Maternal Sepsis Morbidity and Mortality

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Maternal sepsis is an obstetric emergency and a leading cause of maternal morbidity and mortality. Early recognition in a pregnant and postpartum patient can be a challenge as the normal physiologic changes of pregnancy may mask the signs and symptoms of sepsis. Bedside assessment tools may aid in the detection of maternal sepsis. Timely and targeted antibiotic therapy and fluid resuscitation are critical for survival in patients with suspected sepsis. Once diagnosed, a search for etiologies and early application of source control measures will further reduce harms. If the patient is in septic shock or not responding to initial treatment, multidisciplinary consultation and escalation of care is necessary. Healthcare professionals should be aware of the unique complications of sepsis in critically ill pregnant and postpartum patients, and measure to prevent poor outcomes of sepsis in this population. Adverse pregnancy outcomes may occur in association with sepsis, and should be anticipated and prevented when possible, or managed appropriately when they occur. Using a standardized approach to the patient with suspected sepsis, may reduce maternal morbidity and mortality.

The purpose of this document is to review the epidemiology, common causes, clinical pearls for screening, diagnosis, treatment, and long-term sequelae of sepsis during pregnancy and postpartum. Because most cases occur outside of the hospital, it is crucial to educate patients about the warning signs to seek early medical care and for clinicians to engage in critical aberrancy, followed by bedside and laboratory evaluation of signs of end-organ injury, prompt antibiotic therapy, and restoration of perfusion (through fluid resuscitation and vasopressor administration), is critical for optimal outcomes. Screening for the long-term effects and referrals for treatment are key to patient recovery.

Incidence and Definition

Sepsis is the leading cause of pregnancy-related morbidity and mortality, with a mortality rate of 28.6% in non-obstetric population. Most of these deaths are believed to be preventable through early identification and treatment.[1] Physiologic changes of pregnancy overlap with early sepsis-induced vital sign abnormalities, making it more difficult for pregnant patients with sepsis to stand out, until later in the disease process. *Maternal sepsis,* defined as sepsis with onset during pregnancy or postpartum, is responsible for 10.7% of global maternal deaths.[2] In the United States (US) maternal sepsis is the fourth leading cause of maternal mortality, occurring in 0.4% of deliveries, but accounting for 23% of all deaths.[3] Contemporary data estimate that 63% of maternal deaths from sepsis may be preventable, and that for each maternal death, there are 50 women who experience life-threatening morbidity from sepsis. [4] Therefore, the early recognition, expedient evaluation, and appropriate management of maternal sepsis are necessary to reduce severe morbidity and mortality.

Sepsis, is defined as "life-threatening organ dysfunction cases by a dysregulated host response to infection." [5] *Septic shock* is defined as "a subset of sepsis in which particularly profound circulatory, cellular, and metabolic abnormalities are associated with a greater risk of mortality than with sepsis alone."[5] Furthermore, the diagnosis of septic shock requires the use of vasopressors and an elevated serum lactate above 2 mmol/L after adequate fluid resuscitation. Hemodynamically, cytokine-induced nitric oxide production by endothelium results in profound vasodilation (decreased systemic vascular resistance) and systemic hypotension (distributive shock).[6]

Why is maternal sepsis different?

	Maternal Physiology	**Sepsis**
Heart rate	Increased ↑	Increased ↑
White blood cell count (WBC)	Increased ↑	Increased or decreased ↑↓
Blood pressure (BP)	Increased or decreased ↑↓	Decreased ↓
Lactic acid	Increased ↑	Increased ↑

Pathophysiology of Sepsis and Septic Shock

Hypotension worsens by diffuse endothelial and glycocalyx injury (medicated by cytokines, elastases, proteases), resulting in third spacing with relative hypovolemia.[7] Although cardiac output is frequently increased as a result of minimal afterload, the heart is profoundly affected during sepsis (septic cardiomyopathy) with development of either systolic or diastolic dysfunction.[8] Systolic dysfunction is induced by direct myocardial contractile inhibition from cytokines; diastolic dysfunction may occur as fluid in third space collects, within the free wall of the left ventricular, obliterating its cavity and limiting diastolic preload filling.[9] Simultaneously, activated inflammatory cells (e.g. monocytes, neutrophils, macrophages) express tissue factor on their surfaces binding factor VII with activation of the clotting cascade through the extrinsic pathway.[9] Clinically, these pathophysiologic changes result in organ hypotension leading to multiple organ failure.

