Clinical Flowchart for Medical Offices: Maternal Infection and Sepsis

Note signs of infection in patients who are pregnant, postpartum, postabortion, or breastfeeding:

- Fever, chills
- Urinary frequency, urgency, burning, pressure
- Persistent or worsening discomfort in chest, abdomen, flank, or back
- Cough, shortness of breath, difficulty breathing
- Persistent or worsening discharge, pain, or redness around a C-section incision, episiotomy, or perineal tear
- New or painful red streaks or lumps in the breast
- Vaginal discharge with foul odor

Obtain vital signs and assess for *SEPSIS* symptoms:

- **S** – Shiver, fever, or very cold
- **E** – Extreme pain or discomfort
- **P** – Pale, clammy, or discolored skin
- **S** – Sleepy, difficult to rouse, confused, restless
- **I** – "I feel like I might die."
- **S** – Short of breath

IMMEDIATELY REPORT ABNORMAL VITAL SIGNS OR SYMPTOMS TO A PROVIDER.

Provider: Assess for sepsis risk factors and potential sources of infection (see p. 2).
If infection is suspected, perform initial sepsis screen.

POSITIVE FOR POTENTIAL SEPSIS IF ANY 2 OF 4 CRITERIA MET:

- Oral temperature < 36°C (96.8°F) or ≥ 38°C (100.4°F)
- Heart rate > 110 beats per minute, sustained for 15 minutes
- Respiratory rate > 24 breaths per minute, sustained for 15 minutes
- White blood cell count > 15,000/mm3 or < 4,000/mm3 or > 10% immature neutrophils (bands)
- Hypotension (usually a later sign; do NOT delay escalation of care in the absence of hypotension) (see p. 2)

IF SEPSIS IS SUSPECTED, MONITOR CLOSELY AND IMMEDIATELY TRANSFER TO HIGHER LEVEL OF CARE:

- Request emergency medical services transport.
- Notify emergency department that you are transferring a suspected sepsis patient.

DO NOT WAIT FOR LAB RESULTS (E.G., WHITE BLOOD CELL COUNT) IF SEPSIS SCREEN IS OTHERWISE POSITIVE

Consider the following under direct provider supervision (if feasible in your setting), *but do not delay transfer for additional testing or treatment!*

- Obtain oxygen saturation level.
- Provide supplemental oxygen to maintain saturations of > 94%.
- Collect urinalysis, cultures (blood, urine, respiratory, wound, or others as indicated), serum metabolic panel, and serum lactate level.
- Check serum glucose level via peripheral finger stick (serum glucose of > 140 in the absence of diabetes can be an indicator of sepsis).
- If patient is pregnant, monitor fetal heart rate as appropriate for gestational age.
- Consult with obstetric or maternal-fetal medicine specialist.
- Start source-directed antibiotics (ideally **after** culture collection and within **1 hour** of sepsis diagnosis, but do not delay antibiotics solely to obtain cultures).

Flowchart adapted from CMQCC's Appendix D: Maternal Sepsis Evaluation Flow Chart, and UK Sepsis Trust's Screening and Action Tools for use in pregnancy.

Blood pressure and maternal sepsis

— Perinatal hypotension is defined as SBP < 85 mm Hg or mean arterial pressure (MAP) < 65 mm Hg or > 40 mm Hg decrease from usual SBP. (See Mean Arterial Pressure (MAP) for a calculator and more information.)

— In the setting of suspected maternal infection, MAP < 65 mm Hg is sufficient to initiate a sepsis protocol even if other sepsis screening criteria are not met.

— In the setting of suspected maternal infection with hypotension, if appropriately trained staff and supplies are available and if EMS transport is *not* immediately available, start crystalloid intravenous fluids: sodium chloride 0.9% or Lactated Ringer's solution administered at 20-30 mL/kg with frequent blood pressure checks and direct provider supervision until hypotension resolves.

— Persistent hypotension sustained for 15 minutes after 30mL/kg fluid load in the setting of maternal infection defines **septic shock**.

Risk Factors for Maternal Sepsis[1-3]

Maternal	Diabetes, obesity, and other chronic conditions which increase infection risk
Prenatal	Late entry to or lack of prenatal care, invasive tests during pregnancy, multiple gestation
Labor	Prolonged rupture of membranes, prolonged or obstructed labor, multiple vaginal examinations (> 3) during labor
Delivery	Cesarean section, home delivery (unplanned), preterm delivery, stillbirth, miscarriage, abortion
Postpartum	Retained placenta after birth, postpartum hemorrhage

Leading Causes of Maternal Sepsis[4]

Antepartum	Septic abortion Chorioamnionitis/intra-amniotic infection Pneumonia/influenza Pyelonephritis Appendicitis
Intrapartum/Immediate postpartum	Chorioamnionitis/intra-amniotic infection Endometritis Pneumonia/influenza Pyelonephritis Wound infection/necrotizing fasciitis
Postdischarge	Pneumonia/influenza Pyelonephritis Wound infection/necrotizing fasciitis Mastitis Cholecystitis

1 Bakhtawar S, Sheikh S, Qureshi R, Hoodbhoy Z, Payne B, Azam I, von Dadelszen P, Magee L. Risk factors for postpartum sepsis: a nested case-control study. BMC Pregnancy Childbirth. 2020 May 14;20(1):297. https://bmcpregnancychildbirth.biomedcentral.com/articles/10.1186/s12884-020-02991-z

2 Sepsis Alliance. Why Maternal Sepsis Is Such an Important Topic. 2018 Apr 23. https://www.sepsis.org/news/maternal-sepsis-important-topic/

3 Foeller ME, Sie L, Foeller TM, Girsen AI, Carmichael SL, Lyell DJ, Lee HC, Gibbs RS. Risk factors for maternal readmission with sepsis. Am J Perinatol. 2020 Apr;37(5):453-60. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7075723/

4 California Maternal Quality Care Collaborative. Improving Diagnosis and Treatment of Maternal Sepsis 2020 Jan 22. http://www.cmqcc.org/node/4253