Maternal Infections and Sepsis in Pregnancy and the Postpartum Period Full Clinical Guideline

Reference No.: UHDB/Obs/01:24/S1

Contents

1. Introduction:

Sepsis during pregnancy poses unique challenges for maternal health. The body's changes during pregnancy, while supporting life, make it tricky to spot infection symptoms. These symptoms are often subtle, requiring healthcare professionals to stay alert. In the realm of maternal health, sepsis remains a significant contributor to maternal mortality in the UK. Recent statistics show progress, but challenges persist, emphasizing the ongoing importance of addressing sepsis in maternal care. These guidelines stress the crucial role of clinicians and highlight the constant need to consider sepsis in daily practice. Encouraging a proactive mindset, these guidelines aim to guide clinicians in early detection and swift intervention, leading to better outcomes for both mothers and infants.

Early referral to hospital may be lifesaving.

2. Purpose and Outcomes:

- Guideline Scope: These guidelines focus on handling sepsis during antenatal, intrapartum, and postnatal periods, with a specific emphasis on managing pyrexia during labour.
- Objectives of Guidance: The primary aim is to offer comprehensive guidance for healthcare professionals, stressing the importance of standardized approaches across different pregnancy stages.
- Collaborative Responsibilities: A multi-disciplinary approach is vital, with the lead roles assigned to the Consultant Obstetrician and Intensive Care Consultant. In cases of severe sepsis, urgent involvement of a Consultant Microbiologist is crucial. Clear and concise management plans documented in patient notes are highlighted.
- Patient Management Location: Sepsis in pregnant patients is to be managed on the labour ward.
- Collaborative Decision-Making: Decisions on Intensive Care transfers require collaboration among the Intensive Care team, Consultant Obstetrician, and Consultant Obstetric Anaesthetist.

3. Abbreviations and Definitions:

BP	-	Blood Pressure
GAS	-	Group A Strep
MAP	-	Mean arterial pressure.
MEWS	-	Maternity Early Warning System
PROM	-	Pre-labour ruptured membranes

Definitions

Maternal Sepsis - is defined as a life-threatening organ dysfunction caused by a dysregulated host response to infection during pregnancy, childbirth, post termination of pregnancy or postpartum period.

Septic Shock

Septic shock is 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.

Patients with septic shock can be clinically identified by a vasopressor requirement to maintain a mean arterial pressure of 65 mmHg (BP systolic of 90 mmHg) or greater with serum lactate level greater than 2 mmol/L (>18mg/dL) in the absence of hypovolemia.

4. Risk Factors for Maternal Sepsis

Women with sepsis during pregnancy in the puerperium are best managed in a hospital where diagnostic services are easy to access, and intensive care facilities are readily available.

Identifying Vulnerabilities:

- Retained products of conception – following miscarriage, termination of pregnancy or birth
- Caesarean delivery particularly an emergency procedure in labour
- Operative vaginal delivery
- Prolonged rupture of membranes
- Wound haematoma

- Invasive intrauterine procedure – ERPC, amniocentesis or CVS
- Cervical suture
- Obesity
- Impaired immunity – immunosuppressive medication including high dose steroids, HIV infection.
- Diabetes
- Working with, or having small children – Group A Streptococcus risk

5. Classification of Maternal Infection:

Pregnancy-specific infections

- Chorioamnionitis
- Endometritis
- Lactational mastitis
- Site of perineal trauma
- Surgical site, e.g. caesarean

Infections exacerbated by pregnancy like

- Urinary tract infection
- Influenza
- Listeriosis
- Hepatitis E
- Herpes simplex virus
- Malaria

Incidental infections like

- Lower respiratory tract infection e.g. Pharyngitis
- Tuberculosis
- Pneumonia
- Skin and soft-tissue infection
- Gastroenteritis
- Acute appendicitis/ pancreatitis/ cholecystitis
- Infection related to regional anaesthesia (meningitis/ spinal abscess)

6. Microbiology:

The most common pathogens are:

- Group A Beta-Hemolytic Streptococcus: which causes puerperal sepsis by endometritis and is a common cause of wound infections, cellulitis, and necrotizing fasciitis. Group A streptococcus can rapidly progress to septic shock.
- Group B Beta-Hemolytic Streptococcus which is strongly associated with neonatal sepsis and endocarditis.
- E-coli is a common cause of gram-negative sepsis usually secondary to urinary tract infection or abdominal sepsis, it accounts for one third of episodes of sepsis.
- Staphylococcus aureus is a common pathogen in mastitis and surgical wound infections.
- Streptococcus pneumonia.

