Identification and Management of Infection/Sepsis in Pregnancy

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Contents

1.0 Objectives

1. To provide updated guidance on identification of infection/sepsis in pregnant individuals.
2. To provide updated guidance on management of infection/sepsis in pregnant individuals.
3. To provide update guidance on screening for infection in pregnant individuals.

2.0 Scope

This update guidance applies to all staff working in all locations of the maternity department.

3.0 Introduction

Suboptimal care continues to be recognised in many cases where pregnant individuals die from sepsis, to reduce this risk it is vital that all health care providers "think sepsis" at an early stage in any unwell around pregnancy time.

It's imperative that there are clear definitions of infection and sepsis to ensure a better understanding, recognition and treatment.

Maternal infection: an infective status which occurs during pregnancy, labour, or immediately postpartum. This infective status may, or may not progress into maternal sepsis and may, or may not affect the fetus.

Maternal sepsis: can result from a mismanagement of an infective status, or a rapidly deteriorating maternal infection. It is a life-threatening situation that may lead to multi-organ dysfunction. This may be during the antenatal, labour or post-partum period.

Septic shock: is an extreme reaction to an infection. Septic shock can lead to poor organ perfusion resulting from hypotension despite resuscitation. The vital organs at risk would be the lungs, kidneys, liver and heart. According to 2024 MBRRACE report, sepsis accounted for 9% of total maternity deaths in the UK.

Diagnosis of maternal sepsis is often challenging, and clinicians should ensure that their care supports prevention. However, early recognition and prompt treatment is imperative.

3.1 Understanding risk factors:

Ensure that infection risks are fully assessed in order to reduce the risk of sepsis. Risk assessment tools are proactive way to anticipate emerging infections which aids the prompt identification and management.

Risk factors for sepsis:

- Obesity (BMI >30)
- Chronic medical conditions such as diabetes, impaired immunity or if on immune-suppressant medications
- Anaemia,

Infection and sepsis are more common for pregnant individuals who identify themselves to be from a global majority ethnic group.

Antenatal/Intrapartum risk factors:

- Invasive procedures such as amniocentesis/ cervical cerclage, caesarean section, instrumental assisted deliveries, complex perineal injuries, and frequent vaginal examinations.
- Prolonged rupture of membranes (premature-prelabour or spontaneous at term)
- Retained products of conception
- Acquisition of group A streptococcus (GAS).

4.0 Sepsis in Pregnancy/Intrapartum/Postpartum

The key message in the recognition and management of sepsis is the early identification of infection and to have a low threshold of suspicion. The "Risk assessment and action for suspected maternal sepsis" tool (Appendix 1) should be used if any risks identified and the "High Risk of Maternal Sepsis Proforma" (Appendix 2) should be commenced for women categorised as RED and considered if AMBER. For women and birthing people who are assessed in community for symptoms or signs of infection, the same risk assessments and proformas should be used with consideration for early referral to hospital if there are found to be actionable triggers.

4.1 Clinical features:

A full clinical history and thorough, systemic physical examination should be undertaken should there be a suspicion of infection.

The following clinical observations should be recorded on the Maternity Early Warning (MEWS). The frequency of the observations should be tailored to the patient's clinical situation and escalated appropriately should there be a deterioration.

1. **Significant change in temperature**: pyrexia or hypothermia.
   (HOWEVER, a normal temperature does not exclude sepsis - paracetamol or use of other anti-inflammatory medications could mask temperature changes. Hypothermia is a significant finding, may indicate severe infection, while a swinging temperature may indicate a persistent focus of infection such as a collection.
2. **Persistent tachycardia**: Persistent heart rate over a 100bpm should prompt assessment for infection, and above 130bpm should prompt assessment for sepsis.
3. **Tachypnoea**: A respiratory rate of over 25 breaths per minute should raise an immediate suspicion of infection/sepsis.
4. **Oxygen saturation**: An oxygen saturation reading of less than 94% should prompt assessment.
5. **Hypotension**: A systolic blood pressure of less than 90mmHg should be investigated and managed urgently.
6. **Reduced urine output**: If urine has not been passed for 12hrs or urine production is less than 0.5ml/Kg/hr.
   (However, this should not be assessed in isolation. Dehydration in labour or pregnant individuals with vomiting illnesses can show reduced urine output. A prompt and full assessment should be undertaken to exclude simple dehydration
7. **Impaired consciousness**: any impaired alertness or reduced GCS should prompt immediate review.

4.2 System specific symptoms:

While there are pregnancy specific infections that can lead to sepsis, other causes should not be overlooked as they still apply to the pregnant individual.

