum

INCREASE PATIENT AND FAMILY ENGAGEMENT

To engage patients and families in all aspects of their care and seek their input and inclusion in advisory capacities throughout organizations

LEAD A CULTURE OF SAFETY

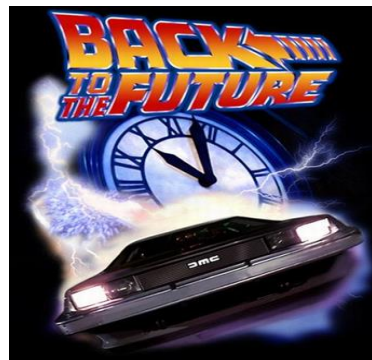
To create an environment of mutual trust, respect, and transparency among organizations, patients, and families

Sepsis: Back and to the Future

IHA 2022 Sepsis Awareness Month Webinars

1-Sept.	3 p.m. ET	Indiana Sepsis State of the State
8-Sept.	3 p.m. ET	Sepsis Pathophysiology & Bundle Compliance
★ 15-Sept.	3 p.m. ET	Sepsis Diagnostic Advances
22-Sept.	3 p.m. ET	Maternal Sepsis
29-Sept.	3 p.m. ET	Sepsis Fluid Management Advances
6-Oct.	3 p.m. ET	Personal Hygiene and Sepsis Prevention

Click on link to register for each webinar



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Sepsis Webinar Details

2022 IHA Clinical Webinar Series - 3 - 4 p.m. ET

Sepsis: Back & to the Future (Click link to register)

Sept. 1: [Indiana Sepsis 2022: Current State of the State and New Resources](#),

Rebecca Hancock PhD, RN, CNS, Patient Quality & Safety Advisor, IHA

Chris Newkirk, BSN, RN, CCM, Clinical Quality Advisor, Columbus Regional Health

Sept. 8: [Sepsis Back to Basics: Pathophysiology and Bundle Compliance](#),

Tom Ahrens, PhD, RN, FAAN

Sept. 15: [Sepsis Future: Advances in Sepsis Diagnostics](#),

Dr. Sandy Estrada, Pharm.D., Clinical Consultant

Sept. 22: [Sepsis Future: Focus on Maternal Sepsis](#),

Brittany Waggoner, Patient Safety & Quality Advisor, RN, MSN, CNS, IHA

Sept. 29: [Sepsis Future: Fluid Management](#)

Danielle Herr BSN, CCRN, Therapy Development Specialist

Vince Holly, MSN, RN, CCNS, ACNS-BC, CCRN, FCNS, Indiana University Health-Bloomington

Oct. 6: [Back to the Basics with Personal Hygiene for Infection Prevention](#)

Rebecca Hancock, Patient Quality & Safety Advisor, IHA

Annette Handy, Clinical Director, Patient Safety Center, IHA

September is Sepsis Awareness Month—SET YOUR HOSPITAL GOALS!

- Updated 2022 Sepsis Toolkit coming August
 - ✓ Updated Social Media messages—connect with your marketing department & share IHA posts
 - ✓ Send photos of sepsis/COVID-19 infection prevention activities with caption to Casey Hutchens, chutchens@ihaconnect.org
 - ✓ Patient & Caregiver Education QR Codes on table tents, & posters
 - ✓ Consider local mayoral proclamation for Sept 13, World Sepsis Day
 - ✓ Share “I am a Sepsis Champion” selfies on Sept 13 via social media
 - ✓ Updated data-based state sepsis goals
- September Webinars, Thursdays 3-4pm
Back & to the Future with Sepsis

www.survivesepsis.com



IHAconnect.org/Quality-Patient-Safety

Sepsis Patient Discharge Education (Updated)



English




Spanish



**SEE IT.
STOP IT.
SURVIVE IT.**

Sepsis Patient
and Family Education



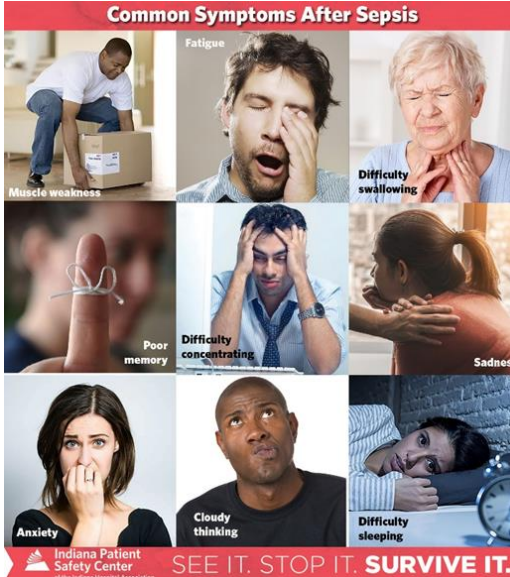
 **Indiana Patient Safety Center**
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www.survivesepsis.com










SEE IT. STOP IT. SURVIVE IT.
I am a sepsis survivor, what now?


What can I do to improve my recovery?

Caregiver Instructions for Patients Recovering from Sepsis



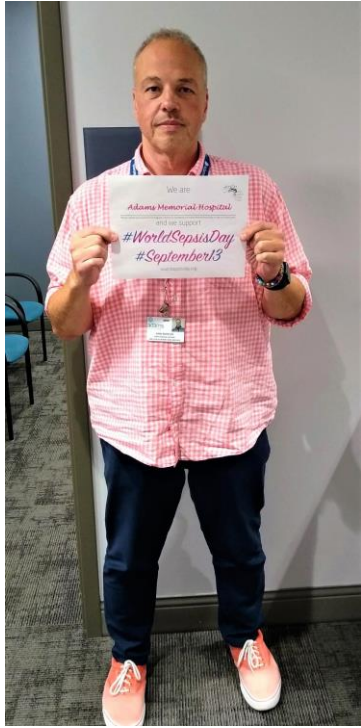
Common Symptoms After Sepsis

 Muscle weakness	 Fatigue	 Difficulty swallowing
 Poor memory	 Difficulty concentrating	 Sadness
 Anxiety	 Cloudy thinking	 Difficulty sleeping

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SEE IT. STOP IT. SURVIVE IT.