- Viral: H1N1 influenza was the commonest cause of death in the 2009-2012 report – the report coincided with an international H1N1 outbreak, but standard strains of influenza also caused death
- Covid-19

7. Recognition:

The natural adaptations to the body with pregnancy may mask the signs and symptoms of infection or an acute abdomen until the woman deteriorates. Symptoms may be less distinctive, for example feeling very unwell; therefore, a high index of suspicion is necessary.
Clinical features of sepsis include:

- Tachycardia >113 bpm (>99 bpm from 48 hours post birth)
- Tachypnoea (respiratory rate >22) or hypoxia with O2 saturation < 92%
- Oliguria (urine output < 0.5ml/kg/hr for 2 hrs)
- Rigors or temperature <36.2 or >38.0C - Pyrexia alone is an unreliable sign.
- Hypoxia
- Hypotension
- Abdominal pain or distension
- Offensive vaginal discharge
- Urinary symptoms
- Productive cough
- Altered conscious level, hypothermia and ashen appearance all represent late signs.
- Failure to respond to treatment

These signs, including pyrexia, may not always be present and are not necessarily related.

Regular observations of all vital signs (including temperature, pulse rate, blood pressure and respiratory rate) should be recorded on a Maternity Early Warning Score (MEWS) chart. All staff taking observations should have annual training in the use of the MEWS chart.

8. <u>Initial treatment</u>

Initial management of a suspected sepsis patient includes an immediate assessment of ABCDE, a brief history and clinical examination followed by the SEPSIS 6 Pathway / Bundle.

8.1. History and clinical examination

Symptoms suggestive of sepsis:

- Rigors, sweating, fever
- Headache, muscle pain
- Altered mental state.
- Lethargy
- Poor appetite

Features of primary infection to consider:

- Genital tract sepsis (chorioamnionitis, postpartum endometritis);
- Wound infection
- Pyelonephritis
- Pneumonia

- Acute appendicitis
- Acute cholecystitis
- Pancreatitis
- Necrotizing fasciitis
- Mastitis
- An abnormal or absent fetal heartbeat with or without placental abruption may be the result of sepsis.

9. SEPSIS 6 pathway Order these as '3 in, 3 out'

The SEPSIS 6 should be delivered as quickly as possible, but always within the first hour following recognition of sepsis, as per Sepsis management guideline for non-pregnant adult click here for sepsis 6 bundle

1 Administer oxygen to maintain O2 saturations >94%. This can usually be achieved by giving high-flow oxygen by face mask with a reservoir bag at 15l/min and ensure the woman is maintained in the left lateral position. If increased difficulty in breathing, contact critical care team to consider intubation and ventilation.

2 Take blood cultures even if already on antibiotics. Do not delay starting antibiotics if blood culture bottles are not available. The medical microbiologist should be consulted to ensure specimens are processed appropriately and results communicated directly to the consultant at the earliest opportunity. Additionally take an immediate lactate.

3 Give intravenous antibiotics – see local antibiotic policy. Refer to Obstetric Infections – Maternity; Microbiology guideline to treat specific infections by identified focus and sepsis of unknown origin click here for full guidelines. Breastfeeding limits the use of some antimicrobials, hence the advice of a consultant microbiologist should be sought at an early stage.

4 Give intravenous fluid – initial 500mls stat over 15 mins but may require up to 30mls/kg of iv fluid. (70kg patient = approximately 2l fluid)

- Secure IV access with 2 large bore cannulae
- Avoid siting epidural or spinal anaesthesia
- Ensure adequate fluid replacement.
- Crystalloid [compound sodium lactate (Hartmann's) 40 mL/kg 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.

5 Complete serial lactate levels every 6 hours. Lactate >4.0 represents septic shock and should prompt a referral to critical care if does not respond to fluid resuscitation.

6 Measure urine output and record on fluid balance chart. May need Urobag-hourly urinary catheter. plus 1 If the woman has an ongoing pregnancy monitor fetal wellbeing by CTG (beyond 26 weeks' gestation). Delivery should be expedited if chorioamnionitis is the source of infection or with any source of sepsis if the maternal condition does not improve with treatment.

