Maternal Sepsis and Septic Shock: detection, investigation and management

Aim
To promote the appropriate and timely detection, investigation and management of maternal sepsis at KEMH.

Note: Other related KEMH clinical guidelines
1. Postpartum Infections (for obstetric patients with suspected infection without organ dysfunction)
2. Group A streptococcus (new guideline by Infection Prevention and Management- coming soon)

Background and Definitions¹⁻³

Sepsis and septic shock

Sepsis is defined as 'life-threatening organ dysfunction caused by a dysregulated host response to infection'. Organ dysfunction may be identified by the following variable on a qSOFA (quick Sequential Organ Failure assessment): respiratory rate > = 22 /min, altered mentation, systolic BP < = 100 mm Hg

Septic shock is defined as a subset of sepsis in which underlying circulatory, cellular, and metabolic abnormalities are associated with a greater risk of mortality than sepsis alone. Adult patients with septic shock can be identified using the clinical criteria of hypotension requiring use of vasopressors to maintain mean blood pressure of 65 mm Hg or greater and having a serum lactate level greater than 2 mmol/L persisting after adequate fluid resuscitation.

Severe sepsis with acute organ dysfunction has a mortality rate of 20–40%, rising to around 60% if septicaemic shock develops¹

Key Points
1. Abdominal pain, pyrexia (> 38°C) and tachycardia (> 90 beats / minute in the puerperium) are indications for blood cultures, prompt administration of IV antibiotics and senior clinical review.
2. Monitoring of the woman with suspected or established sepsis should be multidisciplinary but preferably under the leadership of a single consultant in
the Adult Special Care Unit (ASCU). A Consultant Obstetrician should be involved in consultation with an anaesthetists and microbiologist.

Signs and Symptoms

“Red Flag” symptoms:

- Pyrexia >38°C (common but its absence does not rule out sepsis)
- Hypothermia < 36°C (a significant finding that may indicate severe infection)
- Persistent tachycardia > 90 beats per minute.
- Tachypnoea (RR > 20 breaths / minute).
- Abdominal or chest pain
- Diarrhoea or vomiting – may indicate exotoxin production (early toxic shock)
- Rash (generalised streptococcal maculopapular rash or purpura fulminans). Any widespread rash suggests early toxic shock syndrome, especially if conjunctival Hyperaemia or suffusion is present.

- Abdominal / pelvic pain and tenderness (severe lower abdominal pain and severe ‘after pains’ that require frequent analgesia or do not respond to the usual analgesia are also common important symptoms of pelvic sepsis).
- Extreme patient anxiety / distress
- An abnormal or absent fetal heart may be secondary to sepsis.

Other symptoms of potential relevance

- Offensive vaginal discharge (offensive suggests anaerobes; serosanguinous suggests streptococcal infection).
- Productive cough
- Urinary symptoms
- General non-specific signs such as lethargy, reduced appetite.
- Breast engorgement / redness
- Delay in uterine involution, heavy lochia.
- Wound infection, spreading cellulitis or discharge

Severe pain out of proportion to the clinical signs may suggest deep infection and necrotising fasciitis / myositis should be considered.

Management of Suspected / Confirmed Severe Sepsis

The aim of management is to stabilise the patient while diagnosing and treating the underlying cause. The response to treatment in this group of patients is highly unpredictable and mortality is high. Treatment is more likely to be effective, and severe sepsis avoided if appropriate therapy is started early.

A multidisciplinary team approach is required including obstetricians, midwives/nurses, anaesthetists, microbiologists and critical care staff. The Infection Prevention and Control Clinical Nurse Consultants should be notified if necessary.
Critically ill patients should be cared for in ASCU or transferred to an ICU.