1. Respiratory: cough, shortness of breath (SOB), sore throat, loss of smell.
2. Abdomen: pain, diarrhoea, nausea and vomiting.
3. Urinary tract: Dysuria, frequency, urgency, pain.
4. Skin: rash, skin changes.
5. Neurological: unusual headaches, neck pain, neck stiffness, intolerance to light.
6. Genital tract: discharge, bleeding, itching, skin changes.
7. Uterine: pain, vaginal loss.
8. Breast: pain, skin changes, swelling, temperature change, nipple discharge other than breast milk.

System	Features	Potential source
Respiratory	Cough SOB Hypoxia	• Pneumonia • Viral illness • PE
Abdomen	Nausea/vomiting Diarrhoea pian	• Gastroenteritis • Pelvic collection • Cholecystitis • Appendicitis • Pancreatitis
Urinary tract	Dysuria/frequency/urgency Pain (renal angle)	• Lower/upper urinary tract infection • Kidney stones
Breast	Engorgement Redness/hotness Nipple discharge Skin changes	• Mastitis • Inflammatory carcinomatosis
Genital tract	Discharge Offensive smell Increased bleeding	• Endometritis • Retained products of conception
Skin and soft tissue	Perineal wound breakdown Wound discharge Wound swelling	• Wound infection • Wound collection • Necrotising fasciitis
Lower limb	Redness Pain Congested veins	• Thrombophlebitis
Head and neck	Neck stiffness Photophobia Focal neurology	• Meningitis • Meningioencepahlitis

Table 1: A non-exhaustive list of differential diagnosis and features and possible source for maternal sepsis.

4.3 Sepsis proforma/chart

The “Risk Assessment and Action for Suspected Maternal Sepsis” proforma is present within the maternity bundle booklet, there are also copies of the proforma for single use should there be any suspicion of sepsis.
(Please refer to Appendix 1 for the proformas)

4.4 Sepsis Investigations

Following a full systematic clinical assessment, blood samples should be taken in order to obtain a complete evaluation of the clinical situation. Blood tests should be repeated as required, the aim being to identify the microbial source of infection through utilising targeted swabs/cultures.

1. Full blood count (FBC): with differentials: when repeated will aid in assessing response to antimicrobials.
2. Arterial blood gas (ABG): used to assess acid-base balance, and tissue hypoperfusion
3. CRP monitoring: not only a marker of infection, has a protective role through activation of complement and subsequent opsonisation of pathogens.
4. Serum lactate: this marker should be measured urgently, a level of 4 or more should prompt escalation to critical care team.
   False positives may occur if taken during the 2nd stage labour or where a tourniquet has been left for too long prior to withdrawal of blood, and after administration of beta-agonists
5. Coagulation panel: to assess for an emerging DIC picture.
6. Comprehensive metabolic panel: Liver function (LFT), kidney function which can assess for end-organ compromise. Calcitonin can possibly indicate a bacterial infection if raised.
7. Consider peripheral blood smear/film
8. Blood Cultures
9. Other samples for culture: urine, vaginal swab, throat swab, placenta swab, breast milk, to identify pathogen for a targeted antimicrobial use.
10. Placenta for histology if chorioamnionitis is suspected.
11. Radiology and imaging: chest x-ray, ultrasound assessment of pelvis/CT scan for any postoperative collections/hematomas.

4.5 Sepsis Management

- If there is a high suspicion of maternal sepsis and the sepsis pathway has been commenced, a senior Obstetric review should take place within the **first hour**. Once the “Sepsis Six” actions have been initiated, a further review should be undertaken at 2 hours to assess the response to the provided treatment.
  Antibiotic administration **should not** be delayed

  If the clinical situation deteriorates within the hour there is a high risk of septic shock therefore an MDT review should be sought including a senior Obstetrician and the on-call senior Anaesthetist.
  - Thromboprophylaxis screening **must** be carried out and appropriate use of low molecular weight heparin (LMWH) initiated where no clinical contraindication is identified.
  - If the source of infection/sepsis is unknown, broad-spectrum antibiotics should be commenced according to local antimicrobial guidance.

- If, despite appropriate use of antimicrobials and resuscitation the maternal/fetal clinical condition does not improve, expedited birth should be considered.
- The most appropriate mode of birth should be chosen following a discussion with a senior Obstetrician to ensure the safety of the woman and the baby.
- The senior Anaesthetic team should be involved in all of these discussions

All women with confirmed sepsis should be reviewed by a senior Obstetrician (ST3 and above) prior to discharge.

