University Hospitals Sussex
NHS Foundation Trust

Pyrexia & Sepsis in Pregnancy, Labour and in Postnatal Period

Maternity Protocol MP045

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Contents

Key Principles

A protocol is a set of measurable, objective standards to determine a course of action. Professional judgement may be used in the application of a protocol.

Scope

Recognition and management of serious bacterial illness arising in the genital tract or elsewhere in the antenatal, intrapartum periods or following pregnancy, and its management in primary and secondary care

♦ This protocol applies to:

- Pregnant women
- Women in labour
- Women following pregnancy suspected of, or diagnosed with, serious bacterial sepsis.

Responsibilites

- Midwives & Obstetricians:
  - To access, read, understand and follow this guidance
  - To use their professional judgement in application of this protocol

- Management Team:
  - To ensure the protocol is reviewed as required in line with Trust and National recommendations
  - To ensure the protocol is accessible to all relevant staff
  - To ensure the protocol is available to service users on request

1.0 Sepsis

Sepsis may be defined as infection plus systemic manifestations of infection.
Severe sepsis may be defined as sepsis plus sepsis-induced organ dysfunction or tissue hypoperfusion.
Septic shock is defined as the persistence of hypoperfusion despite adequate fluid replacement therapy.

1.1 Definition (see Appendix A for diagnosis criteria for sepsis):
Temperature of 38°C or above on a single reading, or 37.5°C or above on 2 consecutive readings 1 hour apart

1.2 Clinical signs suggestive of sepsis include one or more of the following:
pyrexia, hypothermia, tachycardia, tachypnoea, hypoxia, hypotension, oliguria, impaired consciousness and failure to respond to treatment. These signs, including pyrexia, may not always be present and are not necessarily related to the severity of sepsis.

2.0 Sepsis in Pregnancy

2.1 Special attention should be paid to higher risk pregnant women

2.1.1 Risk factors for sepsis during pregnancy and labour are:

- Obesity
- Impaired glucose tolerance / diabetes
- Impaired immunity/ immunosuppressant medication
- Anaemia
- Abnormal vaginal discharge
- History of pelvic infection
- History of group B streptococcal infection
- Amniocentesis and other invasive procedures
- Cervical cerclage
- Prolonged spontaneous rupture of membranes
- Group A Strep (GAS) infection in close contacts / family members (pharyngitis, impetigo, celliulitis)
- Woman of black or other minority ethnic group origin
- Intravenous drug misusers

2.2 When community midwives suspect the development of sepsis based on the criteria below, they should refer the woman to the labour ward immediately informing the labour ward co-ordinator and Obstetric Registrar.

2.3 Maternal tachycardia, constant severe abdominal pain and tenderness, fever (greater than 38˚C) are important early features of genital tract sepsis that should prompt urgent senior obstetric review and administration of intravenous antibiotics.

2.4 **Clinical signs suggestive of sepsis include one or more of the following:** pyrexia, hypothermia (<36˚), tachycardia (>100BPM), tachypnoea (>20 breath per minute) , hypoxia, hypotension, oliguria, impaired consciousness and failure to respond to treatment. These signs, including pyrexia, may not always be present and are not necessarily related to the severity of sepsis**.**

2.5 All health professionals must be aware of the symptoms and signs of maternal sepsis and critical illness and of the rapid, potentially lethal course of severe sepsis and septic shock.

2.6 **The presence of the following should be regarded as 'red flags' for the diagnosis of sepsis:**

2.6.1 Temperature >38 degrees Celsius
2.6.2 Persistent tachycardia >100 bpm
2.6.3 Respiratory rate greater than 20/min
2.6.4 Abdominal/chest pain and tenderness
2.6.5 Diarrhoea/vomiting may indicate exotoxin production (early toxic shock)
2.6.6 Decreased FM/absent FH
2.6.7 Pre-labour SROM/vaginal discharge
2.6.8 Uterine/renal angle tenderness
2.6.9 Woman generally unwell

2.7 **Other clinical features suggestive of sepsis:**

- Offensive vaginal discharge (smelly suggests anaerobes; serosanguinous suggests streptococcal infection)
- Rigors
- Diarrhoea or vomiting (toxic shock syndrome)
- Rash (generalised streptococcal maculopapular rash)
- Abdominal/pelvic pain and tenderness

2.7.1 Productive cough
2.7.2 Urinary symptoms

See also diagnostic criteria of sepsis (Table A).