**Within the First Hour**

- High flow oxygen to achieve saturation > 94%
- Blood cultures. Do not delay the administration of antibiotics or wait for the results of investigations.
- If a staph aureus blood stream infection is suspected remove any potentially infected devices e.g. cannulae
- Intravenous antibiotics.
- IV fluid resuscitation
- Measure lactate and Hb: ensure Hb > 70g / L
- Monitor the hourly urine output (catheterise if organ dysfunction is apparent).
- NSAIDS should be avoided for pain relief in cases of sepsis as they impede the ability of polymorphs to fight GAS infection.
- Measure and fit Graduated Compression Stockings.
- Women suspected of or diagnosed with group A Streptococcus sepsis should be isolated in a single room with ensuite facilities to minimise the risk of spread to other women. Refer to the GAS Policy

**Monitoring**

- Respiratory rate, oxygen saturation, heart rate, blood pressure, consciousness, pain score every 15 minutes. In severely compromised patients consider arterial access to provide MAP and Blood Pressure monitoring.
- Temperature hourly (frequency may be altered depending on the maternal condition).
- Strict fluid balance – consider catheterisation and hourly urine measurement.
  - **In antenatal patients** If > 25 weeks, perform a CTG (between 23-25 weeks a CTG is performed at the discretion of the obstetrician).
  - If < 25 weeks auscultate the fetal heart intermittently.
  - Assessment of fetal wellbeing should be individualised to patient circumstances and may include intermittent fetal heart rate auscultation, and/or CTG.
  - Observe PV loss / amniotic fluid.
- In postnatal patients, observe the lochia, wound / drain sites and perineum.
- In septic shock, perform the observations above plus
  - 12 lead ECG
  - Consider CVP
Investigations

- Arterial blood gas measurement (to assess for hypoxia and measurement of the serum lactate).
- FBC, coagulation, G&S, U&Es, LFT, CRP.
- Obtain blood cultures prior to antibiotic administration provided this does not delay antibiotic administration.
- Culture from other sites as guided by clinical suspicion e.g. MSU, HVS, wound swab, breast milk, stool, respiratory secretions, CSF, placental swabs and neonatal swabs.
- Amniocentesis for microbiology studies may be warranted if chorioamnionitis is suspected.
- Take a throat swab if the woman presents with a sore throat / respiratory symptoms (gel swab for bacterial MC &S (Group A streptococcus throat carriage) dry swab for influenza + respiratory viral pathogen PCR.
- Check previous and recent microbiology results as these may indicate the nature of the likely pathogen.
- Imaging studies (USS/CXR, CT scan) to identify / sample any source of infection as appropriate.
- Check the blood glucose

Clinical Care

Airway and Breathing

- Maintain adequate oxygenation. Use supplemental High Flow Oxygen Therapy (15L/minute) via a non-re-breathable mask to maintain Sp02 > 94% unless the patient is a C02 retainer, in which case contact medical staff.

Circulation

- Hypovolaemia is present in almost all patients with septic shock. Fluid resuscitation is the mainstay of management. With hypotension and / or lactate > 4mmol/L administer a minimum of 20mL / kg of crystalloid / colloid. Use vasopressors for hypotension not responding to the initial fluid resuscitation to maintain a mean arterial pressure (MAP) > 65mmHg.
- Invasive monitoring should be considered if the woman is not responding to simple resuscitation.
Antibiotic Therapy

All cases of sepsis / septic shock should be discussed with the clinical microbiologist on-call to optimise the empiric regimen for the patient’s circumstances. Do not delay the initiation of antimicrobial therapy in critically unwell patients. Initial regimens can be modified after microbiology advice is given if required. Important information which should be provided to the microbiologist includes:

- Vital signs
- Suspected sites for infection
- Past microbiology results
- Known micro alerts for resistant organisms
- Antibiotic allergies
- The presence of renal dysfunction

Intravenous broad-spectrum antibiotics should be started as early as possible and always within the first hour of recognising sepsis.

**Maternal sepsis (peri or postpartum) if the source is unclear, empiric management.**

If normal renal function and NO beta lactam allergy:
For **Septic shock** administer Meropenem 1g IV.
- Any subsequent doses of Meropenem require microbiology approval
- *If* Group A streptococcal infection is suspected
  Add clindamycin 600mg-900mg g IV 8 hourly
For all other presentations:
  Piperacillin + Tazobactam (4 + 0.5g IV 8 hourly)
Contact the microbiologist on call as soon as practicable.

