**SEPSIS**

**BACKGROUND**
- Sepsis is any suspected or known infection associated with a systemic inflammatory response
- Sepsis is a leading cause of maternal mortality in the UK and the most common cause of maternal mortality in the intensive care unit (ICU)
- If septicemic shock develops, mortality rates approach 60% in ICU
- Early detection, accurate diagnosis and aggressive appropriate treatment can significantly improve outcome
- One-third of women who die do so because of refractory hypotension whilst the rest die later from multi-organ failure

**Risk factors for maternal sepsis**
- Obesity
- Impaired glucose tolerance/diabetes
- Impaired immunity
- Anaemia
- Vaginal discharge
- History of pelvic infection
- Amniocentesis and other invasive intrauterine procedures
- Cervical cerclage
- Prolonged SRM
- Vaginal trauma
- Caesarean section
- Wound haematoma
- Self or family history of, or contact with upper respiratory tract infection
- Group A streptococcus disease in close family/contacts
- Sickle cell disease/trait
- Black/ethnic minority
- After prolonged rupture of membranes (PROM)
- Emergency caesarean section
- Retained products of conception after miscarriage, termination of pregnancy or delivery
- Uterine infection following amniocentesis

**RECOGNITION AND ASSESSMENT**

**Symptoms, signs and laboratory results**

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<th>Consider sepsis in any woman with symptoms and signs suggestive of abruption (confidential enquiry and RCOG)</th>
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- Rigors, sweating, fever
- Headache, muscle pain, altered mental state, _lethargy, poor appetite_
- Features of primary infection. Consider especially genital tract sepsis (chorioamnionitis, postpartum endometritis); also wound infection, pyelonephritis, pneumonia, acute appendicitis, acute cholecystitis, pancreatitis, necrotising fasciitis
- Sepsis is the presence of one of the above symptoms plus two of the following:
  - heart rate >100 beats/min
  - respiratory rate >20 breaths/min
  - temperature >38°C or <36°C
  - WBC >11 or <4 × 10⁹/L
  - normal WCC with >10% immature forms or increased CRP

**Genital tract sepsis**
- Vomiting and diarrhoea, and/or abdominal pain
Sepsis 2013–15

- often attributed to gastroenteritis
- Vaginal discharge, wound infection
- Rash (generalised streptococcal maculopapular rash)
- discoloration or mottling of the skin may indicate cellulitis

Life-threatening features
- **Severe sepsis**: sepsis with impaired organ function [e.g. diminishing renal function, impaired cardiac function, hypoxia, acidosis, acute respiratory distress syndrome (ARDS), clotting disturbance, plasma lactate >4.0 mmol/L]
- **Septic shock**: severe sepsis with systolic BP <90 mmHg or MAP (mean arterial pressure) <65 mmHg

Investigations

**Sepsis**
- Swabs:
  - vaginal
  - endo-cervical (if swabs for chlamydia PCR, use chlamydia detection kit; if for N gonorrhoea culture, place swab in charcoal medium)
  - wound
  - throat
  - rectal
- FBC and differential WBC
- INR, APTT
- Group & save
- Biochemical screen (U&E, LFT and C-reactive protein)
- Glucose
- Culture
  - blood × 2 (take 3 only if infective endocarditis suspected)
  - urine
  - if woman has travelled abroad recently or enteric infections suspected, faeces
  - if any hint of meningitis, CSF (omit if woman confused or intracranial pressure raised)

**Severe sepsis**
**Add**
- If severe sepsis suspected, measure venous plasma lactate
- Arterial blood gases (ABG), acid-base and lactate
- Chest X-ray
- If source of infection not apparent, consider CT scan, ultrasound scan and nuclear medicine imaging
- If woman known to be positive for ESBL or MGNB, re-screen for carriage of multi-resistant Gram-negative bacilli with rectal swab and, if urinary catheter in situ, CSU

Differential diagnosis
- Systemic disease: occult haemorrhage, myocardial infarction, adrenal insufficiency, pulmonary embolism

OBSERVATIONS

Take and record [on high dependency chart or maternity early warning scoring (MEWS) chart if available locally]
- Temperature and pulse
- Blood pressure using automated non-invasive blood pressure device
- Respiratory rate
- Oxygen saturation
- Peripheral perfusion
- Urinanalysis
Hourly urine output
Fluid intake, oral and IV
Lochia if appropriate

**Severe sepsis**
Observations listed above *plus*
- Level of consciousness, use Glasgow coma scale
- Commence 3 Lead ECG
- If central line inserted, central venous pressure (CVP)
- If gestation appropriate and not delivered, continuous electronic fetal monitoring (EFM)

**MANAGEMENT**

**Pyrexia**
- If maternal temperature >37.5°C on one occasion:
  - keep woman cool
  - administer paracetamol 1 g oral repeated 6-hrly as required
  - avoid dehydration
  - record temperature hourly until apyrexial

**High or prolonged pyrexia**
- If maternal temperature >38°C once or >37.5°C on two occasions 2 hr apart:
  - commence external EFM
  - MSU or catheter specimen of urine
  - high vaginal swab or low vaginal swab
  - blood culture x 2
  - Liaise with neonatologists to consider their presence at delivery
  - Start IV antibiotics

**SEVERE SEPSIS**

*Severe sepsis is an emergency. Involve consultant obstetrician at an early stage. Consultant obstetrician will seek advice from other specialists e.g. anaesthetist, haematologist, microbiologist and intensivist*

**Key actions (from ‘Surviving sepsis’)**
1. Obtain blood cultures before antibiotics
2. Administer broad spectrum antibiotics within an hour of presentation
3. Measure serum lactate
4. If hypotension or lactate >4 mmol/L, give 20 mL/kg crystalloid. If MAP <65 mmHg, give vasopressors

**Airway and breathing**
- Adequate oxygen therapy to maintain SpO₂ 94–98%
- If increased difficulty in breathing, contact, critical care team to consider intubation and ventilation

**Circulation**
- Secure IV access with two large bore cannulae
- Avoid sitting epidural or spinal anaesthesia
- Ensure adequate fluid replacement
  - 20 mL/kg colloid or 40 mL/kg crystalloid [compound sodium lactate (Hartmann’s) or sodium chloride 0.9%] over <30 min then reassess
- If no response to simple resuscitation measures, insert CVP line and monitor to guide further fluid replacement
- If anaemic, transfuse blood
If woman remains hypotensive despite adequate fluid replacement, transfer to critical care for further management.

**Antibiotics**

*After obtaining urgent bloods, swabs and cultures, administer high dose broad spectrum IV antibiotics immediately without waiting for microbiology results*

- Choice of antibiotic therapy depends on clinical suspicions and local flora and culture information (if available)
- Treatment should include cover for:
  - Gram negative and anaerobic organism
  - Gram-positive cover if likelihood of infection is high

**FURTHER MANAGEMENT**

- If woman already extremely ill, deteriorates or does not improve, consider additional or alternative IV antibiotics – seek further early advice from consultant microbiologist
- Repeat microbiological specimens and mark ‘urgent’
- Remove source of infection
- Closed-space infections need surgical drainage including evacuation of retained products of conception
- In women with endometritis not responding to antibiotics, consider septic pelvic thrombosis
- In presence of uterine sepsis, carefully counsel women requesting conservative management about maternal risks
- Necrotising fasciitis requires early surgical intervention with fasciotomy and aggressive antibiotic therapy
- If Group A streptococcus disease suspected, inform neonatologists
- Be prepared for haemorrhage from uterine atony and DIC