Adams Memorial Hospital



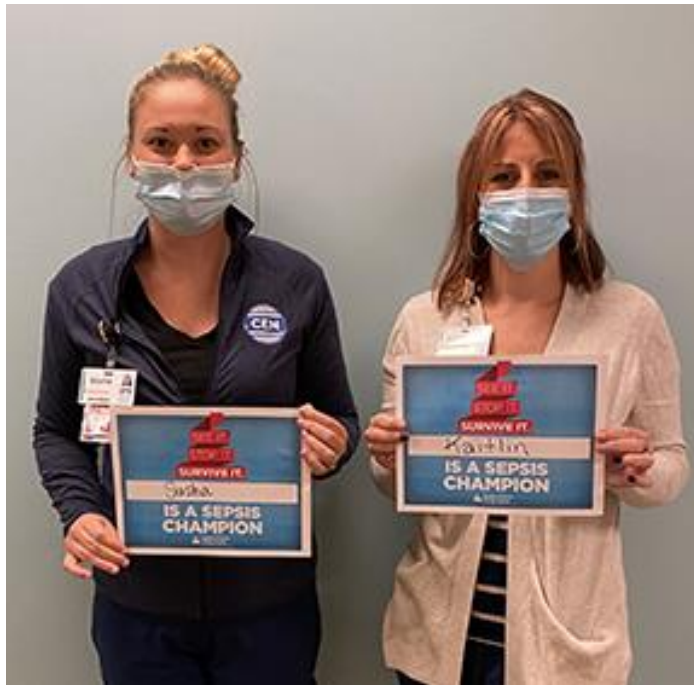
Ascension St. Vincent Indianapolis



Central Southwest Patient Safety Coalition



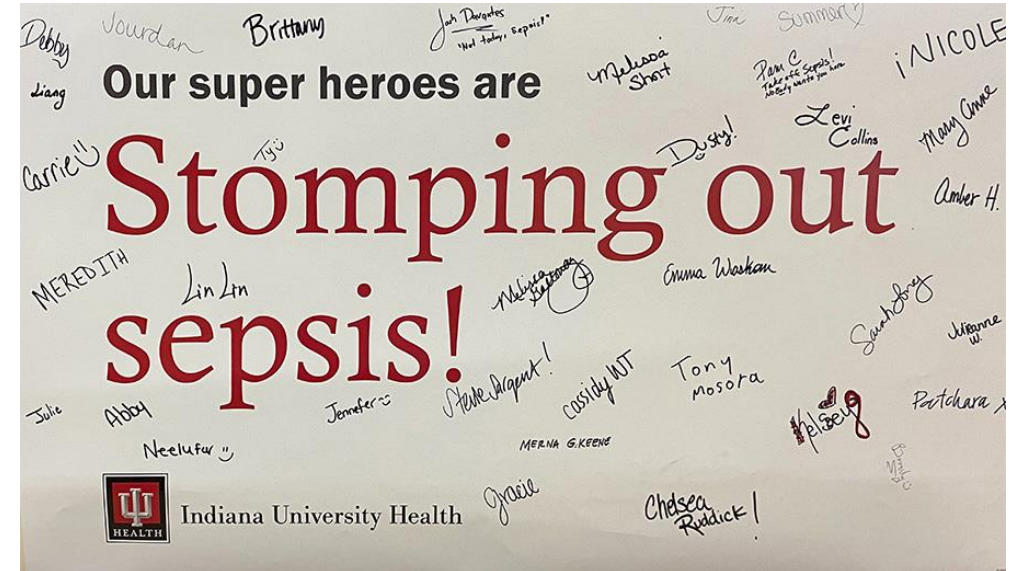
Columbus Regional Health



Harrison County Hospital



Indiana University Health



St. Mary Medical Center



St. Mary's Medical Center

SEE IT.
STOP IT.
SURVIVE IT.

THANK YOU SEPSIS HEROES

DECEMBER 2021

Thank you sepsis superheroes for acknowledgment of the sepsis BPA with notification to the provider for prompt attention.



Bradley Evans ED



Jessica Loya ICU



Layne Watts 6W



Objectives

1. Describe incidence of national and Indiana maternal sepsis and outcomes
2. Describe maternal sepsis identification & treatment recommendations

IHA Quality Reporting Table

*The IHA table can be found at
[Regulatory and Reporting \(ihaconnect.org\)](https://ihaconnect.org).*



Current and Proposed CMS Quality Measures
for Reporting in 2022 through 2028
Revised 8/19/2022

<u>INPATIENT</u> Current					
Measures Collected and Submitted by Hospital					
MEASURE Bolded measures must be manually abstracted and submitted to HQR site quarterly.	HIQRP		VBP		HITECH
	Reporting effective date	Affects APU	Reporting effective date	Affects Reimbursement	Promoting Interoperability Program
Structural Measure					
Maternal Morbidity	Oct 2021	FY 2023			
Hospital Commitment to Health Equity	CY 2023	CY 2025			

Maternal Morbidity

Hospital Inpatient Quality Reporting (IQR) Program Maternal Morbidity Structural Measure Quick Reference Guide Fiscal Year (FY) 2023

Accessing and Completing the Maternal Morbidity Structural Measure in the <i>Hospital Quality Reporting (HQR) Secure Portal</i>	Helpful Tips
<ul style="list-style-type: none"> In your Internet browser, navigate to https://hqr.cms.gov. The HQR home page will open. Enter your HARP user ID and Password. Click on Login. Select a device to verify your account. Click on Next. Continue the two-factor authentication by entering your security code. Click on Continue. On the Terms & Conditions page, scroll down to the bottom of the Terms & Conditions. Click on Accept. The HQR home page will open. Under the Dashboard, on the left-hand side of the screen, click on Data Submissions. Click on Structural Measures. Click on the Select a Response drop-down box and select your response: <ul style="list-style-type: none"> Yes No N/A (Our hospital does not provide inpatient labor/delivery care) Click on Save and Return. The structural measure data should display as "Submitted" on the Provider Participation Report. 	<ul style="list-style-type: none"> CMS defines a statewide or national Perinatal Quality Improvement (QI) Collaborative as a statewide or multi-state network working to improve maternal and child health outcomes by addressing the quality and safety of perinatal care. <ul style="list-style-type: none"> Examples include the Centers for Disease Control and Prevention's (CDC's) National Network of Perinatal Quality Collaboratives or Health Resources and Services Administration's (HRSA's) Alliance for Innovation on Maternal Health (AIM) program. There are two parts to this measure's question. Both parts of the measure's question must be considered by hospitals when determining which final answer choice is appropriate. <ul style="list-style-type: none"> For example, part one of the question assesses a hospital's participation in a statewide and/or national Perinatal QI Collaborative. Part two of the question assesses a hospital's implementation, through participation in the collaborative(s), of patient safety practices and/or bundles related to maternal morbidity. In order to select (A) Yes, a hospital must be able to answer "Yes" to both parts of the question. If a hospital deems a "No" response is correct to either part of the question, then their attestation for the entire question must be (B) No. If a facility does not provide labor/delivery care, the IPPS Measure Exception Form (used for the PC-01 measure) cannot be applied to the Maternal Morbidity Structural Measure. The facility will need to provide a response to the measure by selecting (C) N/A (Our hospital does not provide inpatient labor/delivery care). Facilities should allow ample time before the deadline to review and, if necessary, correct their response. Facilities can update/correct their submitted response until the submission deadline. Immediately after that deadline, the <i>HQR Secure Portal</i> will be locked.
Reporting and Submission Periods	
<ul style="list-style-type: none"> For the CY 2021 reporting period/FY 2023 payment determination, the reporting period is a shortened period from October 1, 2021 through December 31, 2021. <ul style="list-style-type: none"> For CY 2021, if a facility participated in a perinatal quality improvement (QI) collaborative anytime during Q4 2021 (October 1 through December 31, 2021), it would satisfy the requirement. The submission period will be April 1 through May 16, 2022. 	