Excessive inflammatory response with cytokine overproduction causes:

- Increased nitric oxide production and diffuse endothelial damage;
- Inflammatory cells express tissue factor with activation of clotting cascade and microvascular thrombosis (pro-thrombotic state);
- Septic cardiomyopathy (systolic and diastolic dysfunction);
- Mitochondria dysfunction compromising aerobic metabolism resulting in increased serum lactate.

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Results in vasodilatory shock, hypovolemia, disseminated intravascular coagulation (DIC), and potential addition of cardiogenic shock.

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Hypoperfusion and end organ damage including: encephalopathy, acute respiratory distress syndrome (from lung endothelial injury), liver and kidney injury, bowel dysfunction (ileus), bone

marrow (thrombocytopenia, leukopenia, dysfunctional neutrophils, and prolonged clotting times from consumptive coagulopathy).

Causes of Sepsis and Risk Factors

The most common site of infection associated with sepsis is genitourinary (e.g., chorioamnionitis, endometritis, pyelonephritis). Other important sources during antepartum include septic abortion, pneumonia (bacterial and viral), and rarely central line-associated blood stream infection.[10] During the delivery hospitalization and postpartum, additional sources include pelvic abscess, pneumonia (bacterial and viral), wound infection (perineal and after cesarean delivery), necrotizing fasciitis, appendicitis, and acute cholecystitis. More rare sources include septic thrombophlebitis, endocarditis, and meningitis.

Bacterial organisms that are most common include: *Escherichia Coli*, group B streptococcus, and group A streptococcus, followed by unspecified staphylococcus and streptococcus, mixed organisms, and anaerobic organism.[11] Sepsis may also be caused by fungi and viruses such as influenza and severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).

An initiative to prevent maternal sepsis is the Stop, Look, and Listen Campaign focusing on maternal safety.[12] When a patient presents with concerns, 1) Stop assuming that complaints are typical of pregnant or postpartum patients, 2) Look and perform a thorough physical examination, and 3) Listen to the patient as she tells you what you her concerns are in own words. Using a patient-centered approach may help identify patients presenting with non-specific concerns that may be signs of developing sepsis.

Patient Factors: Obesity, impaired immunity or immunosuppressant therapy, anemia, impaired glucose tolerance, vaginal discharge, history of pelvic infection, history of group B streptococcal infection, Group A streptococcal infection in close contacts, age older than 35 years, disadvantaged socioeconomic background, congestive heart failure, chronic liver failure, systemic lupus erythematous.

Obstetric Factors: Cesarean delivery, retained products of conception, prolonged rupture of membranes, multiple gestation, cervical cerclage, amniocentesis or other invasive procedure, complex perineal lacerations, wound hematoma.

Screening Criteria for Sepsis

Multiple screening tools have been studied to help identify obstetric patients with sepsis. The ideal tool is one with high sensitivity allowing the identification of most patients with sepsis but with a limited number of false positives to limit unnecessary use of resources. The use of screening systems for early identification of sepsis has been shown to decrease severe maternal morbidity.[13] Sepsis Screening criteria for non-pregnant adults are:

I. Systemic Inflammatory Response Syndrome (SIRS)[14]
   - Oral temperature below 36°C (96.8°F) or above 38° C (100.4°F);
   - Heart rate above 90 beats per minute;
   - Respiration rate above 20 breaths / minute

- White Blood Count (WBC) above 12,000/mm^3 or below 4,000/mm^3 or above 0% bands.
- Positive if any 2 of 4 criteria are met.

Study combined pregnancy and postpartum data not reported.

II. National Early Warning Score (NEWS)[15]
- Parameters are given points according to degree of abnormality:
- Respiratory rate, oxygen saturation requiring supplemental oxygen;
- Temperature, Blood Pressure, Heart Rate and alert, voice, pain, unresponsive (AVPU) Score.
- Scoring system; 0 – 20 points; low risk (1 – 4), medium (5 – 6), high risk (7 and above).

33.7%/97% to predict Intensive Care Unit (ICU) admission or death (5 points)[16]

III. Modified Early Warning Score (MEWS)[17]
- Parameters are given points according to degree of abnormality;
- Systolic blood pressure, heart rate, respiratory rate, temperature and AVPU score;
- Score of 5 or more points associated an increased risk of death, ICU admission, and step-down admission.