2.8 If sepsis is suspected, regular frequent observations should be made and use of the Modified Early Obstetric Warning core (MEOWS) is crucial. The Obstetrician should make a clear plan in the notes how often these observations are required, but they should be at least hourly.

2.9 Severe sepsis requires multidisciplinary involvement of consultant obstetrician, labour ward co-ordinator (or midwife providing care) critical care specialists/anaesthetists and consultant microbiologist or infectious disease physician and others as required.

2.10 It is the responsibility of the Obstetric Registrar to inform the other members of this team

2.11 Establish IV access and take bloods for culture, lactate, FBC/ CRP, U&E.

2.12 Take blood cultures and other samples as guided by clinical suspicion of the focus of infection (e.g. mid-stream urine, high vaginal swab, throat swabs) should be obtained prior to starting antibiotic therapy as they may become uninformative within a few hours of commencing antibiotics but must not delay antibiotic therapy. High-dose broad-spectrum antibiotics should be given within one hour after diagnosis as this reduces the mortality rate to a significant degree.

2.13 Fluid resuscitation: Infuse initial minimum 20 ml/kg normal saline or Hartmann's solution.

2.14 Use IV Cefuroxime IV and Metronidazole IV as first choice antibiotics if genital tract sepsis is suspected. Co-amoxiclav does not cover MRSA or *Pseudomonas*, and there is concern about an increase in the risk of necrotising enterocolitis in neonates exposed to co-amoxiclav in utero.

2.15 The most common organisms identified in pregnant women dying from sepsis are group A beta-haemolytic *Streptococcus* and *E.Coli*

2.16 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 cerclage. Anaerobes such as *Clostridium perfringens* (the cause of gas gangrene) are less commonly seen nowadays, with *Peptostreptococcus* and *Bacteroides spp*. predominating.

2.17 Any relevant imaging studies should be performed promptly in an attempt to confirm the source of infection and should not be deferred on the grounds of pregnancy.

2.18 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 and warrants discussion with Consultant Obstetrician on call.

2.19 Transfer to ICU should be discussed critical care /anaesthesia / on-call consultant if:

2.18.1 Hypotension or raised serum lactate persisting despite fluid resuscitation, suggesting the need for inotrope support

2.18.2 If cardiac output monitoring,ventilatory support requiring intubation, and renal support is necessary

2.18.3 If conscious level of the patient is significantly decreased

2.18.4 And in presence of multi-organ failure, uncorrected acidosis or hypothermia

3.0 Management of Pyrexia in Labour

3.1 Complete full set of maternal observations (including temperature, pulse, blood pressure (BP), oxygen saturation, and respiratory rate (RR) and document on a MEOWS chart. Repeat all observations hourly. Review medical and obstetric history and any outstanding blood/urine/swab results. Inform and discuss your care and plans with the woman. A single temperature over 37.5C should prompt 1g paracetamol PO and hydration.

3.2 Inform doctor. A woman who develops a fever and tachycardia or other signs of sepsis should be assessed by senior medical staff.

3.3 Take LVS, MSU, FBC/ CRP, and blood cultures with informed consent. Blood cultures should be obtained prior to antibiotic administration if within 1 hour.

3.5 Administer broad-spectrum antibiotic within one hour of recognition of severe sepsis. Commence treatment if maternal temperature of 38°C or above on a single reading, or 37.5°C or above on 2 consecutive readings, 1 hour apart. Use IV Cefuroxime IV and Metronidazole IV as first choice antibiotics if genital tract sepsis is suspected.

3.6 Rehydrate with IV fluids. In the event of hypotension and/or a serum lactate >4mmol/l administer an initial minimum 20ml/kg of crystalloid.