- 2 parts for hospital with L & D:
1. Participation in a statewide and/or national Perinatal QI Collaborative
 2. Implementation through participation in the collaborative(s), safety practices and/or bundles related to maternal morbidity

Guest Speaker



Brittany Waggoner, RN, MSN, XXX
Maternal & Infant Quality Improvement Advisor
Indiana Hospital Association

Background

- *Sepsis is an important cause of maternal morbidity and mortality.*
- *The Centers for Disease Control and Prevention notes that the proportion of U.S. maternal deaths from sepsis (12.7%) is similar to the proportion of deaths from obstetric hemorrhage (11.4%) and hypertensive disorders (7.4%).*
- *It is estimated that 63 to 73% of maternal deaths from sepsis are preventable.*
- *Furthermore, for each maternal death, there are 50 women who experience life threatening morbidity from sepsis.*

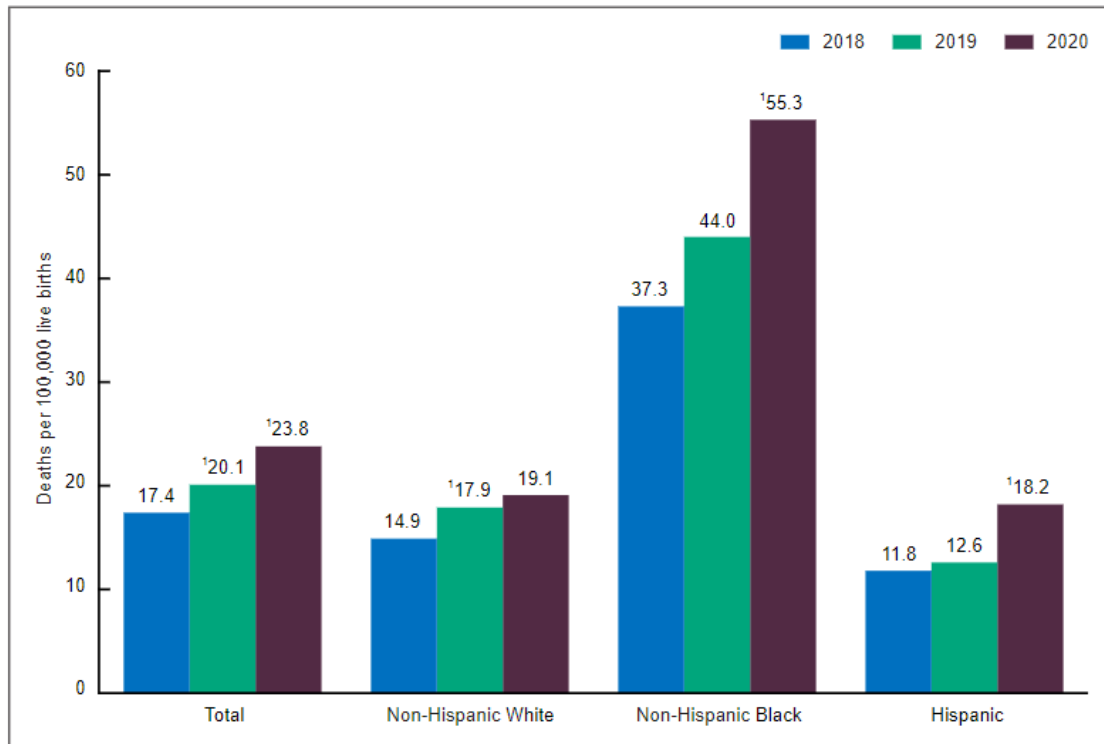


Maternal Mortality Rates (MMR) in the United States, 2020

	2018	2019	2020
Live Births	3,791,712	3,747,540	2,613,647
Maternal Deaths	658	754	861
Maternal Mortality Rate	17.4	20.1	23.8

Non-Hispanic Black MMR in the United States, 2020

Figure 1. Maternal mortality rates, by race and Hispanic origin: United States, 2018–2020



¹Statistically significant increase in rate from previous year ($p < 0.05$).
NOTE: Race groups are single race.
SOURCE: National Center for Health Statistics, National Vital Statistics System, Mortality.

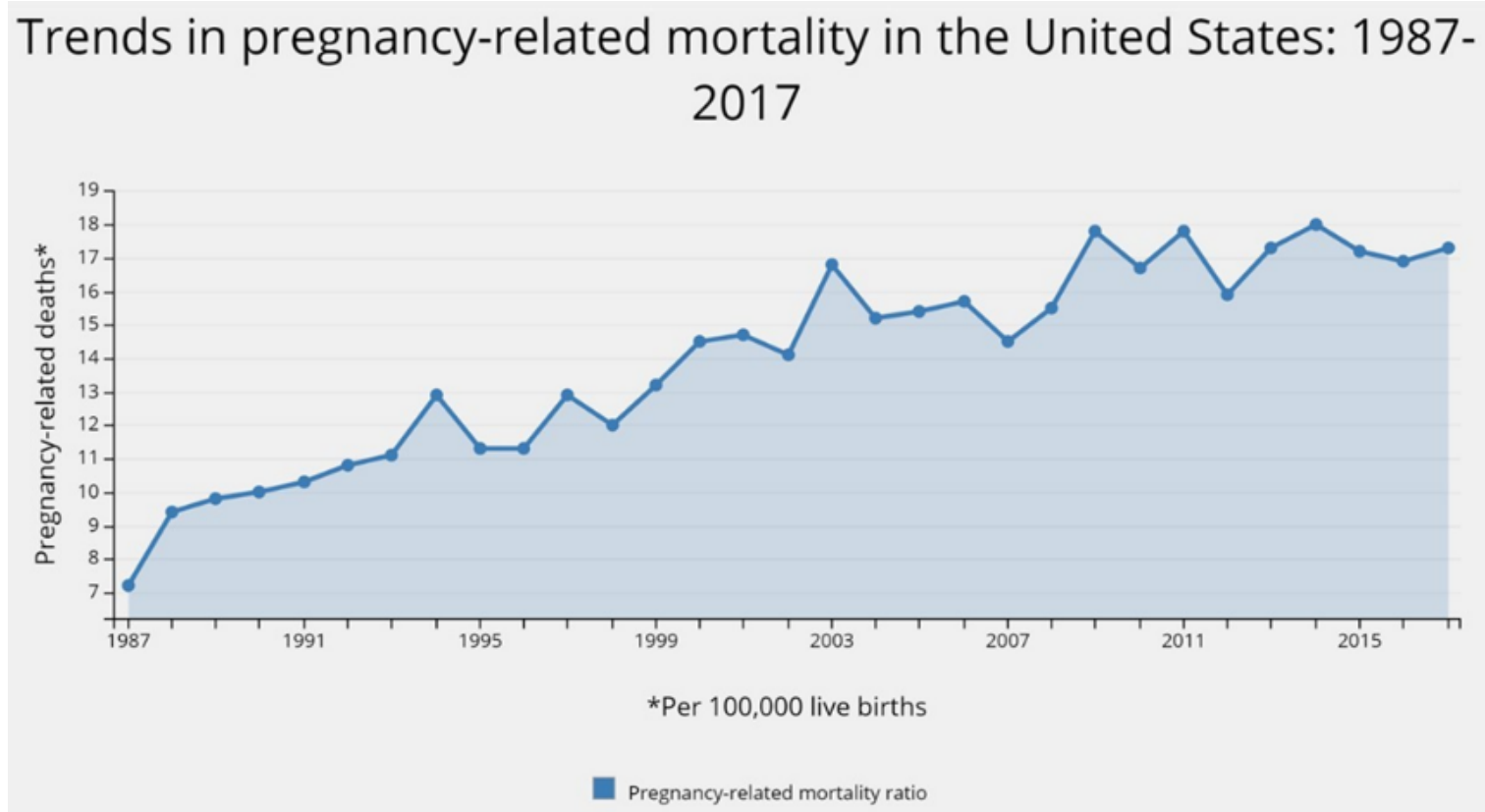
***Non-Hispanic Black Maternal Mortality Rate
55.3***

***2.9 times the rate for non-Hispanic Whites
(19.1)***

The increases from 2019 to 2020 for non-Hispanic Black and Hispanic women were significant