14.8%/97.0% to predict ICU admission or death (5 points).[18] 100%/50.6% (up to 2 week postpartum to predict ICU admission.[16]

IV. Electronic Cardiac Arrest Triage Score (eCART)
- Parameters are given points according to: age, respiratory rate, heart rate, diastolic blood pressure, systolic blood pressure;
- Number of ICU stays, temperature pulse pressure index, oxygen saturation;
- Mental status, sodium, potassium, bicarbonate, anion gap, blood urea nitrogen (BUN), creatinine, glucose, calcium, white blood cell (WBC) count, hemoglobin, platelet count, albumin, total bilirubin, aspartate transaminase (AST), alkaline phosphatase.

40.9%/97.0% (score above 0.006 to predict ICU admission or death.[19]

Pregnancy-adjusted sepsis screening tools.

V. Sepsis-Associated Adverse Outcomes (SAAP) in Pregnancy Screening Tool[20]
- Points are given according to when the following are present: WBC count higher than 16.0 x 10^9/L,
- Systolic blood pressure below 90 mm Hg,
- Respiratory rate 22 breaths/minute or higher,
- Heart rate 120 beats per minute or higher,
- Lactic acid 3 mmol/L or higher,
- Abnormal radiography, computed tomography (CT), magnetic resonance imaging (MRI), or ultrasound,
- Score of 7 or higher is a positive score and associated with a composite of maternal outcomes.

71%/73% to identify severe maternal adverse outcomes.[20]

VI. UK Obstetric Surveillance System.[21]

- Temperature below 36ºC or above 38ºC,
- Heart rate above 100 beats per minute,
- Respiratory rate above 20 breaths/minute,
- WBC count above 17 x 10^9/L or below 4 x 10^9/L or with 10% immature band forms,
- Positive if any 2 of 4 criteria are met if measures on 2 occasions (at least 4 hour apart for temperature, heart rate, respiratory rate).

VII. California Maternal Quality Care Collaborative.[22]

- Oral temperature below 36ºC (96.8ºF) or above 38ºC (100.4ºF),
- Heart rate above 110 beats per minutes,
- Respiratory rate above 24 breaths per minute,
- WBC count above 15,000/mm^3 or below 4,000/mm^3 or above 10% bands,
- Positive if any 2 of 4 criteria are met (sustained for 15 minutes).

Severe maternal morbidity screening tools.

VIII. Maternal Early Warning Trigger Tool (MEWT)[23]

Red criteria (any 1 sustained for more than 20 minutes)

- Heart rate less than 50 or more than 130 beats per minutes;
- Respiratory rate less than 10 or more than 30 breaths/minute;
- Pulse oximetry below 90%;
- Blood pressure above 160/110 mm Hg;
- Mean arterial pressure below 55 mm Hg;

Yellow criteria (any 2 sustained for more than 20 minutes)

- Heart rate above 110 beats per minutes;
- Respiratory rate above 24 breaths/minute;
- Pulse oximetry below 93%;
- Blood pressure below 85/45 mm Hg;
- Temperature below 36ºC or above 38ºC;

31.4%/98.1% to identify ICU admission or death (2 yellow or 1 red criteria)[23]

IX. Safe Motherhood Initiative (modified Maternal Early Warning Criteria)[24]

Positive if any 1 criterion is met, sustained for 20 minutes.

- Systolic blood pressure below 90 or above 160 mm Hg;
- Diastolic blood pressure above 100 mm Hg;
- Heart rate below 50 or above 120 beats per minute;
- Respiratory rate below 10 or more than 24 breaths/minute;
- O_2 saturation on room air less than 95%;
- Oliguria less than 35mL/hour for 2 hours;
- Temperature below 36ºC or above 38ºC;
- WBC count less than 4,000/mm^3 or more than 15,000/mm^3;
- Maternal agitation, confusion or unresponsiveness.

