Maternal Sepsis
Prevention, Recognition, Treatment

1. Risk Factors

- Community Conditions:
  - Long distance from health care facility
  - Delivery by unauthorized attendant
  - Delay in seeking treatment
  - Low socioeconomic status
  - Lack of transportation

- Maternal Conditions:
  - Impaired glucose tolerance
  - Invasive procedures
  - Septic shock
  - Prior infection
  - Inadequate nutrition
  - Pre-eclampsia
  - Obstetric conditions
  - Malnourishment

2. Prevent

- Maintain good hand washing practices
- Malana screening
- Avoid premature rupture of membranes
- Keep all delivery areas clean
- Provide access to electricity

3. Recognize: Symptoms

- Maternal conditions:
  - Augmentation of the birth process
  - Maternal death 10 days postpartum

- Labor:
  - Vaginal examination
  - Monitoring of fetal heart rate

- Symptoms:
  - Uterine tenderness
  - Fever
  - Chills
  - Leukocytosis

- Clinical features:
  - Severe headache
  - Seizures
  - Systolic pressure <90 mmHg

4. For more detailed information, see text on the reverse side of this leaflet

5. Investigate: Laboratory

- Blood cultures
  - Vaginal/rectovaginal cultures

- Blood chemistry:
  - Blood glucose
  - Sodium
  - Potassium
  - Calcium

- Intrauterine fetal blood

6. Resuscitate

- Pneumonia
- Electronic fetal monitoring if maternal pyrexia

- Antibiotics & Bacteria

- Chorioamnionitis:
  - Each hour of delay in the initiation of appropriate and adequate intravenous antibiotics once sepsis is diagnosed reduces survival by 6–8%.

- Endometritis:

- What Bacteria Are You Covering?
  - GAS (Streptococcus pyogenes)
  - Escherichia coli
  - Staphylococcus aureus
  - Streptococcus pneumoniae
  - MRSA
  - Clostridium septicum
  - Morganella morganii

- Often there is a mixed infection with Gram positive and Gram negative organisms

- Antibiotic Regimens:
  - Ampicillin 2 g IV q 6 hours + Gentamicin 1 mg/kg IV q 8 hours
  - Unasyn (ampicillin sulbactam) 3 g IV q 6 hours
  - Ticarcillin-clavulanate 3.1 g IV q 6 hours
  - Cefoxitin 2 g IV q 6 hours

- If cesarean delivery is performed, add metronidazole 500 mg IV X 1 or clindamycin 900 mg IV should provide 1 additional dose following delivery

- Clindamycin 900 mg IV q 8 hours + Gentamicin 1.5 mg/kg IV q 8 hours
- Amoxicillin 1 g IV q 8 hours + Gentamicin 1 mg/kg IV q 8 hours
- Metronidazole 250 mg IV q 8 hours
- Other options:
  - Cefotaxim
  - Ceftriaxone
  - Cefazolin
  - Piperacillin/tazobactam

- EMN (Escherichia coli, M. morganii, N. meningitidis)

- Multi-organ failure
- Hypoglycemia
- Hypothermia

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### Maternal Sepsis Risk Factors

**Risk factors for puerperal sepsis surround the following three central components:** 1) community-related factors, 2) delivery conditions, and 3) maternal comorbid conditions.

#### Community-related factors

- **Risk scores:** used to stratify patients into risk categories based on the likelihood of complications (e.g., Modified Early Obstetric Warning Score). These scores can help in predicting maternal mortality and guiding management.

#### Delivery conditions

- **Delivery outcomes:** can be significantly influenced by maternal factors. For example, the presence of diabetes, hypertension, or a history of puerperal sepsis can increase the risk of sepsis during delivery.

#### Maternal comorbid conditions

- **Maternal comorbidities:** can significantly affect the risk of sepsis. Conditions such as diabetes, cardiovascular disease, and renal failure are associated with an increased risk of sepsis.