5.0 Top 10 pearls in management of maternal sepsis:

1: Maintain a high index of suspicion.
2: Implement "The Risk Assessment and Action for Suspected Maternal Sepsis Tool" for rapid assessment and identification.
3: Implement the "High Risk of Maternal Sepsis – Sepsis Six Actions" quickly and effectively.
4: Move quickly in the 1st hour with effective use of laboratory and radiology resources.
5: Know your "bugs"
6: Refer to local departmental guidance for effective use of antimicrobials.
7: Fluid resuscitation
8: Early escalation to critical care team.
9: Once stabilised -aim to identify the source.
10: Anticipate adverse pregnancy outcomes.

6.0 Common causes of sepsis in obstetrics:

6.1 Chorioamnionitis

Chorioamnionitis occurs in 1-5% of all term pregnancies with ascending microbes from the genital tract is possibly the most common cause. The incidence can be as high as 30% where there is preterm prelabour rupture of membranes (PPROM). Chorioamnionitis usually presents with pyrexia and abdominal (uterine) pain. Maternal pyrexia is usually preceded by maternal or fetal tachycardia. Fetal tachycardia is included in the maternal sepsis risk assessment as it is a feature of chorioamnionitis.

6.1.1 Risk factors for chorioamnionitis:

PPROM, prolonged labour, sweep of membranes, frequent vaginal examinations, positive GBS status, internal monitoring via a fetal scalp electrode (FSE), and presence of meconium.

6.1.2 Maternal implication of chorioamnionitis:

Increased risk of intervention including unplanned caesarean birth, post-partum bleeding (PPH), endometritis, pelvic collection, wound infection (caesarean scar/ perineal obstetric injuries), bacteraemia, sepsis and septic shock.

6.1.3 Fetal implication of chorioamnionitis:

Pneumonia, admission to neonatal intense care unit, brain hypoxia (HIE), early onset sepsis, intraventricular bleeding, perinatal death. Babies of women treated for sepsis during/around labour require assessment and monitoring for clinical indicators of neonatal infection.

6.1.4 Diagnosis:

Presence of risk factors along with symptoms should raise suspicion of chorioamnionitis and prompt management. Signs include maternal pyrexia, maternal / fetal tachycardia, uterine tenderness, change in liquor colour/smell.

6.1.5 Management:

Initiate sepsis six as soon as possible **(remember the first hour rule)** maternal resuscitation steps will unlikely have profound effect on fetal outcome despite a good maternal response to those measures (fluids/antibiotics-broad spectrum, antipyretic medication). Expediting birth may be the only protective course of action for the baby, therefore in cases suspected with chorioamnionitis in early stages of labour/not in labour discussion with consultant on-call should be undertaken to optimise management.

The placenta should be sent for histology examination in all cases of suspected infection especially if birth is preterm. Swabs from both the fetal and maternal surfaces of the placenta should be taken, clearly labelled and sent for culture.

8.0 Urinary tract infection (UTI)

8.1 Urinary tract infection in the antenatal period:

The physiological and anatomical changes in pregnancy increases the risk of urinary tract infection (UTI). The most common organism is E.Coli (80-90%), however gram negative organisms can also be present such as Klebseilla. Symptoms of UTI may be non-specific in pregnancy, therefore it is important to enquire about possible symptoms suggestive of UTI at every antenatal visit.

Asymptomatic bacteriuria (a positive culture of the same uro-pathogen on two occasions in a patient without urinary symptoms) continues to be screened for in pregnancy due to the risk of progression to pyelonephritis.

The presence of leucocytes alone on urinalysis are non-specific therefore, not diagnostic of UTI and their presence in isolation does not require further investigation or treatment.

Assure that an explanation of how to obtain a urine sample is undertaken (aseptic technique), and assure a sample is always sent for a culture analysis.

The presence of Nitrites on urinalysis in symptomatic individuals should prompt empirical antibiotic treatment according to local antimicrobial guidance, as it is highly suggestive of significant bacteriuria and sample sent for culture.

8.2 Urinary tract infection in labour:
A positive nitrite in a symptomatic patient in labour should prompt a request for an Obstetric review and consideration of intravenous antibiotics due to the risk of ascending chorioamnionitis, assure a mid-stream urine sample is sent for culture analysis.