53.3%/88.9% to identify ICU admission or death.[24]

When the optimal tool is being selected, it is important to consider the timing of maternal evaluation. When there is concern of sepsis, we suggest further assessment with bedside and laboratory evaluation for signs of end-organ injury to confirm diagnosis. Once sepsis is identified, evaluation for escalation of care is a critical step. In patients who died of sepsis, one of the critical findings has consistently been a delay in escalation of care.[25] The Sepsis in Obstetrics score has been prospectively validated to identify patients at risk of ICU admission with a score of 6 points or more. A bedside user-friendly version is available at perinatology.com.[25]

Treatment and Stabilization

We suggest prompt treatment with any signs of end-organ injury even if they do not meet qSOFA (Quick Sequential Organ Failure Assessment), or any other screening criteria. The diagnosis of sepsis, immediate hemodynamic resuscitation is mandatory because even short delays in treatment resulting in hypotension and tissue hypoperfusion increase morbidity and mortality.[26] Early administration of broad-spectrum antibiotics decreases mortality in patients with sepsis. In a case-control study of 7 centers, pregnant patients with sepsis who received antibiotic treatment within 1 hour, had an 8% mortality compared with 20% mortality in patients who received antibiotic treatment after 1 hour.[27]

Initial management of pregnant patient with sepsis:

Sepsis Suspected (Initial 6 basic steps)

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- Broad-Spectrum antibiotics;
- Fluid resuscitation (1-2 liters balanced crystalloid) within the first 3 hours of resuscitation. Mean arterial blood pressure (MAP) >65 mm Hg;
- Serum lactate;
- Obtain cultures as indicated;
- Initiate source control planning;
- Early use of norepinephrine if there is no fluid response (may administer peripherally).

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Hemodynamics:

- Periodically reassess fluid responsiveness with dynamic measures of preload (pulse pressure variation, passive leg raising, inferior vena cava sonographic evaluation);
- If septic shock, start hydrocortisone 200 mg/day (50 mg intravenously (IV) every 6 hours or as continuous infusion) with or without fludrocortisone;
- Add second-line pressor if hypotension persists.

Organ support:

- Lung protective mechanical ventilation (tidal volume 6-8 mL/kg)
- Deep vein thrombosis (DVT) prophylaxis with low molecular weight heparin (if high risk of bleeding), mechanical prophylaxis only for the low risk of DVT;
- Transfuse to maintain hemoglobin above 7 g/dL;

- Initiate insulin (preferably intravenously) if serum glucose >180 mg/dL and maintain below 200 mg/dL;
- Early enteral feeding within 72 hours of admission.

Fetal:

- Consider fetal monitoring if viable pregnancy;
- Administer steroids to enhance fetal lung maturity as indicated;
- Delivery not indicated for maternal indications unless uterine source for sepsis is present;
- Consider delivery if need for escalating care resulting in potential life-threatening hypotension/hypoperfusion or hypoxemia for potentially viable fetus.

Of note, lactic acid level interpretation is challenging in peripartum period. According to recent data, healthy patient can have significantly elevated lactic acid levels above 4 mmol/L during the second stage of labor and at the time of the delivery.[28] The same study suggested that outside of active labor, lactate levels should be expected to be around 2 mmol/L. No studies have evaluated when elevated levels should return to normal. According to high-intensity exercise literature, levels should be expected to return to normal levels within 30 minutes to 1 hour after delivery.

Inability to achieve a mean arterial pressure above 65 mm Hg despite fluid therapy, norepinephrine, and steroids commonly will require the second line vasopressors such as vasopressin or epinephrine.[29] Addition of a second vasopressor will require placement of a central venous catheter, if not already done. In non-pregnant individuals, vasopressin is recommended second-line agent; however, evidence for its use during pregnancy is limited. Despite theoretical concerns of oxytocin receptor activation with vasopressin administration, in the setting of refractory septic shock during pregnancy, addition of vasopressin as a life-saving intervention is reasonable. It is important to note that vasopressin is administered as a fixed dose (0.03 units/minute) and should not be titrated because higher doses my result in severe vasoconstriction and multi-organ ischemia. Alternatively, epinephrine may be added at a started dose of 0.02 – 0.03 micrograms/kg/minute titrated to a mean arterial pressure of 65 mm Hg.[29]

Commonly Used Empiric Antibiotics and Antiviral Regimens

Ideally, patients with high clinical suspicion of sepsis and those with septic shock should receive broad-spectrum antibiotics within 1 hour of presentation.[30] For patients who are not in shock and in whom the diagnosis of sepsis is unclear, current recommendations for non-pregnant individuals suggest that antibiotics should be started within 3 hours if no alternative diagnosis has been established. Our suggestion below provides antibiotic selection for common infections in pregnant and postpartum patients.