3.7 During the intrapartum period, continuous electronic fetal monitoring is recommended. In the presence of maternal pyrexia (defined as a temperature of 38°C or above on a single reading, or 37.5°C or above on 2 consecutive readings 1 hour apart) and this should also apply to sepsis without pyrexia.

- 3.7.1 If new changes in baseline variability or new onset decelerations, reassess maternal mean arterial pressure, saturation and blood gases.
- 3.7.2 If CTG becomes pathological, the baby should be delivered. Evidence of intrauterine infection is associated with abnormal fetal heart monitoring; however, electronic fetal monitoring is not a sensitive predictor of early onset neonatal sepsis
- 3.7.3 There is insufficient evidence regarding fetal blood sampling in the presence of maternal sepsis to guide practice.
- 3.7.4 The effects of maternal sepsis on fetal wellbeing include the direct effect of infection in the fetus, the effect of maternal illness/shock and the effect of maternal treatment. The risk of neonatal encephalopathy and cerebral palsy is increased in the presence of intrauterine infection.

3.8 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 as her condition allows.

3.9 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 and warrants discussion with Consultant Obstetrician on call. Women and her partner should be kept informed at all times and the neonatal team should come and discuss possible scenarios with the parents in preparation.

3.10 Attempting delivery in the setting of maternal instability increases the maternal and fetal mortality rates unless the source of infection is intrauterine.

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

3.12 Disseminated intravascular coagulation and uterine atony are common in genital tract sepsis and often cause life-threatening postpartum haemorrhage. Treatment, including delivery, should not be delayed once septicaemia has developed because deterioration can be extremely rapid.

3.13 Inform Neonatal SpR to review baby at delivery.

If temperature is less than 37.3C within 6 hours postnatal stop antibiotics.

If temperature if more than 37.3C after delivery treat for a total of 5 days. Switch IV to oral when temperature is less than 37.5C for 24 hours.

4.0 Sepsis in the Puerperium

4.1 Those caring for pregnant and post-partum women need to inform them of risks of infection along with symptoms and signs and the need to seek advice early if concerned. They should also inform them of how infections spread and how they may be prevented as well as the importance of good personal hygiene. 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 This information should be imparted both verbally and in written form and documented in the maternal notes.

4.2 Postnatal observations of pulse, temperature, BP, respiratory rate, and lochia should be done within 6 hours of birth. Women who have had complications during labour and birth, assisted delivery, PPH, perineal trauma or other higher risk interventions then observations should be considered daily. In the community observations should be considered on women who have had a LSCS or other higher risk interventions during community visits by midwives.

4.3 Any problems noted during a woman's hospital stay should be reported directly to her community carers (GP, midwives MSWs and health visitors) when she is

discharged in order that appropriate follow up visits may be arranged and the significance of developing symptoms recognised.

4.4 Some women will develop complications at home (after discharge if hospital birth). Observations of pulse, BP, temperature, respiratory rate, and lochia should always be undertaken taken where sepsis is suspected.

4.5 Community carers should be aware of the importance of early referral to hospital of recently delivered women who feel unwell and have pyrexia.

4.6 Symptoms of sepsis may be less distinctive than in the non-pregnant population and are not necessarily present in all cases; therefore, a high index of suspicion is necessary. Sepsis is often insidious in onset with a fulminating course. The severity of illness should not be underestimated. Community midwives and GPs need to be vigilant and visit regularly. Early referral to hospital may be life saving.

4.7 Risk factors for puerperal sepsis are these mentioned above for sepsis in pregnancy plus vaginal trauma, caesarean section, wound haematoma, retained products of conception should be noted.

4.8 Common symptoms of sepsis in the puerperium:

4.8.1 Progression of symptoms can be very rapid in puerperal sepsis and requires and equally rapid response

- Fever (>38˚), rigors
- Sustained tachycardia more than 90 beats/minute
- Breathlessness (respiratory rate more than 20 breaths/minute)
- Abdominal or chest pain
- Uterine or renal angle pain and tenderness
- Diarrhoea or vomiting
- Breast engorgement/ redness (
- Rash (generalised and usually maculopapular)
- Wound infection – spreading cellulitis or discharge
- Offensive vaginal discharge
- Productive cough
- Urinary symptoms
- Delay in uterine involution, heavy lochia
- General – non-specific signs such as lethargy, reduced appetite.