9.1. Cultures

Blood cultures should be taken percutaneous and from all intravenous access devices that have been in for more than 24 hours (RDH blood culture clinical guideline and Burton Venepuncture for adults' policy).

Guided by clinical suspicion of focus of infection.

- Throat swab.
- Mid-stream urine,
- High vaginal swab,
- Placental swabs,
- Sputum,
- Cerebrospinal fluid,
- Epidural site swab,
- Caesarean section or episiotomy wound swabs.
- Expressed breast milk.
- Neonatal swabs
- Stool sample: if diarrhoea is particularly offensive, a stool sample should be submitted for clostridium difficile toxin testing. A history of diarrhoea warrants routine culture.

If the source of sepsis is suspected/known send other cultures too, for example.
Intravenous Fluid Resuscitation

10. <u>General principles about treatment-</u>

- Monitoring of the woman with suspected severe sepsis or established sepsis should be multidisciplinary but preferably under the leadership of a single consultant. A senior obstetrician should be involved, in consultation with an intensivist, microbiologist or infectious disease clinician.

- Non-steroidal anti-inflammatory drugs (NSAIDs) should be avoided for pain relief in cases of sepsis as they impeded the ability of polymorphs to fight GAS infection.

- Closed-space infections need surgical drainage including evacuation of retained products of conception.

- Suspicion of necrotizing fasciitis should prompt involvement of intensive care physicians and referral for surgical opinion, ideally from plastic and reconstructive surgeons if available.

- Fluid-repellent surgical masks with visors must be used at operative debridement /change of dressings of GAS necrotising fasciitis and for other procedures where droplet spread is possible.

- In women with endometritis not responding to antibiotics, consider septic pelvic thrombosis.

- Any injection-site lesions should be swabbed and an MRSA screen performed.

- Intravenous immunoglobulin (IVIG) is recommended for severe invasive streptococcal or staphylococcal infection, if other therapies have failed.

11. Imaging

Any relevant imaging studies should be performed promptly to confirm the source of infection.

This could include:

- Chest X-ray - Suspected Pneumonia, Viral flu
- CT, pelvic and abdomen - Suspected intra-abdominal haematoma/ CS scar infection / pelvic collection/ Appendicitis
- Ultrasound scan

12. Indication for contacting critical care for support.

- Cardiovascular – hypotension (SBP < 94mmHg) and/or raised serum lactate persisting despite fluid resuscitation (lactate >4mmol/L), severe acidemia pH <7.20.

- Respiratory – respiratory distress despite oxygen administration, respiratory rate >25, low saturations ± Pa02 on arterial blood gas whilst on high flow oxygen, pulmonary oedema, airway protection.

- Renal – low or no urine output, rising urea and creatinine, may need temporary renal replacement therapy.

- Neurological – consciousness level does not return to normal or uncontrolled agitation.

- Miscellaneous – multi-organ failure, uncorrected acidosis, hypothermia.

13. How should the fetus be monitored and when and how should the baby be delivered?

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

- A decision on the timing and mode of birth should be made by a senior obstetrician following discussion with the woman if her condition allows.

- If preterm delivery 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 electronic fetal monitoring is recommended. Changes in cardiotocography (CTG), such as changes in baseline variability or new onset decelerations, must prompt reassessment of maternal mean arterial pressure, hypoxia and acidaemia.

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

- If either the mother or the baby is infected with invasive GAS in the postpartum period, inform the neonatal team, so both should be treated with antibiotics.

14. What prophylaxis should be considered for the neonate, other family members and healthcare workers?

- Adhere to local and national guidelines, consulting with the local health protection unit or communicable disease control lead.
- If a mother is diagnosed with invasive group A streptococcal infection during childbirth, inform the neonatologist and give preventive antibiotics to the new-born.
- Advise close family members to seek medical attention if symptoms arise due to exposure to a woman with group A streptococcal infection. Depending on the situation, antibiotic prophylaxis may be necessary.
- Healthcare workers in contact with respiratory secretions from infected women should also be considered for antibiotic prophylaxis.