- Community-acquired meningitis: ceftriaxone and vancomycin.
- Community-acquired pneumonia: ceftriaxone and azithromycin.
- Endocarditis: vancomycin and gentamicin (add rifampin if prosthetic valve).
- Complicated abdominal-pelvic infections: monotherapy with any of meropenem, imipenem, ertapenem, or piperacillin-tazobactam or combination therapy with levofloxacin plus metronidazole or ceftriaxone plus metronidazole.
- Chorioamnionitis: ampicillin plus gentamicin (add metronidazole for anaerobic coverage if cesarean delivery).

- Endometritis: monotherapy with piperacillin-tazobactam, meropenem, ertapenem, or imipenem or combination therapy with ampicillin plus gentamicin plus metronidazole or levofloxacin plus metronidazole.
- Urinary tract infection (pyelonephritis): ceftriaxone.
- Necrotizing soft tissue infection (e.g., necrotizing fasciitis): vancomycin plus meropenem (consider adding clindamycin or linezolid to decrease exotoxin production).
- Influenza pneumonia: oseltamivir.
- Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pneumonia: remdesivir.

Fetal Management and Delivery Planning

There is no evidence that in the absence of chorioamnionitis, delivery of the fetus will improve maternal sepsis outcomes. If indicated, betamethasone or dexamethasone may be administered if preterm delivery is anticipated within 7 days.[31] The addition of magnesium sulfate for neuroprotection will depend on sepsis severity and should be individualized because of potential harms, including worsening shock secondary to vasodilatory effect of magnesium and magnesium toxicity in the setting of sepsis-associated acute kidney injury.

Clinicians must be aware that many non-reassuring fetal heart tracing may improve with fluid resuscitation and vasopressin therapy. Although delivery is usually indicated only for obstetric indications (in the absence of chorioamnionitis), delivery may be prudent in unstable patients with sepsis with escalating treatment requirements (e.g., significantly increased need of vasopressors, prolonged periods of systemic hypotension, worsening respiratory status resulting in significant hypoxemia). In the setting of severe respiratory failure secondary to sepsis, delivery for maternal indications is not indicated.

Post-sepsis Syndrome

Post-sepsis syndrome is characterized by cognitive dysfunction and physical and psychological impairment. However, many patients may experience some symptoms without the entire constellation of symptoms. Given the high frequency of mood disorders in postpartum period and after severe maternal morbidity, we suggest that patients receive screening for depression, anxiety, and post-traumatic stress disorder (PTSD) after sepsis for up to 1 year postpartum.[32]

Consistent with Surviving Sepsis Campaign guideline, we recommend the following:[32]

- Providing patient education about common sequalae after sepsis.
- Assessing and referring for physical, cognitive, and psychological sequelae.
- Referring to a post-critical illness multidisciplinary clinic if available.
- Including in-hospital discharge plans for follow-up with clinicians able to assess, refer, and manage new and long-term sequelae.

A common theme in qualitative interviews of maternal sepsis survivors was that many had long term effects but had difficulty obtaining screening and referral for treatment. Referral to physical therapy, occupational therapy, speech therapy (for difficulty swallowing) and regular assessments of depression, anxiety, and PTSD are highly recommended.

Important Strategies for Early Diagnosis and Management of Maternal Sepsis:[34]