4.9 The major pathogens causing sepsis in the puerperium are:

4.9.1 Group A Strep (GAS), also known as *Streptococcus pyogenes (causing 30-40% of maternal death)*

4.9.2 *Escherichia coli*

4.9.3 *Staphylococcus aureus*

4.9.4 *Streptococcus pneumoniae*

4.9.5 Meticillin-resistant *S. aureus* (MRSA), *Clostridium septicum* and *Morganella morganii*.

4.9.6 Gram-negative bacteria that produce extended-spectrum beta-lactamases (ESBL) are an increasingly common (> 12% of coliform bacteria) cause of co-amoxiclav- and cephalosporin-resistant urinary tract infections

4.9.7 Early presentation of sepsis (less than 12 hours post-birth) is more likely to be caused by streptococcal infection, particularly Group A Streptococcus

5.0 Other Likely Causes of Sepsis Outside the Genital Tract following Pregnancy

- Mastitis
- Urinary tract infection,
- Pneumonia,
- Skin and soft-tissue infection,
- Gastroenteritis and pharyngitis are likely causes of sepsis other than the genital tract.
- Rarer causes include bacterial meningitis, bacterial endocarditis.

5.1 Mastitis if complicated may lead to breast abscesses, necrotizing fasciitis and toxic shock syndrome. Immediate referral to hospital is indicated if the woman with mastitis is clinically unwell, if there is no response to oral antibiotics within 48 hours or if mastitis recurs or if there are very severe or unusual symptoms.

5.2 Urinary tract infection

See MP028 Infections in Pregnancy

5.3 Pneumonia

5.3.1 Identification of the cause of pneumonia is by submitting a sample of sputum to the laboratory for culture.

5.3.2 Severe pneumonia should be managed in consultation with a respiratory physician and a medical microbiologist.

5.3.3 A beta-lactam antibiotic together with a macrolide antibiotic is used to cover typical and atypical organisms as per Medical Registrar advise

5.4 Skin and soft-tissue infection

5.4.1 **Infection sites:**Intravenous cannulae**,** Injection sites**,** Caesarean section wound**,** Episiotomy wounds

5.4.2 Swabs should be taken of any discharge.

5.4.3 If drains, vascular access devices or other indwelling devices are suspected as the source of infection, they should be removed as soon as is practicable.

5.4.4 The location of intravenous cannula sites should be recorded and inspected twice daily.

5.4.5 Skin and soft-tissue infections are particularly associated with toxic shock syndromes.

5.4.6 Cellulitis first line Fluclox 500mg QDS or clindamycin 450mg QDS in penicillin allergic patient

5.5 Necrotising fasciitis

5.5.1 The clinical feature of necrotising fasciitis is of agonising pain, typically necessitating increasing amounts of strong analgesia culminating in use of opaites.

5.5.2 Early necrotising fasciitis occurs deep in the tissues; therefore, in early necrotising fasciitis there may be no visible skin changes.

5.5.3 As the necrotising process ascends to the skin, late infection produces blisters and obvious necrosis

5.5.4 Septicaemic seeding of streptococci from a uterine focus may give rise to a secondary focus in a limb, simulating a venous thrombosis.

5.5.5 Necrotising fasciitis ceftriaxone/clindamycin (no gent) and severe Pen allergy teic/clind/gent

5.6 Gastroenteritis

5.6.1 *C. difficile* is rare but increasingly found in obstetric patients.

5.6.2 If diarrhoea is particularly offensive following antimicrobial therapy, a stool sample should be submitted for *C. difficile* toxin testing.

