

## Maternal sepsis

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<b>Guideline to be followed by (target staff):</b> All staff			
<b>To be read in conjunction with the following documents:</b>			
<b>Are there any eCARE implications?</b> No			
<b>CQC Fundamental standards:</b> Regulation 9 – person centered care Regulation 10 – dignity and respect Regulation 11 – Need for consent Regulation 12 – Safe care and treatment Regulation 13 – Safeguarding service users from abuse and improper treatment Regulation 14 – Meeting nutritional and hydration needs Regulation 15 – Premises and equipment Regulation 16 – Receiving and acting on complaints Regulation 17 – Good governance Regulation 18 – Staffing Regulation 19 – Fit and proper			

### Disclaimer -

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The ultimate responsibility for the use of the guideline, dosage of drugs and correct following of instructions as well as the interpretation of the published material **lies solely with you** as the medical practitioner.

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## Guideline Statement

To enable all healthcare professionals caring for pregnant and postpartum service users in the prevention, recognition and management of sepsis.

## Executive Summary

Sepsis contributes significantly to maternal morbidity and mortality world-wide. Global estimates suggest that direct (obstetric) infections are the third most common cause of maternal mortality, representing about 10.7% of maternal deaths, with the largest toll estimated in low-income and middle-income countries (10.7% compared to 4.7% in high income countries).

In 2017-19, 13 women died during or up to six weeks after the end of pregnancy, from sepsis associated with their pregnancy. Sepsis remains the fifth leading cause of maternal death in the UK (MBRRACE-UK 2021).

In MBRRACE report 2014, rates of direct deaths related to pregnancy related infections (genital tract/ urinary tract sepsis) remained a significant contributor to maternal deaths but rates of indirect deaths due to pneumonia and influenza have significantly decreased, compared to MBRRACE report 2014. This is due to introduction of flu vaccinations and Influenza vaccine should be offered to all pregnant women at any gestation of pregnancy (PHE 2019).

Deaths from mid-trimester sepsis account for the rise in the mortality from direct sepsis since nadir in 2012-2014.

Overall, in 29% of all maternal deaths improvements to care may have made a difference to the outcome, thus highlighting the need for a sepsis guideline.

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

In a pregnant or postpartum woman, a single abnormal finding can be significant and warrants a thorough clinical assessment looking for signs of an infection. (Saving Lives, Improving Mothers' Care 2014).

## Definitions

### Maternal Sepsis

Maternal sepsis is defined as a life-threatening condition characterised by organ dysfunction resulting from infection during pregnancy, childbirth, post-abortion, or postpartum period. (WHO)

It's further referred to as "antenatal sepsis" if it occurs in antenatal period, "intrapartum sepsis" when it occurs in labour and "puerperal or postnatal sepsis" if it occurs after delivery to 6 weeks postnatal (RCOG/UKOSS/The UK Sepsis Trust).

Sepsis may be caused by bacterial, viral, or fungal infections and requires treatment of the underlying infection as well as symptom control for effective care.

Pathogens identified in maternal sepsis include B- hemolytic streptococcus (Group A and B), Escherichia coli, Pseudomonas, Staphylococcus aureus, Streptococcus pneumonia, Methicillin-resistant staphylococcus aureus (MRSA), covid and Influenza.

Mixed infections with both Gram-positive and Gram-negative organisms are common, especially in chorioamnionitis. Coliform infection is particularly associated with urinary sepsis, preterm premature rupture of membranes, and cervical cerclage.

Gram-negative bacteria that produce extended-spectrum beta-lactamases (ESBL) are an increasingly common cause of co-amoxiclav- and cephalosporin-resistant urinary tract infections.

Key actions for diagnosis and management of sepsis are (MBRRACE 2017- 19)

- Timely Recognition
- Fast administration of antibiotics
- Quick involvement of experts

## **Maternal Pyrexia**

Maternal pyrexia is defined as temperature of 37.5 degrees Celsius or greater on two occasions 1 hour apart OR one temperature of 38 degrees Celsius or greater (NICE 2019).