If the woman is penicillin allergic (not immediate hypersensitivity) with normal renal function:
For **septic shock in patients** - administer 1g of Meropenem IV.
- Any subsequent doses of meropenem require microbiology approval

*If group A streptococcal infection is suspected*,
- Add clindamycin 600mg-900mg TDS IV 8 hourly.
For all other presentations:
  Ceftriaxone 2g daily + metronidazole 500 mg BD
Contact the microbiologist on call as soon as practicable.
NB none of the above empiric regimens are suitable for MRSA sepsis. If MRSA is known or suspected, vancomycin will need to be included in the antimicrobial regimen according to microbiology advice.

The antimicrobial regimen should be reassessed when culture results become available. If and when a specific organism is identified, antibiotic therapy can be modified to the most appropriate regimen. Duration of therapy should be typically 7 – 10 days; longer courses may be appropriate in women who have a slow clinical response, non-drainable focus of infection or immunological deficiencies, including neutropenia or who are proven to have a \textit{S. aureus} bacteraemia.

**Remove Infected Foci**

The focus of the infection should be identified as a priority and dealt with. This may be by uterine evacuation or by drainage of a breast, wound or pelvic abscess, haematoma drainage or removal of potentially infected devices e.g. cannulas.

**Blood Products**

- Red blood cells should be given when the haemoglobin is less than 70g/L with the aim of achieving a target haemoglobin of 70-90g/L. A higher Hb may be required in special circumstances e.g. acute haemorrhage or lactic acidosis.

- It is common for patients with severe sepsis to develop a coagulopathy and thrombocytopenia. If the woman is not actively bleeding and no invasive procedure is planned it may be possible to manage the coagulopathy conservatively. The management of these patients is complex and individual assessment is dependent upon the clinical picture, current laboratory results and presence of comorbidities. This requires input from the on call Consultant Haematologist.

- Administer platelets only in consultation with the on call haematologist and when the platelet count is
  - \(< 5 \times 10^9\) regardless of bleeding
  - \(5 – 30 \times 10^9\) and there is a significant risk of bleeding
  - \(> 50 \times 10^9\) are required for surgery or invasive procedures

**For urgent blood product requests in the septic patient, contact the Transfusion Laboratory Scientist by telephone to prioritise release.**

**If the woman is penicillin or cephalosporin allergic with immediate hypersensitivity with no renal impairment:**

- \textbf{Gentamicin IV} (administer this first as it can be given as a push dose)
- plus clindamycin 600mg-900 mg IV 6 hourly.

Contact the microbiologist on call as soon as practicable.
Fetal Monitoring and Delivery

- In a critically ill pregnant woman, delivery of the baby may be considered if it would be beneficial to the mother or the baby or to both.

- Decision on the timing, place and mode of birth should be made by a consultant obstetrician following consultation with the woman if her condition allows.

- If preterm birth is anticipated, cautious consideration should be given to the use of antenatal corticosteroids for fetal lung maturity in the woman with sepsis.

- During the intrapartum period continuous CTG is recommended and changes in the CTG must prompt reassessment of maternal MAP, hypoxia and acidaemia.

- Epidural / spinal anaesthesia should be avoided in women with sepsis and a general anaesthetic is usually required for caesarean section.

- Prophylaxis for the Neonate, other family members and Health Care Workers when the mother has invasive group A streptococcal infection—see Infection Prevention and Control Manual

Debrief

Women whose pregnancies have been complicated by severe sepsis should be reviewed and debriefed by the consultant obstetrician prior to discharge. A postpartum outpatient review should be considered to discuss the events.

References

## Related WNHS policies, procedures and guidelines

<table>
<thead>
<tr>
<th>KEMH Infection Control Manual</th>
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<td>KEMH Clinical Guideline  Infections Postpartum</td>
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### Standards Applicable:
- NSQHS Standards: 1 Clinical Care is Guided by Current Best Practice,
- 3 Infection Control, 4 Medication Safety; 7 Blood Products, 9 Clinical Deterioration,

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