9.0 Postpartum sepsis:
Puerperal sepsis is the infection of the genital tract at any time from rupture of membranes to 42 days post-birth in which two or more of the following may be present:

1. Feeling generally unwell
2. Pelvic pain
3. Fever/rigors
4. Abnormal vaginal discharge (colour/smell)
5. Delay in uterine evolution

The possible organisms to cause such symptoms are:

1. GAS (Group A Streptococci)
2. E.Coli
3. Staphylococcus Aureus
4. Streptococcus Pneumonia
5. MRSA (Methicillin Resistant Staphylococcus Aureus)
6. Clostridium Septicum

The “High Risk of Maternal Sepsis Proforma” and “Sepsis Six Action card” should be referred to with antibiotic of choice should in line with local antimicrobial guidance. Observations should be recorded regularly on a MEWS chart. If readmission is indicated it is important to review events during the antenatal and intrapartum period to assess for risk factors that could potentially influence management. During readmission venous-thrombo-embolism score should be recalculated and thromboprophylaxis prescribed accordingly.

10.0 Discharge letters:
Women with diagnosed sepsis during the antenatal/intrapartum or the postpartum period should have electronic discharge documentation that can be readily accessible by other medical teams. Please ensure that the discharge letters sent to the GP, Health Visitor and within the postnatal paperwork for the community Midwife that there is information regarding the nature of the infection, along with any medications in which the mother has been discharged with. If a follow-up from the GP is required- this should be clearly documented within this document.

11.0 Auditable standards:

1. Compliance of sepsis proforma use (standard 100%).
2. Relevant bloods taken and timing, optimum use of the golden hour (administration of antibiotics) (standard 100%).
3. Accessible electronic discharge summary (standard 100%).

12.0 References

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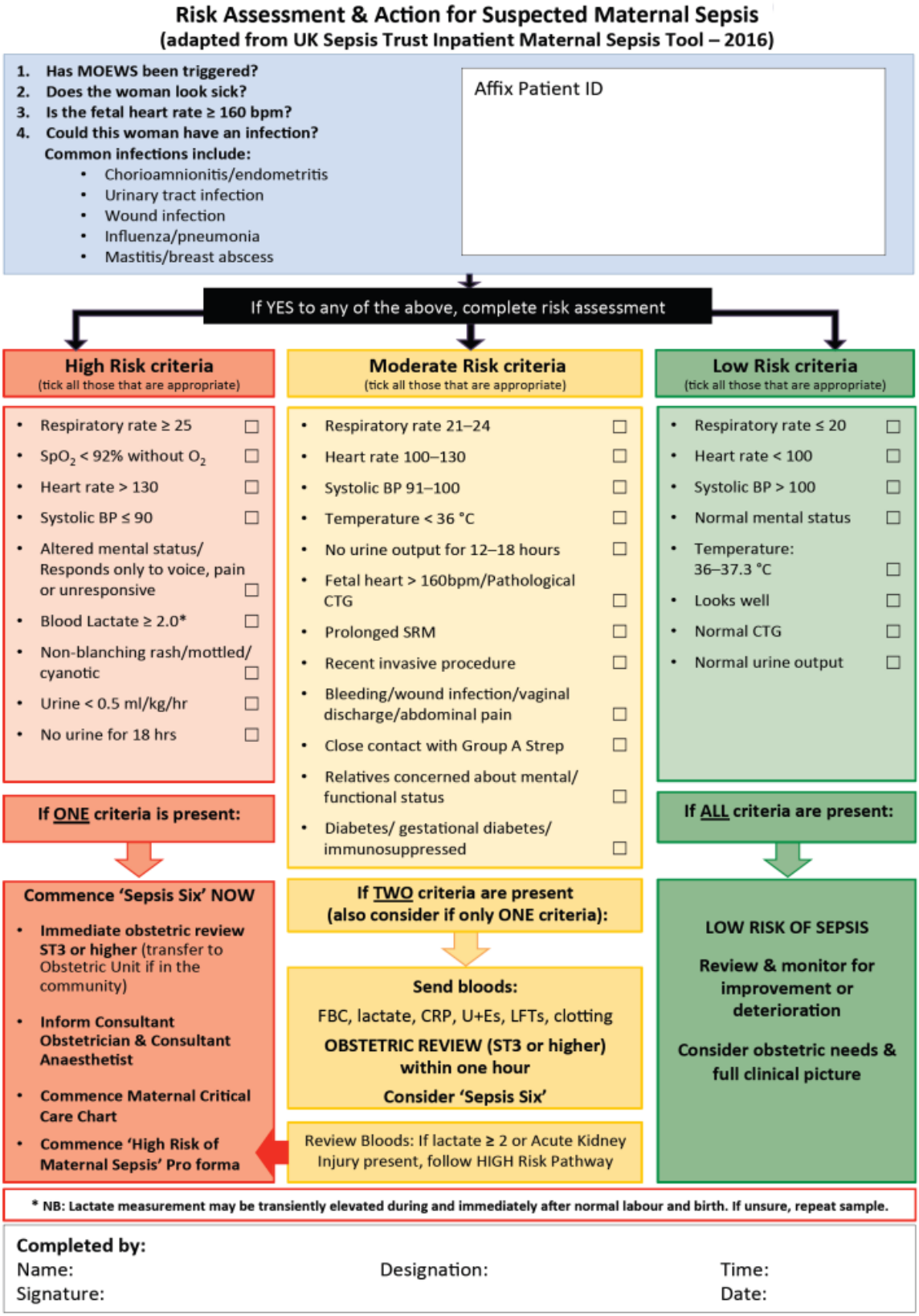
Appendix 1: Risk Assessment & Action for Maternal Sepsis