## **Septic shock**

Septic shock is a subset of sepsis where particularly profound circulatory, cellular and metabolic abnormalities increase mortality. It is defined as persisting hypotension despite adequate fluid resuscitation in the presence of sepsis.

## **Chorioamnionitis**

Chorioamnionitis is a term used to describe inflammation limited to the chorion and amnion layers of the fetal membranes. It is also often used when other intrauterine components are involved, such as amniotic fluid or the decidua. It typically happens due to ascending polymicrobial bacterial infection in the setting of membrane rupture. Chorioamnionitis can occur with intact membranes, and this appears to be especially common for the very small fastidious genital mycoplasmas such as Ureaplasma species and Mycoplasma hominis, found in the lower genital tract of over 70% of women. Only rarely is haematogenous spread implicated in chorioamnionitis, as occurs with Listeria monocytogenes.

## **Clinical Chorioamnionitis**

Clinical chorioamnionitis is characteristic when clinical signs are present, the condition is referred to as clinical chorioamnionitis or clinical intraamniotic infection. It is usually defined as maternal temperature, with one of following signs:

- Maternal tachycardia (>100/min,
- Fetal tachycardia >160/min,
- Leucocytosis >15x10<sup>9</sup>cells/l,
- Offensive liquor,
- Tender uterus on palpation.

## **Subclinical chorioamnionitis**

Subclinical chorioamnionitis by definition does not present with the above clinical signs but may manifest as preterm labour or, even more commonly, as preterm premature rupture of membranes (PPROM). In addition, premature ROM at term (membrane rupture at  $\geq 37$  weeks' gestation but prior to onset of uterine contractions), which occurs in 8% or less of term births, is associated with an increased risk of chorioamnionitis (2-5%).

Hence, term subclinical chorioamnionitis encompasses any other features in absence of maternal pyrexia such as;

- Maternal tachycardia ( $>100$ bpm where other causes like dehydration or pain has been excluded)
- Fetal tachycardia ( $>160$ /min for any gestation),
- A persistent rise in the baseline fetal heart rate for the given gestation or a persistent increase in the baseline fetal heart rate during labour  $>10\%$  without preceding CTG signs of hypoxia (but beware that chorioamnionitis and hypoxia can happen simultaneously too),
- Tender uterus,
- Offensive liquor

## **Histologic chorioamnionitis**

Histologic chorioamnionitis is diagnosis based on pathologic findings on microscopic examination of the placenta or chorioamnion specimens and includes sub-clinical chorioamnionitis as well as clinical chorioamnionitis.

### **Note-**

- There is a 5-fold increase in risk of cerebral palsy with chorioamnionitis.
- The presence of chorioamnionitis and hypoxia causes a 78-fold increase in risk of cerebral palsy.
- Paracetamol is particularly important during the intrapartum period since fetal acidosis in the setting of fever has been associated with a marked increase in the incidence of neonatal encephalopathy. If a raised temperature is identified follow point **3.3** maternal pyrexia.

Please refer to MKUH Fetal Monitoring Guideline Flow chart on

- Chorioamnionitis **AMBER ALERT** Management
- Chorioamnionitis **RED ALERT** Management

Fetal monitoring guideline hyperlink -

<https://documentcloud.adobe.com/spodintegration/index.html?r=1&locale=en-us>

## **1.0 Roles and Responsibilities:**

It is the role of the clinical team to:

- Undertake observations in line with clinical guidelines and record these on the MEOWS chart
- All staff who perform observations should be trained and competent in the use of the MEOWS chart.
- Undertake general and systemic examination to identify the cause of sepsis.

- Deliver the sepsis six where indicated, including administration of antibiotics within one hour of diagnosis/suspected sepsis being identified.
- Escalate any concerns to the relevant senior staff, using a Situation, Background, Assessment, Recommendation (SBAR) format to communicate the urgency

## 2.0 Implementation and dissemination of document

This document will be disseminated via clinical governance pathways to all maternity staff. This document can only be considered valid when accessed via MKUH intranet, if this document is printed you must check that it matches the in the version on the intranet.

