Perinatal Sepsis

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Learning Outcomes:

1. Clarify definitions for intraamniotic infection, sepsis, septic shock and maternal sepsis
2. Identify key nursing assessments and protocols for early recognition and management of perinatal sepsis

Why is this topic important?

- Maternal sepsis occurred in 0.04% of US deliveries, accounted for 23% of all maternal deaths (Hensley, 2019, National Readmissions Database 2013-16)
- Sepsis has no validated standard diagnostic test
- Early identification and prompt treatment improves outcomes (Bauer, 2019)
- Most cases of sepsis occurred after discharge from delivery
- Sepsis has long-term sequelae for hospital survivors, including lingering physical, cognitive, and mental health morbidity.

Definitions:

Chorioamnionitis	Historical term; Infection of the chorion, amnion, or both
Intraamniotic infection (IAI)	Infection involving the amniotic fluid, fetus, umbilical cord, or placenta and fetal membranes
Triple I (suspected)	Fever without a clear source plus any of the following: 1)Baseline fetal tachycardia; 2) Maternal WBC >15,000 per mm^3 in the absence of corticosteroids; 3)Purulent fluid from the cervical os
Triple I (confirmed)	All of the above plus laboratory findings of infection e.g.: Positive amniotic fluid Gram stain for bacteria, low amniotic fluid glucose (≤14 mg/dL), amniotic fluid white cell count (>30 cells/mm3), or positive amniotic fluid culture results, or histopathologic evidence of infection or inflammation or both in the placenta, fetal membranes, or the umbilical cord vessels (funisitis)
Sepsis	Life threatening organ dysfunction caused by a dysregulated host response to infection: SBP< 100mmHg; Significantly decreased urine output; Abrupt change in mental status; Decrease in platelet count; Difficulty breathing (RR>22); Abnormal heart pumping function; Abdominal pain
Septic Shock	Circulatory and cellular/metabolic dysfunction associated with a higher risk of mortality: Hypotension that does not respond to fluid boluses, requirement for vasopressors to sustain a MAP of at least 65mmHg, and serum lactate > 2mmol/L.
Maternal sepsis	A life-threatening condition; organ dysfunction resulting from infection during pregnancy, childbirth, post-abortion or postpartum period

***Organisms* (Polymicrobial is possible)**

- Bacterial

Group B streptococcus (GBS) and *Escherichia coli*.
Group A streptococcus and *E. coli* infection are associated with worse outcomes leading to death

- Viral

Influenza leads to respiratory complications
SARS-CoV-2 increased hospital admissions and the impact in pregnancy remains to be determined

- Fungal
  - Candida in about 20% women
  - Common second and third trimester
- Parasitic
  - Recent travel history

Pathways to invasion

- Ascending
- Maternal blood infection
- Iatrogenic
- Retrograde from fallopian tubes

***Diagnosis* of chorioamnionitis (IAI)**

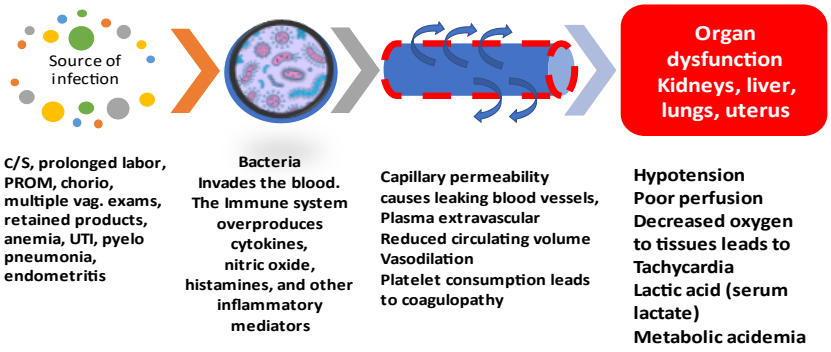
- Maternal temperature

Fever of ≥100.4° F (38°C) present on 2 occasions 30 minutes apart or any temp ≥ 102.2° F (39°C)

- Maternal tachycardia
- Fetal tachycardia
- Maternal leukocytosis
- Purulent / foul smelling amniotic fluid

} Only need one of these in addition to fever

Sepsis pathophysiology



When compared with the non-pregnant population, normal physiological changes during pregnancy, labor and postpartum can cause abnormal readings potentially leading to a missed diagnosis of sepsis.

