

# Managing Septic Shock in Critically Ill Obstetric Patients

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# Objectives



Discuss the principles of resuscitation in septic shock



Devise a systematic approach to septic shock



Review utilization of vasopressors in septic shock as they apply to the obstetric patient

Improves survival

## Key Features of septic shock

- Suspected or confirmed infection
- Persistent hypotension
  - (MAP < 65 mmHg)
- Elevated lactate\*
  - ( $\geq 2$  mmol/L) despite fluids
- Signs of organ dysfunction
  - AMS
  - Low U op
  - Etc...

Early  
Recognit  
ion

# Maternal Infections



## Obstetric Causes

Chorioamnionitis

Endometritis

Septic abortion

Septic pelvic thrombophlebitis

Pelvic abscess

Mastitis

Retained products of conception



## Non-obstetric Causes

Pre-eclampsia

Pyelonephritis

Appendicitis

Cholecystitis

# Sepsis Definitions

## Sepsis

- Organ dysfunction with a Sequential Organ Failure Assessment (SOFA)
  - Previous SIRS
  - SOFA:  $\geq 2$  from baseline and due to infection
  - Quick SOFA (qSOFA)  $\geq 2$  Positive

## Septic Shock (despite adequate vol. resuscitation)

- Persistent hypotension requiring vasopressors (MAP  $\geq 65$  mm Hg)
- Serum lactate  $\geq 2$  mmol/L

## Maternal Sepsis

- Sepsis-3 definition  $\rightarrow$  not validated in pregnancy
- Physiologic changes of pregnancy impact SOFA scores
  - May lead to under- or over- diagnosis
- Increase HR, Increase CO, Decreased SVR, Lowered baseline BP
- Mild tachycardia or hypotension may appear normal  $\rightarrow$  delayed diagnosis

## SOFA Criteria

Points	1	2	3	4
RESPIRATION PaO <sub>2</sub> /FiO <sub>2</sub>	<400	<300	<200	<100
COAGULATION Platelet Count	<150	<100	<50	<25
LIVER FUNCTION Bilirubin (mg/dL)	1.2 – 1.9	2.0 – 5.9	6.0 – 11.9	>12.0
CARDIOVASCULAR Hypotension	MAP <70	Dopamine ≤5 or dobutamine (any dose)	Dopamine >5 or epinephrine ≤0.1 or norepinephrine ≤0.1	Dopamine >15 or epinephrine >0.1 or norepinephrine >0.1
NEUROLOGIC GCS	13 – 14	10 – 12	6 – 9	<6
RENAL Creatinine/UOP	1.2 – 1.9	2.0 – 3.4	3.5 – 4.9 or UOP <500 mL/day	>5.0 or UOP <200 mL/day

# qSOFA

RR > 22bpm

sBP < 100mmHg

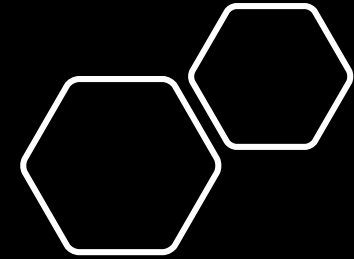
Altered GCS

0 = Mortality < 1%

1 = Mortality 2-3%

≥2 = Mortality ≥10%

Screening for outcome rather than diagnosis



NEWS 2 (New Updates..)

SBP

HR

RR

Temp

SpO2

LOC

# Scoring

Table 1. The adapted NEWS tool

Element	Score						
	3	2	1	0	1	2	3
Respiratory rate	≤8		9-11	12-20		21-24	≥25
SpO <sub>2</sub>	≤91	92-93	94-95	≥96			
Oxygen		Yes		No			
Systolic blood pressure	≤90	91-100	101-110	111-219			≥220
Pulse	≤40		41-50	51-90	91-110	111-130	≥131
ACVPU				A			C,V,P,U
Temperature, °C	≤35.0		35.1-36.0	36.1-38.0	38.1-39.0	≥39.1	

Score ≥3: discuss with duty nurse or senior colleague; score ≥6: immediate discussion with ACT advanced practitioner or ACT doctor. Concern about patient or difficulty obtaining any single parameter should lead to escalation regardless of score. Complete a sepsis screen on all patients with NEWS ≥3 with signs of infection.