5.6.3 A history of diarrhoea warrants routine culture (e.g. *Salmonella*, *Campylobacter*).

5.6.4 The laboratory should be informed if there is a clinical indication for investigations for unusual pathogens such as *Listeria monocytogenes* (consumption of soft cheese or cured meats) or if there is a history of foreign travel (parasites, typhoid or cholera)

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5.7 Pharyngitis

5.7.1 Most cases of pharyngitis are viral, but approximately 10% of cases in adults are attributable to GAS

5.7.2 If 3 of the following criteria: fever, tonsillar exudate, no cough, tender anterior cervical lymphadenopathy) are present, treatment with an antibiotic is appropriate.

5.8 Infection related to regional anaesthesia

5.8.1 Spinal abscess is a very rare complication after regional anaesthesia in obstetric patients.

5.8.2 The usual organism responsible is *S. aureus*

6.0 Management of Sepsis in the Puerperium

6.1 A general history and examination to identify the source of sepsis
Women should be assessed clinically and if unwell or with dehydration or vomiting admission should be considered. Women should be fully informed about their condition, the treatement recommened and involved in the plans of care made.

6.2 Initial Measures

6.2.1 Establish IV access and take blood for culture, lactate, FBC, U&E, CRP

6.2.2 Administer broad spectrum IV antibiotics to cover aerobes and anaerobes within one hour;

6.2.3 Contact microbiologist and discuss antibiotic treatment

6.2.4 Fluid resuscitation: Infuse initial minimum 20 ml/kg normal saline or Ringer's Lactate

6.2.5 Call for help from critical care/anaesthesia/on-call consultant

6.2.6 Transfer to ICU should be discussed if:

- Hypotension or raised serum lactate persisting despite fluid resuscitation, suggesting the need for inotrope support
- If cardiac output monitoring,ventilatory support requiring intubation, and renal support is necessary
- If conscious level of the patient is significantly decreased
- And in presence of multi-organ failure, uncorrected acidosis or hypothermia

6.3 Tasks to be performed within the first 6 hours of the identification of severe sepsis

6.3.1 Obtain blood cultures prior to antibiotic administration

6.3.2 Administer broad-spectrum antibiotic within 1 hour of recognition of severe sepsis

6.3.3 Measure serum lactate

6.3.4 In the event of hypotension and/or a serum lactate greater than 4 mmol/l:

6.3.5 Deliver an initial minimum 20 ml/kg of crystalloid or an equivalent

6.3.6 Apply vasopressors for hypotension not responding to initial fluid resuscitation to maintain mean arterial pressure above 65 mmHg

6.3.7 In the event of persistent hypotension despite fluid resuscitation (septic shock) and/or serum lactate greater than 4 mmol/l:

6.3.8 Achieve a central venous pressure of ≥8 mmHg

6.3.9 Achieve a central venous oxygen saturation ≥70% or mixed venous oxygen saturation ≥65%

6.4 Tests and investigations

6.4.1 Do not delay in giving antibiotics but if possible take blood cultures ideally before administration of antibiotics and perform the following investigations:

- HVS
- Urine
- CSF (as required)
- Wound swab
- Respiratory tract

6.4.2 Any injection-site lesions should be swabbed and an MRSA screen performed. If the methicillin-resistant *Staphylococcus aureus* (MRSA)

status is unknown, a pre-moistened nose swab may be sent for rapid MRSA screening

6.4.3 A history of intravenous drug use and features of sepsis of unknown site requires a search for bacterial endocarditis or abscesses spread via the bloodstream. Any injection-site lesions should be swabbed and an MRSA screen performed**.**

6.4.4 Rapid antigen tests are available for some infections including group A beta-haemolytic streptococcus (GAS)

6.5 Antibiotics

Administration of intravenous broad spectrum antibiotics is recommended within one hour of suspicion of severe sepsis, with or without septic shock. The obstetric SpR should discuss with microbiologist.

6.5.1 Use IV Cefuroxime IV and Metronidazole IV as first choice antibiotics.

6.5.2 Prior carriage of or infection with multiresistant organisms such as ESBL-producing Gram-negative bacteria, vancomycin-resistant enterococci and MRSA should be noted on admission.

6.5.3 In ESBL infection, piperacillin/ tazobactam is likely to be ineffective

6.5.4 If genital tract sepsis is suspected, prompt early treatment with a combination of high-dose broad spectrum intravenous antibiotics may be life saving.