The increases from 2019 to 2020 for non-Hispanic White women was not significant

Maternal Mortality due to Sepsis in the United States



Pregnancy-Related Deaths: Data from Maternal Mortality Review Committees in 36 US States, 2017-2019

Table 4. Underlying causes of pregnancy-related deaths*, overall and by race or ethnicity¹, data from Maternal Mortality Review Committees in 36 US states, 2017–2019¹

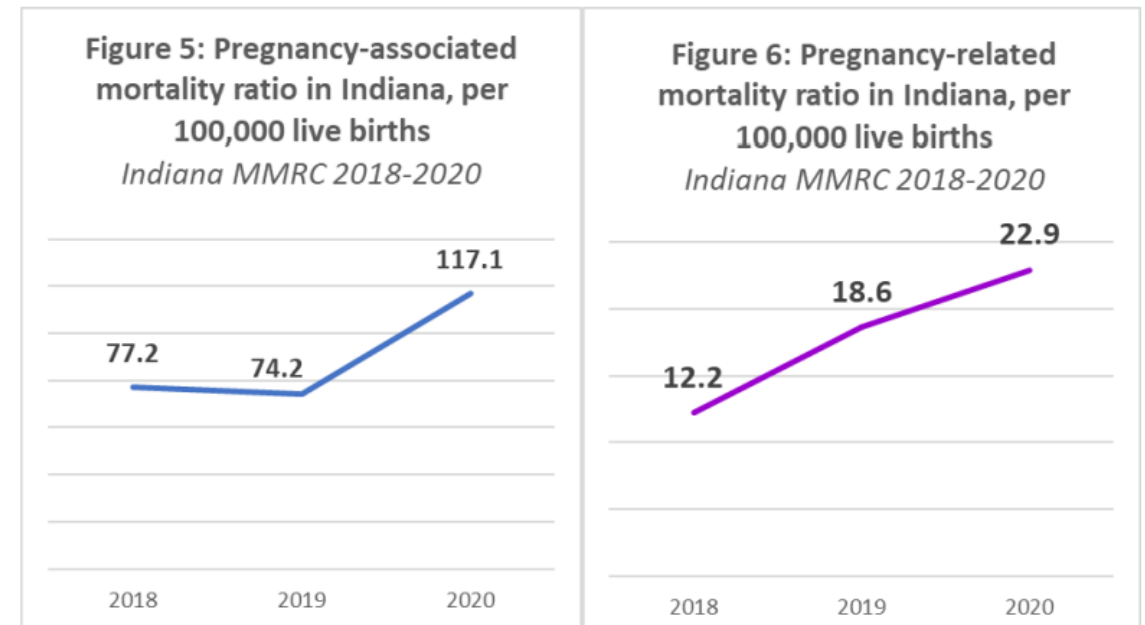
	Total		Hispanic		Non Hispanic									
					AIAN		Asian		Black		NHOPI		White	
	N	%	n	%	n	%	n	%	n	%	n	%	n	%
Mental health conditions ²	224	22.7	34	24.1	2	-	1	3.1	21	7.0	0	-	159	34.8
Hemorrhage ³	135	13.7	30	21.3	2	-	10	31.3	33	10.9	1	-	53	11.6
Cardiac and coronary conditions ⁴	126	12.8	15	10.6	1	-	7	21.9	48	15.9	0	-	49	10.7
Infection	91	9.2	15	10.6	1	-	0	0.0	23	7.6	0	-	49	10.7
Embolism-thrombotic	86	8.7	9	6.4	0	-	2	6.3	36	11.9	0	-	34	7.4
Cardiomyopathy	84	8.5	5	3.6	0	-	2	6.3	42	13.9	0	-	33	7.2
Hypertensive disorders of pregnancy	64	6.5	7	5.0	0	-	1	3.1	30	9.9	1	-	22	4.8
Amniotic fluid embolism	37	3.8	6	4.3	1	-	7	21.9	10	3.3	2	-	9	2.0
Injury ⁵	35	3.6	5	3.6	1	-	1	3.1	15	5.0	0	-	10	2.2
Cerebrovascular accident	25	2.5	2	1.4	0	-	0	0.0	10	3.3	0	-	13	2.8
Cancer	19	1.9	3	2.1	0	-	1	3.1	7	2.3	0	-	7	1.5
Metabolic/endocrine conditions	12	1.2	2	1.4	0	-	0	0.0	6	2.0	0	-	3	0.7
									4	1.3	1	-	5	1.1





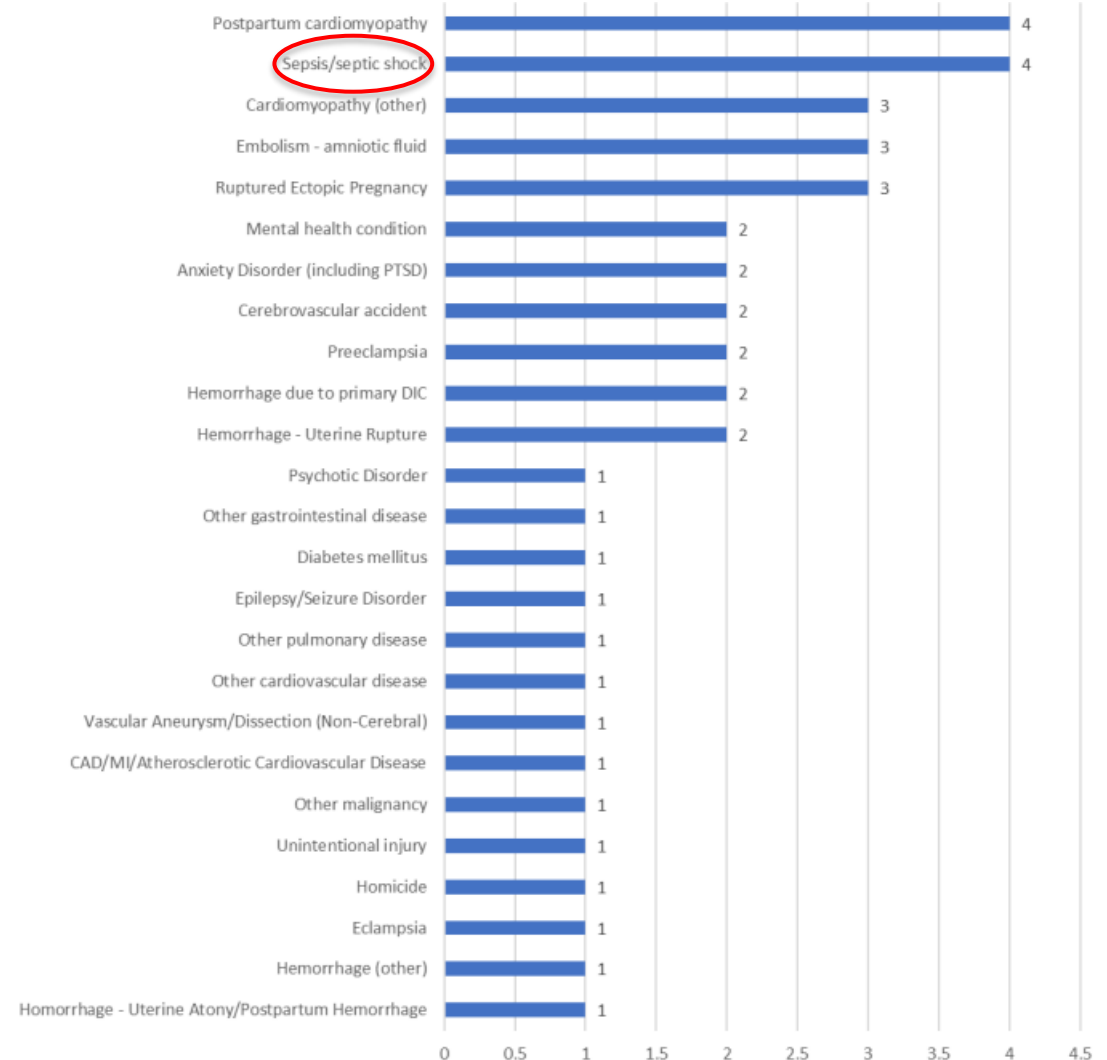
Statewide
Sepsis
Statistics

- **2020 Key Findings**
 - 92 pregnancy-associated deaths occurred during pregnancy or within one year of the end of pregnancy.
 - 79% of reviewed pregnancy-associated deaths in 2020 were preventable.