## 3.0 Processes and procedures

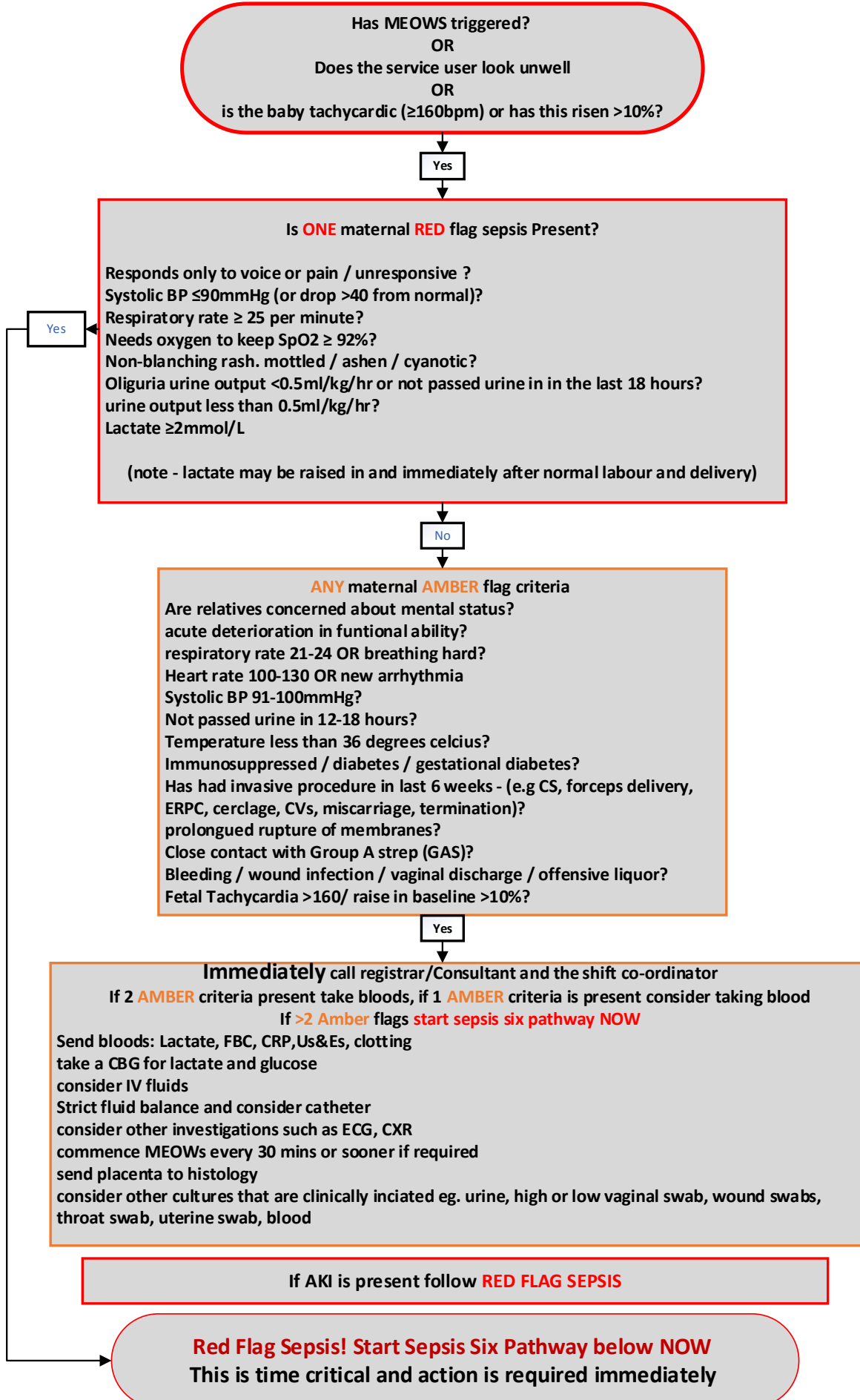
### 3.1 Risk factors

This list is not exhaustive;