6.5.5 A combination of either piperacillin/tazobactam or a carbapenem plus clindamycin provides one of the broadest ranges of treatment for severe sepsis.

6.5.6 MRSA may be resistant to clindamycin, hence if the woman is or is highly likely to be MRSA-positive, a glycopeptide such as vancomycin or teicoplanin may be added until sensitivity is known. Clindamycin covers most streptococci and staphylococci, including many MRSA, and switches off exotoxin production with significantly decreased mortality. Not renally excreted or nephrotoxic. Can be an option in penicillin allergy cases

6.5.7 Breastfeeding limits the use of some antimicrobials, hence the advice of a consultant microbiologist should be sought at an early stage.

6.5.8 Gentamicin (as a single dose of 3–5mg/kg) poses no problem in normal renal function but if doses are to be given regularly serum levels must be monitored.

6.5.9 See Appendix C for antimicrobial use for puerperal sepsis.

6.5.10 IVIG is recommended for severe invasive streptococcal or staphylococcal infection if other therapies have failed.

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

6.5.12 Any relevant imaging studies should be performed promptly in an attempt to confirm the source of infection and should not be deferred on the grounds of pregnancy. This could include a chest X-ray, pelvic ultrasound scan or computed tomography scan if pelvic abscess is suspected in postnatal period.

6.6 Source control

6.6.1 The focus of infection should be sought and dealt with. This may be by uterine evacuation or by drainage of a breast, wound or pelvic abscess. Broad-spectrum antibiotics should be given to cover these procedures. It may be necessary to consider radical surgical interventions such as hysterectomy in case of invasive endometrial infection or infarction due to group A streptococcal infection.

6.6.2 Thrombocytosis (high platelet count) with a rising CRP and a swinging pyrexia usually indicates a collection of pus or an infected haematoma in the woman.

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

6.7 Fluids

6.7.1 The treatment of hypotension and oliguria in non-pregnant septic patients involves aggressive fluid replacement.

6.7.2 However, postpartum women may be more susceptible to the development of pulmonary oedema than non-pregnant patients after circulatory fluid overload.

- Any IV fluid **except** dextrose
- Give IV fluids aiming for CVP of > 8 mm Hg (12 mmHg, if ventilated).
- Give 20 mls/kg of crystalloid over 30 minutes and re-assess

6.7.3 Achieving the correct balance between these potentially conflicting aims is exceedingly difficult, and central venous pressure monitoring and vasopressor treatment are likely to be required on the ICU. It is important to involve the anaesthetic and critical care teams early to advise on early management and subsequent transfer.

6.7.4 If woman remains hypotensive despite fluid therapy and vasopressors are necessary seek the critical care specialist review and discuss transfer to ICU.

6.7.5 If the woman is unstable/ severely septic she should be transferred to HDU/ ITU where the following measures may be considered:

6.7.6 Inotrope support if hypotension or raised serum lactate persist despite fluid resuscitation

6.7.7 Mechanical ventilation & airway protection in cases of pulmonary oedema or ARDS

6.7.8 Renal dailysis in cases of renal failure

6.8 Blood products

6.8.1 Aim to keep Hb in range of 7-9 g/dl

6.8.2 Keep platelet count above 50 x 10^8/l

6.8.3 If significant risk of bleeding aim for platelet count > 100 x 10^9/l

6.8.4 There is no evidence to support the use of fresh frozen plasma

6.8.5 Intravenous immunoglobulins for severe invasive streptococcal and staphylococcal infection

6.9 **Glucose control:** Aim for blood sugar of 6-8 mmol/l

6.10 **DVT prophylaxis:** LMWH heparin should be administered at prophylactic dosage

6.11 **Stress ulcer prophylaxis** should be administered

7.0 Prophylactic Measures Against Spread Of Infection

Infection prevention

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8.0 Neonatal Issues In Puerperal Sepsis

8.1 Inform neonatology team in all cases of suspected puerperal sepsis.

8.2 The baby has increased risk of streptococcal and staphylococcal infection during birth and during breastfeeding.

8.3 The umbilical area should be examined and a paediatrician consulted in the event of sepsis in the puerperium.

8.4 If either the mother or the baby is infected with invasive GAS in the postpartum period, both should be treated with antibiotics

9.0 Suspected Infection in the Community Setting

9.1 The community midwife should undertake a full review of the woman and her maternity notes to assess the risk and possible causes of infection.