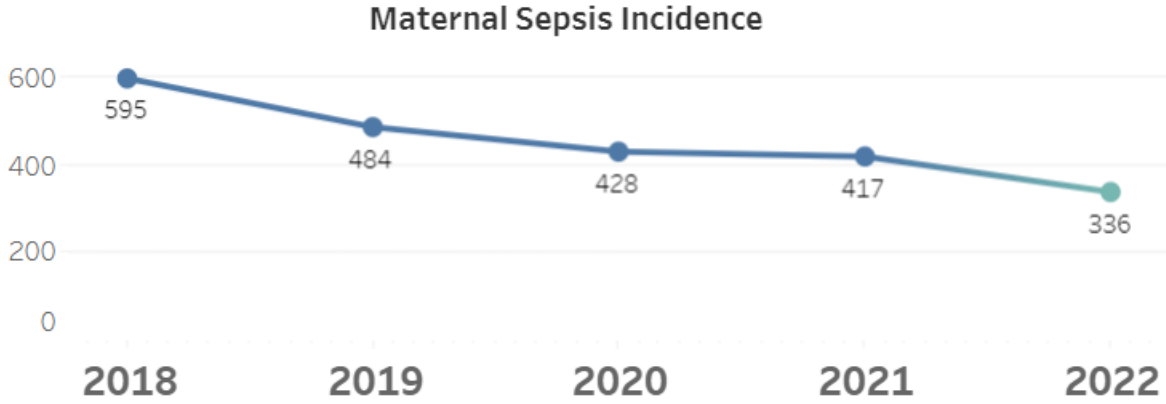
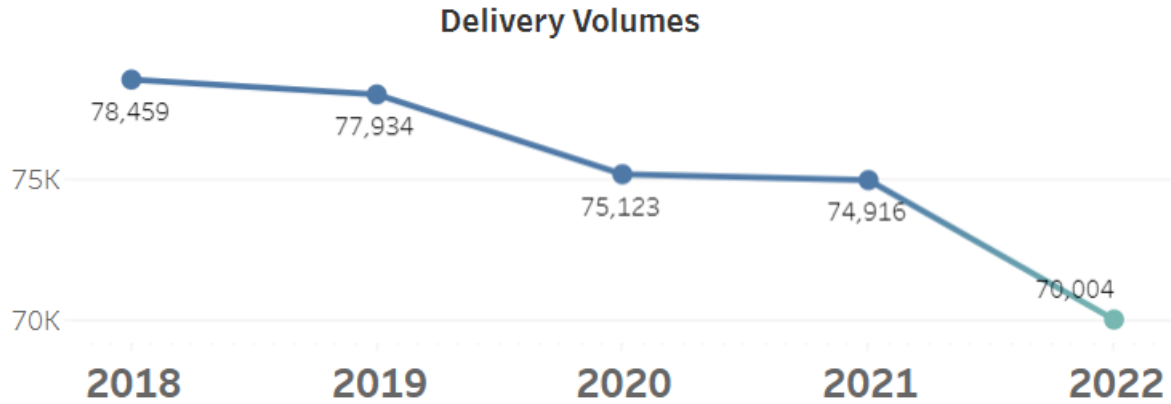


Causes for all 2018-2020 Pregnancy Related Deaths

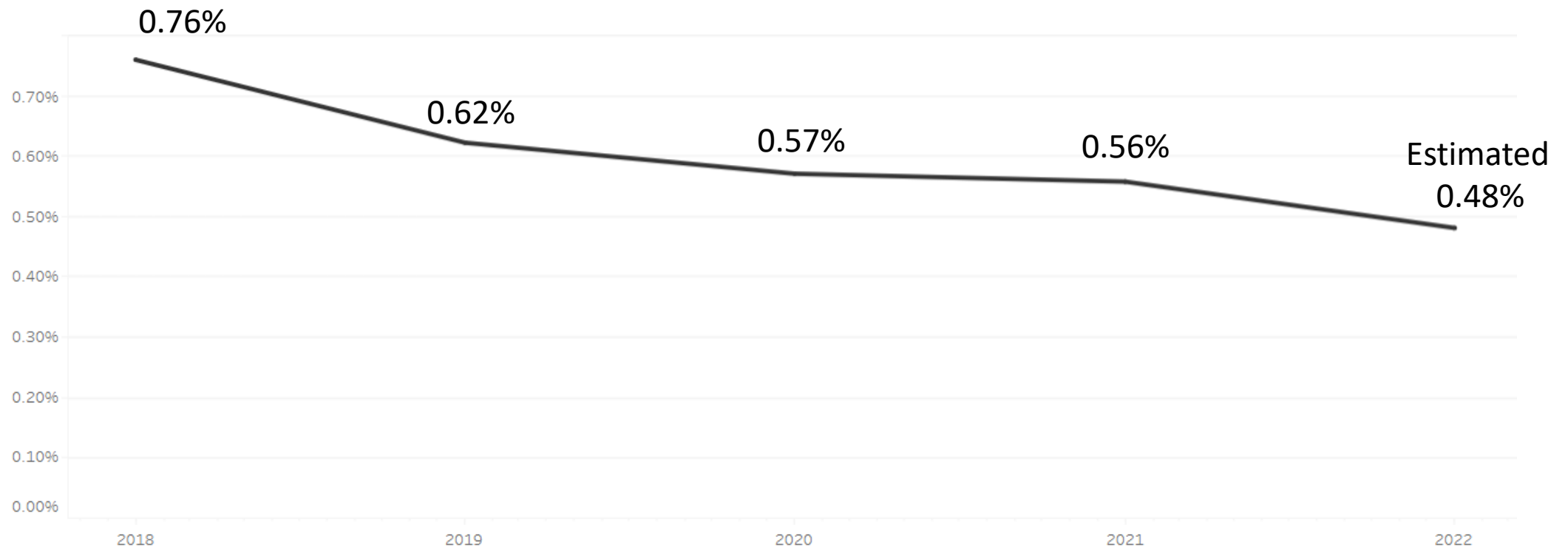
Indiana Maternal Mortality Review Committee 2022 Annual Report



Indiana Maternal Sepsis Incidence



Indiana Maternal Sepsis Rate



2021 Maternal Sepsis Readmissions

Maternal Sepsis Readmission Rate

Maternal Sepsis Readmissions = 23

Delivery Volumes = 74,916

Maternal Sepsis Readmission Rate = 3.07%

It's Not Just About Mortality....