- Obesity
- Diabetes (Impaired Glucose tolerance)
- Anemia
- Black and other ethnic minority
- Group A Streptococcus (GAS) infection in close contact or family members
- History of pyelonephritis
- History of pelvic infections/ STI
- History of febrile illness or taking antibiotics in the 2 weeks prior to presentation
- Immuno-compromised status due to pre-existing medical conditions (eg HIV, sickle-cell disease), undergoing treatment for cancer with immunosuppressant drugs, long term steroid use.
- Nulliparity
- Multiple pregnancy
- Cervical cerclage
- Amniocentesis and other invasive uterine procedures
- Prolonged spontaneous rupture of membranes (SROM)
- Preterm pre-labour rupture of membranes (PPROM)
- All forms of operative birth and perineal trauma or surgery within the last 6 weeks.
- Complications of Caesarean birth – (uterine angle tear, difficult delivery of baby, ureter-bladder damage, bowel perforations, multiple adhesions)
- Wound haematoma
- Retained products of conception
- Women who have continued vaginal bleeding or offensive vaginal discharge (can be associated with increased occurrence of disease or infection)
- History of Group B Streptococcal (GBS) infection
- Women using intravenous drugs/ with indwelling catheters/ central lines
- Women with breach of skin integrity (cuts, burns, blister, skin infections)

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### 3.2 Recognition, screening and diagnosis for sepsis and/or chorioamnionitis





# Sepsis 6 Pathway

1

- Inform Consultant Obstetrician & Obstetric Anaesthetist and transfer to an obstetric unit

2

- Give high-flow OXYGEN at 15 litres per minute via a non-rebreather mask with a reservoir bag, to maintain targeted saturations of 94-98%.

3

- Take 2 sets of paired Blood CULTURES and VBG. Measure serial serum LACTATE and other bloods – FBC, G&S, U&Es, LFTs, CRP, clotting
- Consider other cultures that are clinically indicated eg. urine, high or low vaginal swab, wound swabs, throat swab, uterine swab
- Send the placenta to histology
- Think source control and timing of birth of baby

4

- Give INTRAVENOUS ANTIBIOTICS- Prompt treatment **WITHIN** 1 hour of diagnosis – hyperlink <https://viewer.microguide.global/MKUH/Abx>

5

- Consider INTRAVENOUS FLUIDS –. If hypotensive/lactate >2mmol/L give 500mls stat (can repeat up to 30ml/kg). Discuss with obstetric/anaesthetic team regarding fluids if not hypotensive and lactate normal

6

- Monitor URINE OUTPUT and fluid balance – consider catheterisation

- If sepsis 6 pathway is performed within 24 hours of the birth of the baby – inform the neonates to assess whether the baby will need a septic screen

If after Sepsis 6, systolic BP remains <90mmHg, level of consciousness remains altered, lactate not reducing (or was previous >4mmol/L), refer immediately to rapid response as this service user may need critical care.

**Note-** For every hour of delay in giving antibiotics, there is cumulative increase of 7.5% of mortality.

**If the service user deteriorates or does not improve;**

- Contact Rapid Response immediately
- Consider additional or alternative IV antibiotics.
- Seek advice from Consultant Microbiologist
- Consider additional imaging to aid diagnosis and target treatment



### 3.3 Maternal pyrexia

(A temperature of 37.5 degrees Celsius or greater on two occasions 1 hour apart OR one temperature of 38 degrees Celsius or greater)

- Take a thorough clinical history, consider risk factors, exposure to infections and travel history, if relevant
- Commence a CTG for assessment of fetal well-being.
- Administer 1g paracetamol preferably IV
- Strict fluid balance and avoid dehydration
- Repeat observations half hourly and observe for **AMBER** or **RED** flag sepsis trigger
- Consider expediting birth
- Inform the neonatal team to assess for septic screen after birth

**Note** - Hyperthermia is not a risk factor for sepsis and is not included in the Sepsis Screening Tool (International Sepsis Guidance 2016).