ACT = acute clinical team; ACVPU = Alert, Confusion, Voice, Pain, Unresponsive; SPO<sub>2</sub> = peripheral capillary oxygen saturation; NEWS = National Early Warning Score.

# ACTION

- 1-4: Nurse to evaluate change in monitoring frequency or level of care
- 5-6: Evaluation by skilled provider, Rapid Response or MD to evaluate for acute illness
- >7: prompt emergency assessment by a clinical team/critical care outreach team with critical-care competencies and usually transfer of the patient to a

\*Not validated in pregnancy

# Immediate Resuscitation

- Blood cultures prior to antibiotics
- Broad spectrum antibiotic (*historically appropriate coverage*)
  - MRSA / MDR / Fungal Infections
  - ICU patients at high risk
- RAPID fluid resuscitation
  - 30 mL/kg IV Crystalloids (NS or LR)
  - 20 mL/Kg in pregnancy if concerned for pulmonary edema
    - Decreased oncotic pressure
    - Increased plasma volume
    - Ex: Preeclampsia
  - Target
    - MAP  $\geq$  65 mmHg
      - ? If this applies to pregnant patients – Data is not available
        - Appropriate level of consciousness
        - U op  $\geq$  0.5 mL/kg/hr
        - Improving lactate levels
        - FETAL HEART RATE
- Start vasopressors if hypotension persists

# Additional Factors

## Source Control

- Drain abscess
- Removal of infected catheters
- Surgery for peritonitis
- Debridement of infected tissue

## Organ Support

- Mechanical Support
- RRT
- Blood
- Glycemic Control
- Stress-dose steroids
  - \* in refractory shock
- Hydrocortisone 50 mg IV q 6 hours
- Renal disease
- If fetus is viable:
  - Fetal Heart Rate Monitoring
- Fetal Distress
- Placental Hypoperfusion

# Septic Shock



# Vasopressor S

- Norepinephrine
  - 1<sup>st</sup> Line
  - Contracts peripheral blood vessels > uterine arteries
  - Titrate to clinical perfusion
- Ephedrine and Phenylephrine
  - Used in non-sepsis induced hypotension
  - Not 1<sup>st</sup> Line for sepsis
- Vasopressin (CAUTION)
  - Induces uterine artery vasoconstriction
  - Induces uterine contractions
- Epinephrine
  - → Myocardial dysfunction despite adequate fluid resuscitation and arterial blood pressure
- Dobutamine
  - Added to Norepinephrine IF myocardial dysfunction is present
- Angiotensin II
  - CONTRAINDICATED: severe fetal toxicity
    - Renal dysgenesis
    - Oligohydramnios
    - Calvarial and pulmonary hypoplasia
    - IUGR
    - Fetal death

# Key Considerations

Feature	Non-Obstetric	Obstetric
Sepsis criteria	Standard Sepsis Criteria	Modified keeping physiologic changes of pregnancy in mind
Fluids	Aggressive: 30 mL/kg IV crystalloids	Consider 20 mL/kg IV crystalloids
Monitoring	Hemodynamics	Maternal Monitoring Fetal Monitoring (if viable)
Source Control	Surgery/Drainage	May require delivery
Vasopressors	Norepinephrine Vasopressin Epinephrine Dobutamine Angiotensin II	Norepinephrine Vasopressin (Caution) Epinephrine (Myocardial dysfunction) Dobutamine (Myocardial dysfunction) Angiotensin II (CONTRAINDICATED)
Achievement Goal	Patient resuscitation and stability	Mother and fetus resuscitation and stability

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