15. What infection control issues should be considered?

- Any GAS (Group A β-haemolytic Streptococcus) identified during pregnancy should be treated aggressively.
- Any recent illness or exposure to illness in close contacts, particularly streptococcal infections, should be noted.
- GAS and MRSA are easily transmitted via the hands of healthcare workers and via close contact in households.
- Invasive group A streptococcal infections are notifiable and the infection control team and the consultant for communicable diseases should be informed.
- Local infection control guidelines should be followed for hospital–specific isolation and contact precautions. The woman should be isolated in a single room with en suite facilities to reduce the risk of transmission of infection (In a clearly identified/suspected communicable source of infection)
- Women with previously documented carriage of or infection with multiresistant organisms (e.g. ESBLproducing organisms, MRSA, GAS or PVL-producing staphylococci) should prompt notification of the infection control team.
- If the MRSA status of the woman is unknown, a premoistened nose swab may be sent for rapid MRSA screening where such testing is available.
- Women with a history of substance misuse are usually monitored under multiagency care. The local drugs advisory specialist team and existing hospital guidelines for care of substance misusers /drug users should be consulted.
- Community carers should be aware of the importance of early referral to hospital of recently

delivered women who feel unwell and have pyrexia and should be aware of the possibility of sepsis in the puerperium. If sepsis is suspected in the community, urgent referral to hospital is indicated.

16. Monitoring Compliance and Effectiveness

As per agreed business unit audit forward programme

17. References

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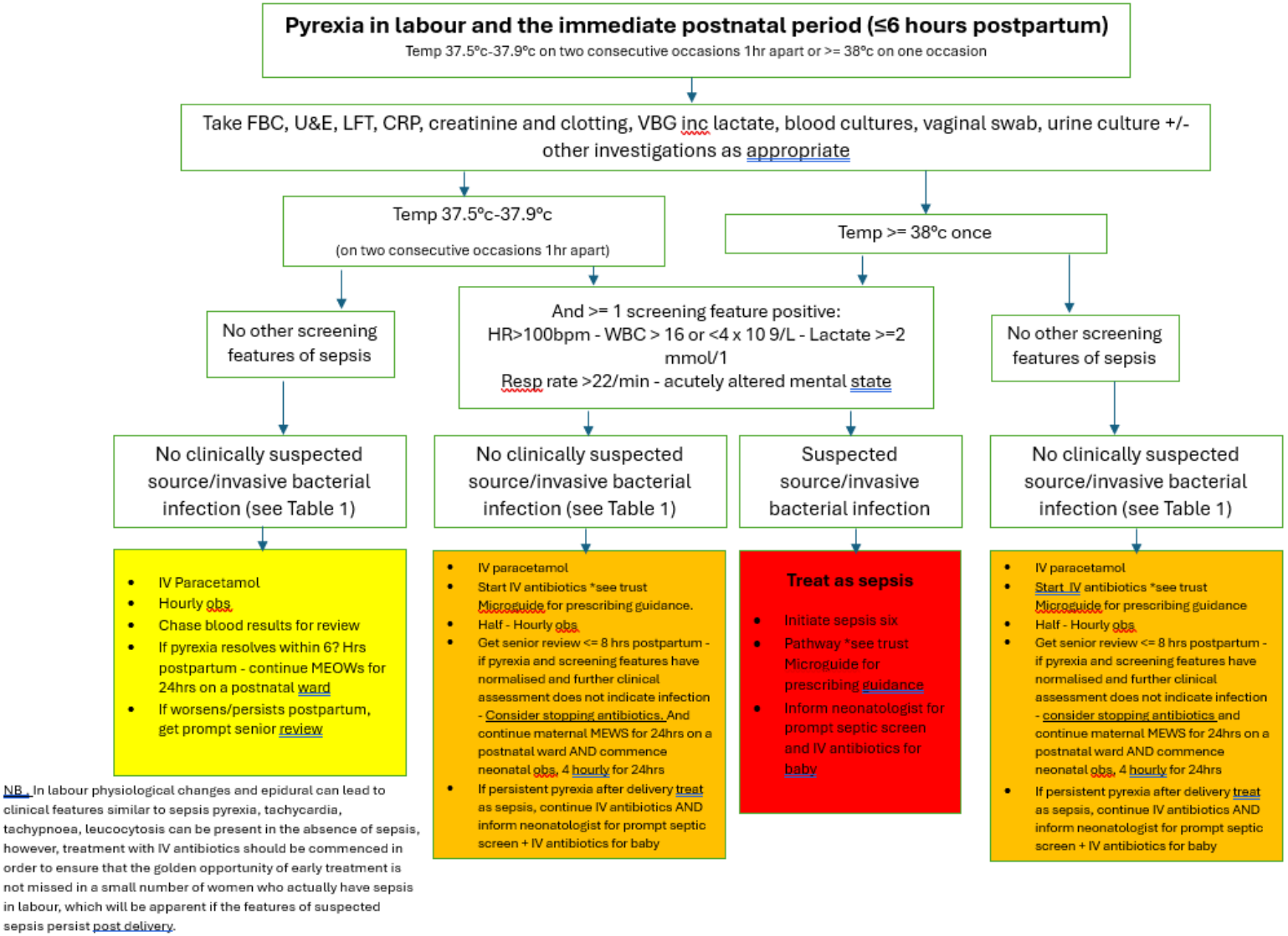
Management of pyrexia in labour