### 3.4 Review and de-escalation of management after initial treatment for sepsis

- When MEOWS is 0 and initial blood culture result is negative (usually available in 24 hours), stop IV antibiotics. Call the labs for results if not available, prior to stopping antibiotics.
- Do not start on oral antibiotics, without senior discussion, WCC and CRP are non-specific markers for infection and levels can increase significantly due to physiological changes in labour. They should not be used to guide management of sepsis in clinically well patients. Repeat them only in those who are persistently unwell, not responding to treatment or culture positive patients.
- If the service users improvement is slow and needs to be switched over to oral antibiotics, liaise with microbiologist. Repeat the blood tests, review all the swab results and consider other tests including imaging (eg CT scan) as appropriate.

### 3.5 Prevention of sepsis

#### Antenatal

- Influenza vaccination: Department of Health recommends all women who are pregnant during the influenza season, regardless of stage of pregnancy, should be offered the inactivated influenza vaccine. Maternal deaths due to Influenza have significantly reduced since Influenza vaccination of all pregnant women (MBRRACE 2017).
- There should be appropriate and clear advice on infection prevention and symptom identification in situations where women were prone to sepsis such as premature rupture of membranes. (MMBRRACE-UK 2014 & 2017).
- Prophylactic antibiotics: This may be indicated for at-risk women eg. after cervical cerclage, recurrent urinary tract infections in pregnancy, including prophylactic erythromycin for services users with PPRM
- Any Group A streptococcus (GAS) identified during pregnancy should be treated to avoid invasive GAS infection. GAS causes a diverse range of skin, soft tissue and respiratory infections, including: tonsillitis, pharyngitis, scarlet fever, impetigo, erysipelas, cellulitis and pneumonia.

- All cases of suspected GAS infection identified in the acute care setting, maternity units or any case identified within 7 days of discharge or delivery that could have been healthcare-associated should be reported to the IPCT (Infection Prevention and Control Team).
  - Healthcare workers exposed to respiratory or infected wound secretions of women with confirmed GAS infection during or in the 7 days prior to an infection should be referred to occupational health.
  - Close contacts of invasive GAS cases should be warned of the symptoms and signs of GAS infection and seek medical care should signs develop within 30 days of the index case.
  - Routine antibiotic prophylaxis of close contacts is not recommended.
- Urethral catheterization must always be undertaken using Aseptic precautions
  - Ensure early senior involvement in the care of extremely PROM cases and a full explanation of the risks and benefits of continuing the pregnancy including termination of pregnancy (MBRRACE 2020).

### Intrapartum

- Prophylactic antibiotics should be given for GBS prophylaxis, Preterm labour.
- Vaginal birth: Aseptic precautions should be observed for all operative vaginal birth. If perineal suturing is required, the operator must use sterile suture pack and follow aseptic precautions during repair. All service users having assisted vaginal birth (Forceps or Ventouse) should have single dose of IV antibiotics.
- Prophylactic antibiotics should be given to women who have had third/fourth degree tears, manual removal of placenta, intrauterine balloon insertion.
- Caesarean birth:
  - Follow the Vaginal Prep SOP for vaginal cleansing prior to commencing the procedure.
  - Intravenous antibiotic (see Caesarean Section Guideline) should be administered to all patients.
  - The abdomen should be prepared using the Chloraprep.
  - Use of PICO dressing must be considered for all women with BMI>35 undergoing caesarean birth.
- In women with sepsis and organ dysfunction, regional anaesthesia should be used with caution and seek advice from anaesthetist.
- Use of the birthing pool: If sepsis is suspected use of the birthing pool should only be used after discussion with senior midwife and senior obstetrician

### Postpartum

- Good personal and hand hygiene should be discussed with the service user. This includes avoiding contamination of the perineum by washing hands before and after using the lavatory or changing sanitary towels. It is especially necessary when the woman or her family or close contacts have a sore throat or upper respiratory tract infection.

- All community midwives must carry a thermometer to check maternal temperature postnatally (MBRRACE 2018).
- All women should be made aware of postpartum sepsis and advised of the signs and symptoms of infection and sepsis, detailing increased infection risk within six weeks of birth.
- Ensure direct communication amongst health care teams and upon discharge, hand-over to community carers (GP, midwives and health visitors) of women requiring antibiotics during hospital stay. This is essential, so that appropriate follow-up visits may be arranged and will aid early detection of sepsis symptoms.