### Maternal Sepsis Evaluation

#### Step 1: Assess Severe Maternal Illness

- **Signs of severe maternal illness:** should be sought aggressively and addressed expeditiously. Administration of intravenous broad spectrum antibiotics is indicated.

#### Step 2: Complete Initial Blood Cultures

- **Blood cultures:** should be obtained the moment sepsis is considered. The source of sepsis should be sought aggressively and addressed expeditiously.

#### Step 3: Severe Maternal Morbidity

- **Significant signs:** that should encourage one to evaluate and treat a patient for sepsis include but are not limited to:
  - Significant maternal hypotension or elevations in the maternal serum lactate level that persist despite fluid resuscitation
  - Respiratory failure (respiratory rate >20 breaths per minute)
  - Pyrexia (temperature >38.5°C once, or >38.0°C on two occasions 4 hours apart)
  - Heart rate >100 bpm; >90 bpm in puerperium
  - Worsening vaginal bleeding
  - Increased vaginal discharge
  - Multi-organ dysfunction (e.g., respiratory, renal, gastrointestinal)

### Maternal Sepsis Recognition

#### Step 1: Identify Severe Maternal Morbidity

- **Susceptible patient:** is a woman who has developed sepsis. Women with severe maternal morbidity are at high risk for developing sepsis.

#### Step 2: Identify Clues of Maternal Septic Shock

- **Signs of septic shock:** can include hypotension, tachycardia, and altered mental status.

### Maternal Sepsis Antagonists

**Organisms most frequently identified in women with maternal sepsis:**

<table>
<thead>
<tr>
<th>Organism</th>
<th>Frequency</th>
<th>Penicillin-resistant</th>
<th>Clindamycin-resistant</th>
<th>MRSA-resistant</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>50–60%</td>
<td>30%</td>
<td>70%</td>
<td>20%</td>
</tr>
<tr>
<td><em>Escherichia coli</em></td>
<td>30–40%</td>
<td>50%</td>
<td>70%</td>
<td>10%</td>
</tr>
<tr>
<td><em>Proteus species</em></td>
<td>10–20%</td>
<td>50%</td>
<td>70%</td>
<td>10%</td>
</tr>
<tr>
<td><em>Aeromonas hydrophila</em></td>
<td>5–10%</td>
<td>50%</td>
<td>70%</td>
<td>10%</td>
</tr>
</tbody>
</table>

**Common sources of maternal sepsis:**

- **Infections:** include urinary tract infections, wound infections, and endometritis.

#### Antimicrobial Therapy

- **Empiric therapy:** should be initiated based on the likelihood of specific pathogens. Broad-spectrum antibiotics are often used initially, followed by targeted therapy based on culture results.

**Bacterial antibiotics:**

- **Penicillin-resistant strains:** may be resistant to penicillin but susceptible to clindamycin.

**Antibiotics for severe maternal sepsis:**

- **Clindamycin:** covers most streptococci and staphylococci including many MRSA species; inhibits production of peptidoglycan.
- **Vancomycin:** targets MRSA.
- **Cefuroxime:** covers group B streptococcal infections.
- **Cefoxitin:** covers MRSA.

**Antimicrobial therapy recommendations:**

- **Maternal sepsis:** requires prompt and aggressive treatment.
- **Clindamycin** or **vancomycin** should be administered empirically.
- **Cefuroxime** or **cefotaxime** should be added if there is a high suspicion of endometritis.
- **Metronidazole** should be added for anaerobic infections.
- **Cefazolin** may be added if there is a high suspicion of group B streptococcal infection.

**Clinical implications:**

- **Sepsis in obstetric patients:** requires prompt and aggressive treatment.
- **Antimicrobial therapy:** should be initiated based on the likelihood of specific pathogens.

### Implications & Definition

- **Severe maternal illness:** is defined as a condition that is life-threatening and requires immediate medical attention.

- **Severe maternal morbidity:** is defined as a condition that results in severe maternal illness or death.

- **Sepsis in obstetric patients:** refers to maternal sepsis that occurs during pregnancy, childbirth, or within 42 days of the end of pregnancy.