NB . In labour physiological changes and epidural can lead to clinical features similar to sepsis pyrexia, tachycardia, tachypnoea, leucocytosis can be present in the absence of sepsis, however, treatment with IV antibiotics should be commenced in order to ensure that the golden opportunity of early treatment is not missed in a small number of women who actually have sepsis in labour, which will be apparent if the features of suspected sepsis persist post delivery.

SEPSIS SCREENING TOOL - THE SEPSIS SIX

PREGNANT
OR UP TO 4 WEEKS POST-PREGNANCY

PATIENT DETAILS:	DATE: TIME:
	NAME:
	DESIGNATION:
	SIGNATURE:

COMPLETE ALL ACTIONS WITHIN ONE HOUR

01 ENSURE ST3 ATTENDS, CALL CONSULTANT

NOT ALL PATIENTS WITH RED FLAGS WILL NEED THE 'SEPSIS 6' URGENTLY. A SENIOR DECISION MAKER MAY SEEK ALTERNATIVE DIAGNOSES/ DE-ESCALATE CARE. RECORD DECISIONS BELOW

NAME: GRADE:

TIME ☐☐:☐☐

02 OXYGEN IF REQUIRED

START IF O_2 SATURATIONS LESS THAN 92% - AIM FOR O_2 SATURATIONS OF 94-98%
IF AT RISK OF HYPERCARBIA AIM FOR SATURATIONS OF 88-92%

TIME ☐☐:☐☐

03 OBTAIN IV ACCESS, TAKE BLOODS

BLOOD CULTURES, BLOOD GLUCOSE, LACTATE, FBC, U&Es, CRP AND CLOTTING
LUMBAR PUNCTURE IF INDICATED

TIME ☐☐:☐☐

04 GIVE IV ANTIBIOTICS, CONSIDER DELIVERY

MAXIMUM DOSE BROAD SPECTRUM THERAPY
CONSIDER: LOCAL POLICY / ALLERGY STATUS / ANTIVIRALS

TIME ☐☐:☐☐

05 GIVE IV FLUIDS

GIVE FLUID BOLUS OF 20 ml/kg if age <16, 500ml if 16+
NICE RECOMMENDS USING LACTATE TO GUIDE FURTHER FLUID THERAPY

TIME ☐☐:☐☐

06 MONITOR

USE MEWS. MEASURE URINARY OUTPUT: THIS MAY REQUIRE A URINARY CATHETER REPEAT LACTATE AT LEAST ONCE PER HOUR IF INITIAL LACTATE ELEVATED OR IF CLINICAL CONDITION CHANGES

TIME ☐☐:☐☐

RED FLAGS AFTER ONE HOUR - ESCALATE TO CONSULTANT NOW

Monitor at least every 30 mins using early warning score e.g. MEWS

RECORD ADDITIONAL NOTES HERE:

e.g. allergy status, arrival of specialist teams, de-escalation of care, delayed antimicrobial decision making, variance

THE UK SEPSIS TRUST

SEPSIS SCREENING TOOL ACUTE ASSESSMENT

PREGNANT
OR UP TO 4 WEEKS POST-PREGNANCY

PATIENT DETAILS:

DATE: **TIME:**
NAME:
DESIGNATION:
SIGNATURE:

01 START THIS CHART IF THE PATIENT LOOKS UNWELL OR MEWS HAS TRIGGERED

RISK FACTORS FOR SEPSIS INCLUDE:

- ☐ Impaired immunity (e.g. diabetes, steroids, chemotherapy)
- ☐ Recent trauma / surgery / invasive procedure
- ☐ Indwelling lines / IVDU / broken skin

02 COULD THIS BE DUE TO AN INFECTION?

YES

LIKELY SOURCE:

- ☐ Respiratory
- ☐ Breast abscess
- ☐ Urine
- ☐ Abdominal pain / distension
- ☐ Infected caesarean / perineal wound
- ☐ Chorioamnionitis / endometritis

NO → **SEPSIS UNLIKELY, CONSIDER OTHER DIAGNOSIS**

03 ANY RED FLAG PRESENT?

YES

☐ **MEWS score is 8 or higher**
or any one of:

- ☐ Objective evidence of new / altered mental state
- ☐ Non-blanching rash / mottled / ashen / cyanotic
- ☐ Lactate ≥ 2 mmol/l*
- ☐ Not passed urine in 18 hours (<0.5ml/kg/hr if catheterised)

*lactate may be raised in & immediately after normal delivery

YES → **RED FLAG SEPSIS**

START MATERNAL SEPSIS SIX

04 ANY AMBER FLAG PRESENT?

NO

☐ **MEWS score is 5 or higher**
or any one of:

- ☐ Acute deterioration in functional ability
- ☐ Has had invasive procedure in last 6 weeks
- ☐ Temperature < 36°C
- ☐ Has diabetes or gestational diabetes
- ☐ Close contact with GAS
- ☐ Prolonged rupture of membranes
- ☐ Bleeding / wound infection
- ☐ Offensive vaginal discharge
- ☐ Non-reassuring CTG / fetal tachycardia >160
- ☐ Behavioural / mental status change

YES →

SEND FULL SET OF BLOODS

ENSURE MIDWIFE IN CHARGE REVIEWS WITHIN 15 MINS & ST3+ WITHIN 60 MINS

IF ANTIMICROBIALS NEEDED, GIVE THESE AND ACHIEVE SOURCE CONTROL WITHIN 3 H

I have prescribed antimicrobials ☐

This patient does not require antimicrobials as:

- I don't think this patient has an infection ☐
- Patient already on appropriate antimicrobials ☐
- Escalation is not appropriate ☐
- Other_____

Name: Date:
Grade: Time:

NO AMBER FLAGS = ROUTINE CARE /CONSIDER OTHER DIAGNOSIS

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Documentation Control

Reference Number: UHDB/Obs/01:24/S1	**Version: UHDB 3.1**		**Status: FINAL**	
	Royal Derby prior to merged document:			
Version Amendment	Version	Date	Author	Reason
	2	May 2016	Maternity Guideline Group	Review
	2.1	May 2017	Maternity Guideline Group Julia Lacey – Lead Pharmacist	Synchronised with Antibiotics guideline
	2.2	March 2019	Cindy Meijer – Risk Support Midwife	Maternity Sepsis Screening Tool added as an appendix
	Burton Trust prior to merged document:			
WC/OG/75	3.1	Aug 2020	Maternity Guideline Group	Removal of antibiotics, replaced with referral to obstetric infections guideline
Version control for UHDB merged document:				
UHDB	1	October 2020	Dr El-Hadidy – SpR O&G Miss S Raouf –Consultant Obstetrician	New Incorporating Group A Streptococcus (G4), Maternity Sepsis Screening Tool
	2	Feb 2024	Miss Anuja Joshi - Obstetric consultant	Review and update
	3	March 2024	Joanna Harrison-Engwell Lead Midwife for Guidelines and Audit	To amend to be inline with new MEWS parameters
	3.1	Aug 2024	Lauren Wilkinson Risk Support Midwife	To be in-line with national guidelines
Intended Recipients: All staff with responsibility for care for women in pregnancy / labour & the puerperium				
Training and Dissemination: Cascaded electronically through lead sisters/midwives/doctors; Published on KOHA, Article in Business unit newsletter; emailed via NHS.net				
Consultation with:	Anaesthetists, Microbiologist			

Business Unit sign off:	02/02/2024: Maternity Guidelines Group: Miss A Joshi – Chair 02/09/2024: V3.1 Maternity Guidelines Group: Miss A Banerjee– Chair 02/02/2024: Maternity Development & Governance Group/CD- Mr R Devaraj 09/09/2024: V3.1 Tier 4 Maternity Quality & Safety Assurance - Miss J Heslop
Notification Overview sent to TIER 3 Divisional Quality Governance Operations & Performance: 02/02/2024 V3.1 17/09/2024	
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Key contact	Joanna Harrison-Engwell