Pathophysiology of Sepsis

Leading Causes of Maternal Sepsis

Antepartum	Intrapartum/ Immed. Postpartum	Post-discharge
Septic abortion	Chorioamnionitis/ intraamniotic infection	Pneumonia/influenza
Chorioamnionitis/ intraamniotic infection	Endometritis	Pyelonephritis
Pneumonia/ influenza	Pneumonia/influenza	Wound Infection/ Necrotizing Fasciitis
Pyelonephritis	Pyelonephritis	Mastitis
Appendicitis	Wound Infection/ Necrotizing Fasciitis	Cholecystitis

Pathophysiology

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

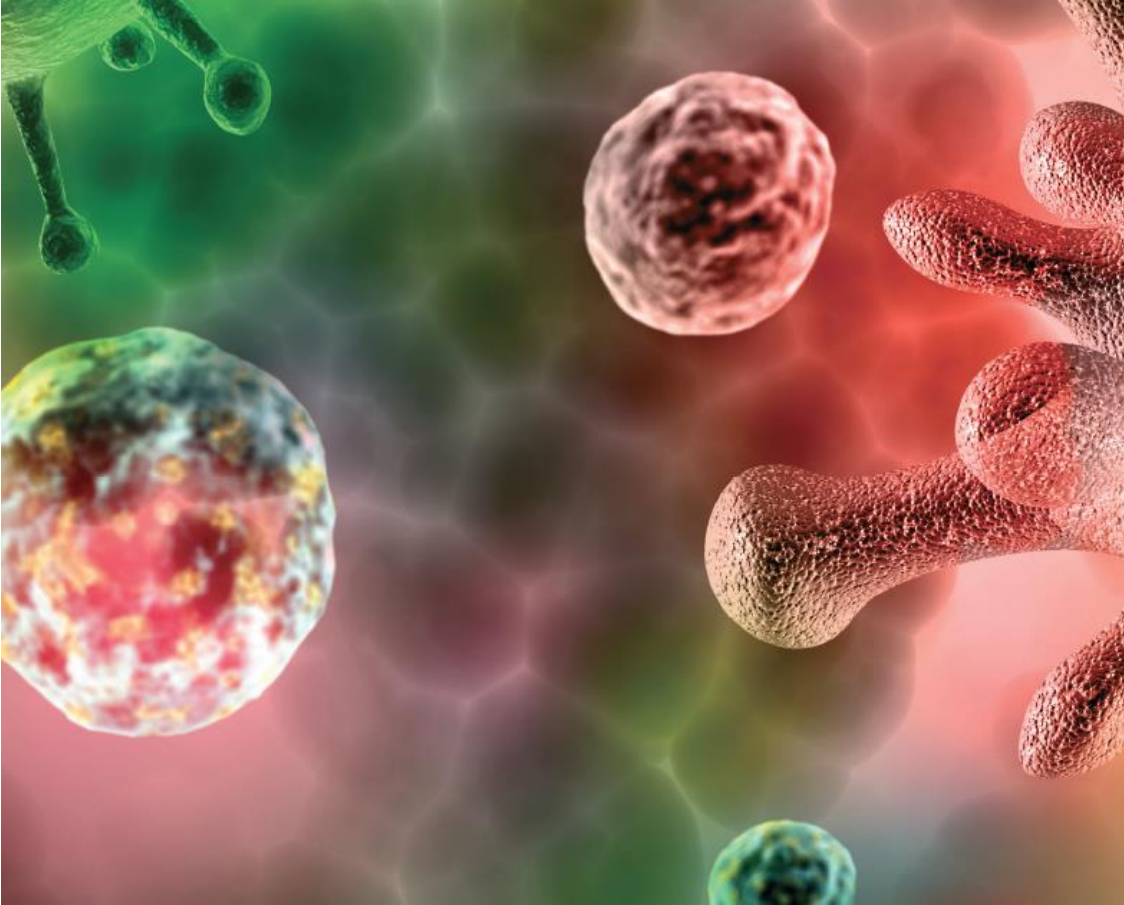
Renal:

- Ischaemia
- Vasoconstriction
- Cytokine-mediated renal cell injury

Coagulation

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

Pathogens



- *Bacterial*
- *Fungal*
- *Viral*
- *No Causative Organism Identified*

Non-OB

> 35 years of age

Tobacco use

Low socioeconomic status

Minorities

Presence of comorbidities

Transfusion



Pregnancy & Postpartum



Antepartum

- PROM
- Multiple Gestation
- Reproductive Technologies
- Preeclampsia
- Preterm Labor

Intrapartum

- PROM
- Multiple Vaginal Exams
- Prolonged 2nd Stage Labor

Postpartum

- Retained Products
- Hemorrhage
- Operative Vaginal or Cesarean Birth
- Multips



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Screening & Diagnoses

CMQCC's Two-Step Screening & Diagnosis Method

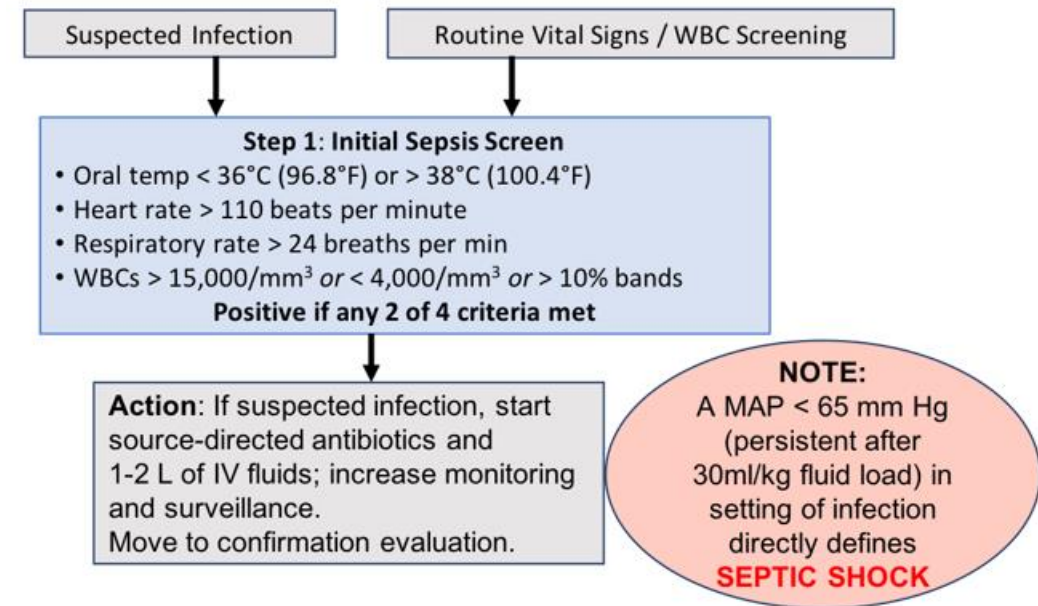
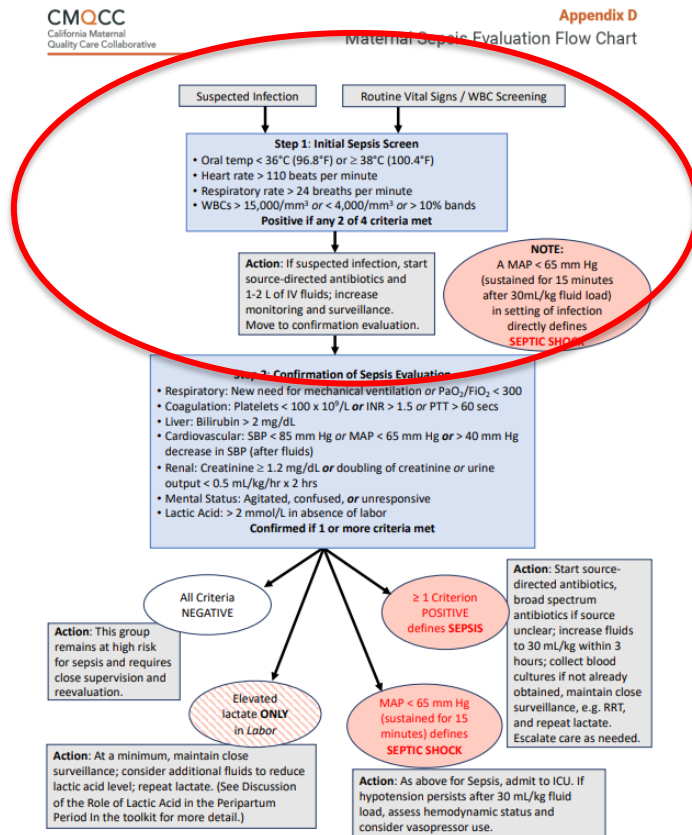
Comparing Normal Pregnancy Physiology and SIRS Criteria