1. **Recognition is Key:** always maintain a high index of suspicion of sepsis.
2. **Implement a rapid bedside tool for detection of maternal deterioration:** bedside assessment tools, such as qSOFA (quick Sepsis-related Organ Failure Assessment), are available to predict mortality in patients with suspected sepsis. **And move fast during the golden hour to save lives.**
3. **Move fast during the "golden hour" to save lives:** the concept of the golden hour of sepsis highlights the importance of timely initiation of antibiotic treatment to improve outcomes. Initiation of effective antimicrobial therapy within the first hour of diagnosis is associated with high rate of survival. Implement sepsis bundles to facilitate rapid escalation of care.
4. **Move fast during the golden hour to save lives:** laboratory and radiology studies are keys to identifying the etiology and gaining source control.
5. **Move fast during the golden hour to save lives:** know the source of information and pathogen, their origin, and that group A streptococcus (*Streptococcus* pyogenes) kills quickly. Genitourinary infections are the most common source of infection throughout pregnancy and postpartum. Respiratory infections (SARS-CoV-2) are equally distributed during pregnancy and postpartum. Sepsis from endomyometritis, mastitis, gastrointestinal, and soft tissue sources are more commonly encountered postpartum.
6. **Move fast during the golden hour to save lives:** choose antimicrobial tailored to the most likely diagnosis. If a viral or fungal etiology is suspected, targeted antimicrobial treatment can be concurrently administered.
7. **Move fast during the golden hour to save lives:** fluid resuscitation should be initiated rapidly for patients with a blood lactate level greater than 4 mmol/L or mean arterial pressure less than 65 mm Hg. Crystalloid fluids (e.g., lactated Ringer's solution or normal saline) are the mainstay of therapy. Passive leg raise may be less predictive of fluid responsiveness in the third trimester due to occlusion of the great vessels by the uterus.
8. **Beyond the golden hour:** escalation of care is critical to survival. Pregnant and postpartum patients with septic shock have significantly higher rates of disseminated intravascular coagulation (DIC), altered mental status, total bilirubin greater than 4 mg/dL, failure in 3 or more organ systems, and maternal death when compared with patients without septic shock. If the mean arterial pressure of 65 mm Hg or greater cannot be maintained with adequate fluid resuscitation, vasopressors should be initiated.
9. **Beyond the golden hour:** once the patient is stabilized, get to the source of the problem. It refers to removing as much as a nidus of infection as possible. Source control may be accomplished using surgical or procedural interventions, removal of foreign bodies associated with infection, such as catheters and intravenous access, and optimization of medications that concentrate in the targeted anatomical areas. Surgical debridement, delivery, uterine evacuation or curettage or even hysterectomy may be required.
10. **Beyond the golden hour:** anticipate and prevent adverse pregnancy outcomes. Sepsis as a lone diagnosis is not an indication of delivery unless intraamniotic infection is suspected. Antenatal corticosteroids should be considered if the gestational age is less than 34 weeks.

Prevention

Prevention of sepsis focuses on prevention of developing infections and prompt treatment when an infection occurs. Some peripartum indications for antibiotics include preterm premature rupture of membranes, group B streptococcus carrier status, chorioamnionitis, and third- or fourth-degree lacerations.[14,33] Infection prevention practices specific for cesarean delivery include the use of electric clippers instead of razor for hair removal, preoperative surgical site skin preparation with an alcohol-based agent, cefazolin administration within 60 minutes before incision for antibiotics prophylaxis, redosing of cefazolin after 1,500 mL estimated blood loss or lengthy procedures (longer than 4 hours), and addition of azithromycin for patients in labor or with ruptured membranes.[14,33]

Summary

Maternal sepsis is a leading cause of maternal mortality and morbidity. Antepartum and post-partum sepsis is a leading cause of preventable maternal morbidity and mortality. Three key delays have been associated with maternal deaths: delays in recognition, delays in treatment, and delays in escalation of care. Key strategies to early identification include patient education about warning signs requiring immediate medical care and screening for abnormal vital signs that would trigger bedside and laboratory evaluation for end-organ injury. Once sepsis is identified, critical steps include administrating broad-spectrum antibiotics therapy, providing fluid resuscitation, administering norepinephrine to maintain mean arterial pressure above 65 mm Hg, obtaining cultures, monitoring lactic acid levels, and providing early source control. Survivors of sepsis may experience long-term effects, and follow-up for assessment and treatment of post-sepsis sequelae is critical.

Recognition of maternal sepsis remains a challenge for healthcare workers as the signs and symptoms of maternal sepsis often overlaps with the normal physiologic changes of pregnancy. Once diagnosed, appropriate antibiotics should be initiated within the first hour, and hypoperfusion corrected. Further evaluation for end-organ damage and a search for etiologies of maternal sepsis and application of source control measures may reduce morbidity and mortality. Whether the patient is in septic shock or not responding to initial treatment, rapid escalation of care with multidisciplinary collaboration is necessary to optimize outcomes. In summary, early recognition, focused evaluation, and expedient treatment tailored to the most likely etiology of maternal sepsis, including aggressive source control, are necessary steps to reduce maternal morbidity and mortality from sepsis.

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