Appendix 2: High Risk Assessment of maternal sepsis proforma

High risk of Maternal Sepsis Pro forma
(adapted from the UK Sepsis Trust Inpatient Maternal Sepsis Tool - 2016)

Affix Patient ID

CALL FOR HELP and complete ALL 'SEPSIS SIX' ACTIONS within ONE HOUR — Time zero:

Action	Time completed & initials	Reason not done/ variance/comments
1. Administer 100% OXYGEN ○ 15 L/min via non-rebreathe mask ○ Aim to keep saturations > 94%		
2. Take BLOOD CULTURES *(but do not delay administering antibiotics)* ○ Also consider sputum/urine/HVS/throat swab/breast milk sample/wound swab/stool sample, etc		
3. Take bloods – CHECK SERUM LACTATE ○ If venous lactate raised, recheck with arterial sample ○ Discuss with critical care if lactate ≥ 4mmol/L ○ Continue to check serial serum lactates to monitor response to treatment (& FBC, CRP, U+Es, LFTs, clotting)		
4. Give IV BROAD SPECTRUM ANTIBIOTICS (as Trust protocol) ○ Administer ASAP, consider allergies ○ Aim to take blood culture first but do not delay antibiotics if culture bottles not available		
5. Give IV FLUID THERAPY ○ If lactate ≥ 2mmol/L give 500mL stat ○ If hypotensive or lactate ≥ 4mmol/L can repeat boluses up to 30 mL/kg (e.g. 2 L for a 70 kg woman) ○ Extreme caution if woman has pre-eclampsia: discuss with anaesthetist		
6. Accurate MEASUREMENT OF URINE OUTPUT ○ Urinary catheter & hourly measurement ○ Document fluid balance record		

If after 'Sepsis Six': systolic BP remains < 90mmHg, level of consciousness remains altered, respiratory rate > 25, lactate not reducing (or was previously ≥ 4mmol/L), refer IMMEDIATELY to Critical Care Team

Also consider:
- ○ If antenatal – monitor fetal heart rate/commence CTG
- ○ Remove the source of infection e.g. retained products, expedite birth
- ○ Refer to Critical Care Team

Document actions taken:

Maternal Sepsis requires multi-professional team input from: (tick staff contacted)

- Midwife coordinator ☐
- Senior/Consultant obstetrician ☐
- Senior obstetric anaesthetist ☐
- Microbiologist ☐
- Intensive/critical care team ☐

Abbreviations

GBS: *Group B Streptococcus*

PPROM: *Premature rupture of membranes*

SROM: *Spontaneous rupture of membranes*

UTI: *Urinary tract infection*

CRP: *C reactive protein*

PET: *Pre-eclampsia*

SOB: *Shortness of breath*

PE: *Pulmonary embolism*

MEWS: *Maternity early warning score*

MBBRACE: *Mothers and Babies: Reducing Risk through Audit and Confidential Enquiries*

ROTEM: *Rotational thrombo-elastometry*

Maternity Services

Checklist for Clinical Guidelines being Submitted for Approval

Title of Guideline:	Identification and Management of Infection/Sepsis in Pregnancy
Name(s) of Author:	Dr Randa Sanusi and Dr Madhuchanda Dey
Chair of Group or Committee approving submission:	Intrapartum forum
Brief outline giving reasons for document being submitted for ratification	
Details of persons included in consultation process:	Intrapartum forum
Name of Pharmacist (mandatory if drugs involved):	
Issue / Version No:	1
Please list any policies/guidelines this document will supercede:	
Date approved by Group:	May 2025
Next Review / Guideline Expiry:	May 2028
Please indicate key words you wish to be linked to document	Infection, sepsis
File Name: Used to locate where file is stores on hard drive	