Pregnancy Physiology	SIRS
↑ or ↓ Temperature	Temperature >38°C or <36°C (>100.4°F or <96.8°F)
HR ↑ 17%	HR >90 bpm
RR ↑ in labor	RR >20 breaths/min
PaCO ₂ 28-32 mmHg	PaCO ₂ <32 mmHg
WBCs ↑ 8% to 5,000-12,000/mm ³ (up to 15,000/mm ³ seen) during pregnancy; during intrapartum may ↑ to 25,000-30,000/mm ³	WBC >12,000mm ³ or <4,000mm ³

SEP-1 Criteria Measure Update

Non-Pregnant Criteria	Pregnant 20 weeks through Day 3 Post-delivery Criteria
Temperature >38.3 C or <36.0 C (>100.9 F or <96.8 F)	Temperature ≥38 C or <36.0 C (≥100.4 or <96.8 F)
Heart rate (pulse) >90	Heart rate (pulse) >110
Respiration >20 per minute	Respiration >24 per minute
White blood cell count >12,000 or 10% bands	White blood cell count >15,000 or 10% bands

Screening & Diagnosing Step # 1



Confirmation of Sepsis Step #2

Tests to Evaluate End Organ Injury

Laboratory values

- CBC (including % immature neutrophils [bands], Platelets)
- Coagulation status (PT, INR, PTT)
- Comprehensive Metabolic Panel (specifically include bilirubin, creatinine)
- Venous Lactic Acid

Bedside assessment

- Urine output (place Foley catheter with urometer)
- Pulse oximetry
- Mental status assessment

Confirmation of Sepsis Step #2

Measure of End Organ Injury	Criteria Positive if one (1) or more criteria are met
Respiratory function*	<ul style="list-style-type: none"> • Acute respiratory failure as evidenced by acute need for invasive or non-invasive mechanical ventilation, OR • $PaO_2/FiO_2 < 300$
Coagulation status	<ul style="list-style-type: none"> • Platelets $< 100 \times 10^9/L$, OR • International Normalized Ratio (INR) > 1.5, OR • Partial Thromboplastin Time (PTT) > 60 seconds
Liver function	<ul style="list-style-type: none"> • Bilirubin > 2 mg/dL
Cardiovascular function	<ul style="list-style-type: none"> • Persistent hypotension after fluid administration: <ul style="list-style-type: none"> ○ SBP < 85 mm Hg, OR ○ MAP < 65 mm Hg, OR ○ > 40 mm Hg decrease in SBP
Renal function	<ul style="list-style-type: none"> • Creatinine > 1.2mg/dL, OR • Doubling of serum creatinine, OR • Urine output less 0.5 mL/kg/hour (for 2 hours)
Mental status assessment	<ul style="list-style-type: none"> • Agitation, confusion, or unresponsiveness
Lactic acid	<ul style="list-style-type: none"> • > 2 mmol/L in absence of labor (Lactic acid not used for diagnosis in labor, but remains important for treatment.)