## 4.0 Statement of evidence/references

### References:

NICE NG121 Intrapartum care for women with existing medical conditions or obstetric complications and their babies (updated April 2019)

<https://www.nice.org.uk/guidance/ng121>

The Third International Consensus Definitions for Sepsis and Septic shock (Sepsis-3): Singer et al; JAMA Feb 2016

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MBRRACEUK: SavingLives,ImprovingMothersCare–2014, 2017, 2018, 2019, 2020

<https://www.npeu.ox.ac.uk/mbrance-uk>

UK sepsis trust – clinical tools <https://sepsistrust.org/professional-resources/clinical-tools/>

RCOG guidelines; Green-top guideline No 64a & 64b

Sepsis in Pregnancy, Bacterial (Green-top Guideline No. 64a)

Bacterial Sepsis following Pregnancy (Green-top Guideline No. 64b)

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December 2022

## 5.0 Governance

### 5.1 Document review history

Version number	Review date	Reviewed by	Changes made
1	October 2022	Katie Selby and Swati Valenkar	New guidance
1.1	January 2024	Jordan Pritchard Alex Fry	Sepsis flow chart amended for clarification

### 5.2 Consultation History

Stakeholders Name/Board	Area of Expertise	Date Sent	Date Received	Comments	Endorsed Yes/No
Jacqueline McAinsh	Midwife	3/10/22	3/10/22	Spelling and grammar	Yes
Janice Styles	Consultant Midwife	29/9/22	29/9/22	Wording change	Yes
Anja Johansen-Bibby	Consultant Obstetrics and Gynaecology	28/9/22	28/9/22	Addition of COVID to pathogens. Clarification of paracetamol. Clarification of cultures. Spelling/grammar	Yes responded.
Women's Health Guideline review group	Maternity	03/01/2024	-	Version 1.1 approved as chairman's actions	Yes

### 5.3 Audit and monitoring

Audit/Monitoring Criteria	Tool	Audit Lead	Frequency of Audit	Responsible Committee/Board
The number of term babies admitted to NNU with suspected sepsis	<b>ATAIN review group</b>	Women's Governance and Quality Improvement Lead		
The number of babies diagnosed with HIE 2&3	Maternity dashboard	Women's Governance		



		and Quality Improvement Lead		
Sepsis flow chart followed and managed appropriately	Audit tool	Women's Governance and Quality Improvement Lead Monthly reporting on the governance report		

## 5.4 Equality Impact Assessment

As part of its development, this Guideline and its impact on equality has been reviewed. The purpose of the assessment is to minimise and if possible remove any disproportionate impact on the grounds of race, gender, disability, age, sexual orientation, religion or belief, pregnancy and maternity, gender reassignment or marriage and civil partnership. No detriment was identified. Equality Impact assessments will show any future actions required to overcome any identified barriers or discriminatory practice.

Equality Impact Assessment			
Division	Women's Health	Department	Maternity
Person completing the EqIA	Katie Selby and Swati Velankar	Contact No.	86034
Others involved:		Date of assessment:	1/11/2022
Existing policy/service	No	New policy/service	Yes
Will patients, carers, the public or staff be affected by the policy/service?		Yes	
If staff, how many/which groups will be affected?		All staff	
Protected characteristic	Any impact?	Comments	
Age	NO	Positive impact as the policy aims to recognise diversity, promote inclusion and fair treatment for patients and staff	
Disability	NO		
Gender reassignment	NO		

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Marriage and civil partnership	NO		
Pregnancy and maternity	YES		
Race	NO		
Religion or belief	NO		
Sex	NO		
Sexual orientation	NO		
What consultation method(s) have you carried out?			
Women's Health Guideline Review Group			
How are the changes/amendments to the policies/services communicated?			
Guideline meeting minutes, guideline monthly memo			
What future actions need to be taken to overcome any barriers or discrimination?			
What?	Who will lead this?	Date of completion	Resources needed
Review date of EqIA	01/11/2025		