Maternal sepsis signs/symptoms **(2 must be present)**

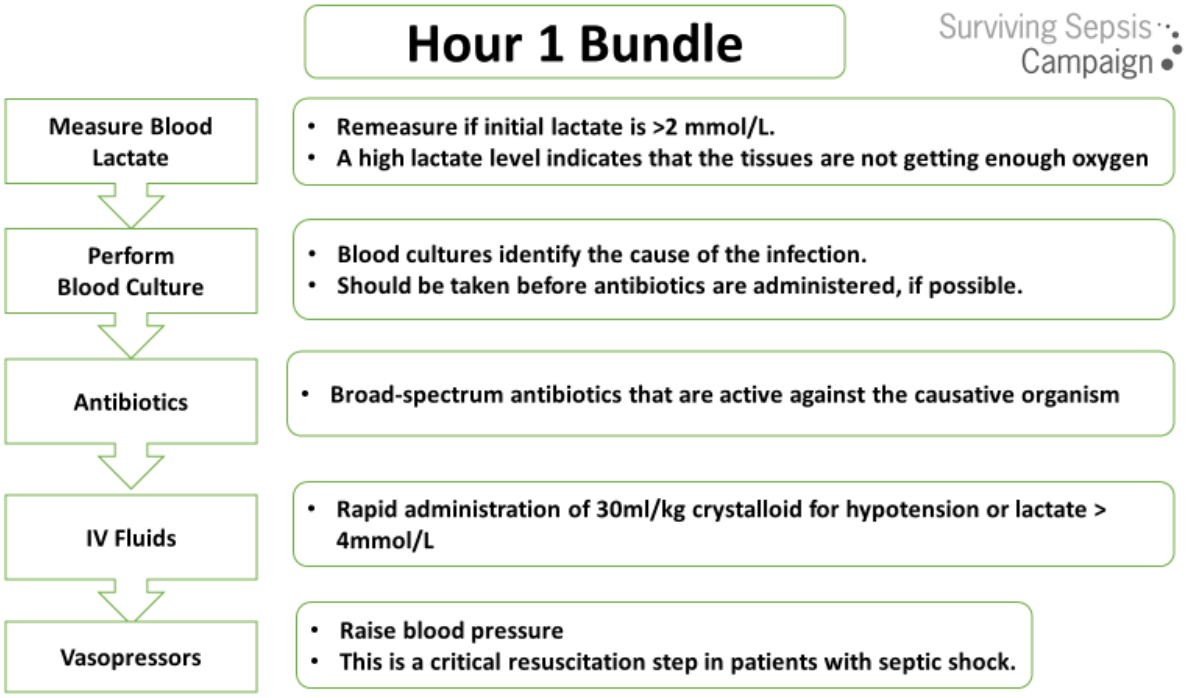
Sign/symptom	Inform	Mislead
Fever	100.4°F or abnormally low temp 96.8°F	Epidural anesthesia Protracted labor Inflammation Dehydration Narcotic administration (morphine, fentanyl) Cold due to exposure in OR during birth
Tachycardia	> 110 bpm	Hemodynamic demand of labor Medication Somatic and psychological responses with sympathetic nervous system activation (e.g.: pain, fear, anxiety, loss of control)
Hypotension	SBP <90 mm Hg, MAP <70 mm Hg, or reduction of >40 mm Hg from baseline.	Normal vasodilation induced by pregnancy Epidural anesthesia Blood loss Hypertensive syndromes
Difficulty breathing, tachypnea	≥ 24 bpm	Pain in labor Workload of labor Fluid overload
Significantly decreased urine output	<30mL/hr. over 2 hrs.	Trauma Retention due to loss of tone Preeclampsia Dehydration with prolonged labor Antidiuretic effect of oxytocin
Skin discoloration	Areas of mottled skin / jaundice	Dehydration Diaphoresis / cooling with labor Ethnicity Cold operating room environment
Abrupt change in mental status	Glasgow Coma Scale score <15	Exhaustion following labor Effect of narcotic administration Effect of magnesium sulfate
Decrease in platelet count	<100,000/microliter	Preeclampsia / HELLP syndrome Immune thrombocytopenia Hemorrhage
Elevated serum lactate	> 2mmol/L	Using 2016 guidelines of ≥4 mmol/L May be slightly elevated in labor

Management Tools

	SBP	HR	RR	Neuro
Modified MEWT	**< 90mmHg**	**>120bpm**	**>30/min**	**Maternal agitation, confusion, or unresponsiveness;**
qSOFA	≤ 100mmHg		≥22/min	Glascow Coma score <15
omqSOFA	**< 90mmHg**		**≥24/min**	**Altered mentation: Not alert**

Toolkits

CMQCC: https://www.cmqcc.org/resources-toolkits/toolkits/improving-diagnosis-and-treatment-maternal-sepsis
Joint Commission: https://www.centerfortransforminghealthcare.org/products-and-services/targeted-solutions-tool/sepsis-tst/
Surviving Sepsis: https://www.sccm.org/SurvivingSepsisCampaign/Home



F-Fluids 500mL crystalloids immediately, repeat as needed up to 30mL/Kg within the first 3 hours; Caution in preeclampsia and anemia

A-Antibiotics Ceftriaxone 2g IV once daily or Chloramphenicol 1g IV/IM Q6 + Gentamycin 240mg IM/IV qd

S-Source Identify it and control it

T-Transport To higher level hospital or location within hospital

M-Monitor q30 minutes Resp, HR, BP, Temp, Urine output, mental state

FAST-M PATHWAY

Nursing Implications

1. Review prenatal and intrapartum history
2. Delivery is not always the 'cure' for the mother
3. Aware of potential maternal deterioration – BE SUSPICIOUS
   - Identify the source
   - Vigilance with vital sign and symptom assessment
   - Ancillary staff should be educated about the importance of respiratory rate and notifying RN
4. Prompt administration of antibiotics
5. Invasive procedures: artificial rupture of membranes, digital cervical exams, and internal monitoring devices need to be avoided without clear indication
6. Reduce risk of a surgical site infection when following an evidence-based safety bundle including vaginal cleansing, skin preparation, timely antibiotic administration, and maintenance of thermoregulation.
7. Utilize standardized guidelines such as those from SSC
8. Patient education for signs of maternal infection
   - Consider using the AWHONN post birth warning signs handout for all women giving birth and educate women on early warning signs of infection.
9. Continued work to reach consensus with maternal early warning systems to improve communication, reduce desensitization, and improve response
10. Attend/Participate in Severe Maternal Morbidity Reviews
    - Was the diagnosis of sepsis or infectious disease made in a timely fashion?
      - Did the Early Warning System alert the team?
    - Were appropriate antibiotics used after diagnosis? How long to treatment?
    - Did the woman receive appropriate volume of IV fluids?
    - Were significant modifiable risk factors for infectious complications identified?

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