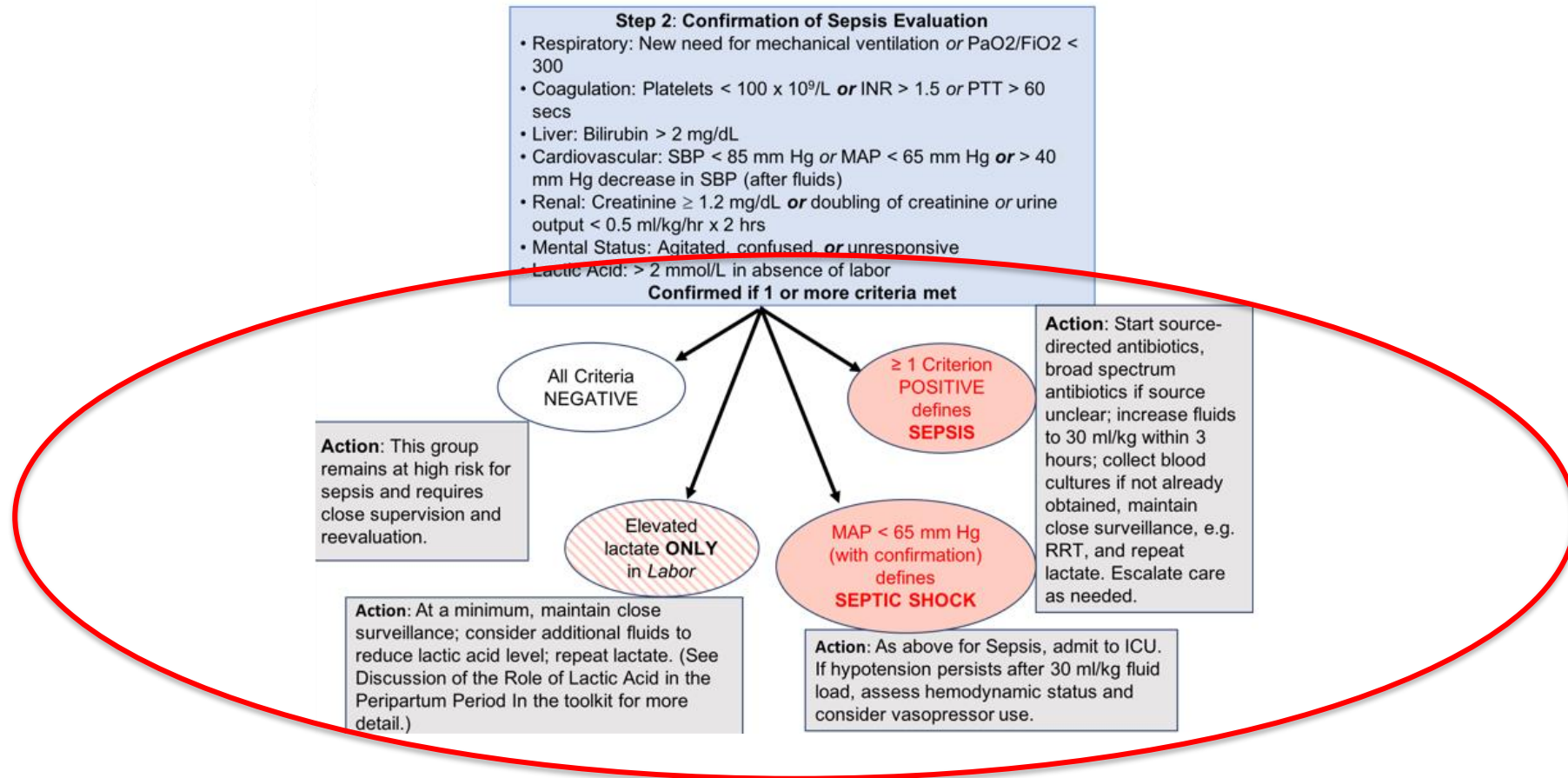


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Assessment & Treatment

Assessment & Treatment



Sepsis Treatment

- *Narrow spectrum antibiotics if not already started*
- *If source unclear, give broad spectrum antibiotics*
- *Increase fluids to 30 mL/kg within 3 hours if not already done*
- *Repeat lactate*
- *Blood cultures, if not already drawn*
- *Call for RRT to escalate care, as needed*

Fluid Management



30ml/kg Crystalloid IV Fluid Bolus

Begin within 3 hours

- Each hour increases mortality rate by 7.6%

Large-bore IV

Considerations

- Pulmonary edema
- ARDS
- Preeclampsia

Antibiotic Therapy

Broad spectrum

- Most cases are polymicrobial
- Ampicillin, Gentamycin, Clindamycin, Vancomycin, Metronidazole, Antivirals
- Reassess therapy daily
- Toxicity versus therapeutic

Antibiotic Regimen (CMQCC)

Antibiotic Regimen by Condition

(See full recommendations in Toolkit)

Condition	Antibiotic Choices	Duration	Notes
Chorioamnionitis / intraamniotic infection (Plante, et al 2019, ACOG)	<p>Ampicillin 2 g IV q6h</p> <p>PLUS</p> <p>Gentamicin 2 mg/kg IV load, then 5mg/kg every 24h</p> <p>Alternate regimens: (Based on local antibiotic resistance patterns)</p> <p>Ampicillin-sulbactam 3g IV q6h OR</p> <p>Piperacillin-tazobactam 3.375g IV q6h OR</p> <p>Cefoxitin 2g IV q6H OR</p>	<p>Generally limited to the peripartum period</p> <p>Duration of therapy is unclear, but there are some recommendations to continue until afebrile for 24h</p>	<p>For post-cesarean delivery: one additional dose of the chosen regimen is indicated. Add clindamycin 90 mg IV or Metronidazole 500 mg IV for at least one additional dose.</p> <p>For post-vaginal delivery: No additional antibiotic doses required, but if additional doses of antibiotics are given, clindamycin is not indicated.</p>

Antibiotic Regimen Cont.

Source infection	Recommended antibiotics
Abdominal infections	Ceftriaxone, cefotaxime, ceftazidime, or cefepime plus metronidazole;
	Complicated cases may require monotherapy with a carbapenem or piperacillin-tazobactam
Chorioamnionitis	Ampicillin plus gentamicin. Add anaerobic coverage with clindamycin or metronidazole if cesarean delivery required
Community- acquired pneumonia	Cefotaxime, ceftriaxone, ertapenem, or ampicillin plus azithromycin, clarithromycin, or erythromycin
Endomyometritis	Ampicillin, gentamicin, and metronidazole (or clindamycin); Alternatively, may use cefotaxime or ceftriaxone plus metronidazole
Hospital-acquired pneumonia	Low risk patients: Piperacillin-tazobactam, meropenem, imipenem, or cefepime
	High mortality risk patients: double coverage for pseudomonas (beta lactam plus an aminoglycoside or a quinolone) and MRSA coverage with vancomycin or linezolid
Skin and soft tissues (necrotizing)	Vancomycin plus piperacillin-tazobactam If Streptococcus Group A or Clostridium perfringens are present, use penicillin G plus clindamycin
Urinary tract infections	Gentamicin with ampicillin; Alternatively, may use monotherapy with a carbapenem or piperacillin-tazobactam

Septic Shock

- *Admit to ICU*
- *Hemodynamic
Monitoring*
- *Vasopressors*



Lactic Acid

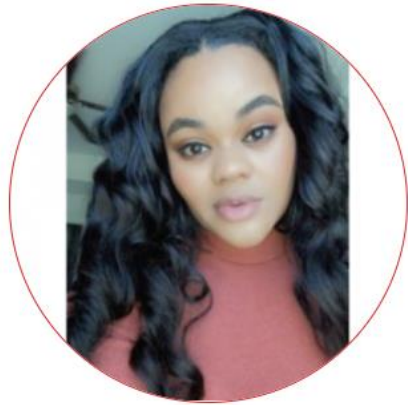
Not used for
diagnosis in labor, but
remains important for
treatment

Trends can be used to
evaluate the
effectiveness of
treatment

Discharge

- *Individualized*
- *Potential for*
 - Depression
 - Anxiety Fatigue
 - Sleep disturbances
 - Post-traumatic stress syndrome

Faces of Sepsis



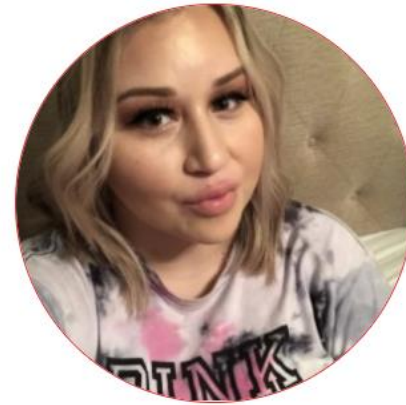
Cortina Pride



Sarah S.



Samantha Bullock



Erza H.



Jennifer Inskip



Shay and Amelia B.



Kourtney N.



Steph Wasson



Thank you!



Brittany Waggoner, RN, MSN
Maternal & Infant Quality Improvement Advisor
Indiana Hospital Association



Nov. 1 – 2

The Westin Indianapolis

Learn more and register on our website:



Quality and Patient Safety Team



Karin Kennedy

Vice President, Quality & Patient Safety

317-423-7737

kkennedy@IHAconnect.org



Annette Handy

Clinical Director, Quality & Patient Safety

317-423-7795

ahandy@IHAconnect.org



Becky Hancock

Quality & Patient Safety Advisor

317-423-7799

rhancock@IHAconnect.org



Madeline Wilson

Quality & Patient Safety Advisor

317-974-1407

mwilson@IHAconnect.org



Laurie Gerdt

Quality & Patient Safety Advisor

317-423-7728

lgerdt@IHAconnect.org



Brittany Waggoner

Maternal & Infant Quality Improvement Advisor

317-488-1031

bwaggoner@IHAconnect.org

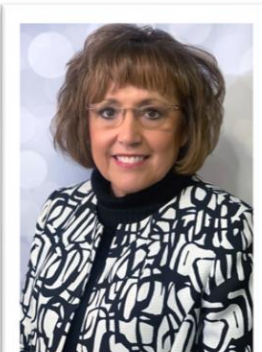


Casey Hutchens

Patient Safety Project Coordinator

317-974-1457

chutchens@IHAconnect.org



Becky Royer

Consultant

812-249-2341

broyer@ihaconnect.org