9.2 **A full set of observations should be undertaken and documented where sepsis is suspected** (Signs of sepsis are referred to in Appendix A)

9.2.1 Temperature, blood pressure, pulse, respiration rate

9.2.2 Any wound sites should be carefully inspected for signs of infection

9.2.3 The woman should be asked about how she feels, pain and changes to her perceived wellbeing.

9.3 **After full assessment:**

9.3.1 **if the woman is well**, observations are within normal limits and the signs indicate a minor infection (slight redness / tenderness / oozing) then

- The woman should be advised to see her GP at the surgery within the same day (midwife should ensure the appointment has been made where possible).

- A wound swab should be taken and sent to the laboratory (the same day it was taken) to commence screening; this should be documented in the maternal notes.
- Where a swab has been taken the woman should be asked to inform the GP that this has been done.
- The midwife is responsible for ensuring the postnatal record in the community midwives office has been updated with details of the investigations undertaken in order that the results can be followed up within 48 hours by the community midwife on that shift.
- A follow up visit should be arranged within 48 hours.

9.3.2 **If the woman is unwell** and / or observations are outside normal limits and /or the signs indicate a moderate or significant infection (significant redness / tenderness / oozing) then

- the midwife should call the labour ward and discuss the woman and her condition with the on call registrar.
- Women required to be reviewed by the obstetric team should be seen on labour ward within the same day.
- If the woman is unwell and the midwife is concerned she should advice immediate transfer to the unit, by ambulance if necessary.
- The community midwife should ensure the woman has transport to attend the unit and follow up that they have attended and been reviewed.
- If on contacting the unit, the woman has not attended for review she should contact the woman by telephone to ascertain the reason for non attendance and advice as appropriate. This should be documented in the postnatal record sheet in the midwives office.

10.0 References

RCOG (2012), Bacterial Sepsis in Pregnancy, Green Top Guideline 64a

RCOG (2012), Bacterial Sepsis Following Pregnancy, Green Top Guideline 64b

MBRRACE (2015), Saving Lives, Improving Mothers' Care: Surveillance of maternal deaths in the UK 2011-13 and lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2009-13, London

Obstetrician and gynaecologists 2012:14: 9-16; Group A streptococcal puerperal sepsis: management and prevention (review). Nithiya Palaniappan, Maria Menezes, Penny Willson.

Appendix A - Diagnostic criteria for sepsis

General variables:

- Fever (>38˚C)
- Hypothermia (core temperature <36˚C)
- Tachycardia (>100 beats per minute)
- Tachypnoea (>20 breaths per minute)
- Impaired mental state
- Significant oedema or positive fluid balance (>20ml/kg over 24 hours)
- Hyperglycaemia in the absence of diabetes (plasma glucose >7.7 mmol/l)

Inflammatory variables:

- White blood cell (WBC) count >12 x 109/l (note that a transient leucocytosis is common in labour)
- Leucopenia (WBC count <4 x 109/l)
- Normal WBC count with >10% immature forms
- Plasma C-reactive protein >7mg/l/

Tissue perfusion variables:

- Raised serum lactate ≥4 mmol/l
- Decreased capillary refill or mottling

Organ dysfunction variables:

- Arterial hypoxaemia (PaO2 (arterial oxygen partial pressure) /FIO2 (fraction of inspired oxygen) >40kPa). Sepsis is severe if >33.3kPa in the absence of pneumonia or >26.7kPa in the presence of pneumonia.
- Oliguria (urine output >0.5ml/kg/hr for at least two hours, despite adequate fluid resuscitation)
- Creatinine rise of >44.2 µmol/l. Sepsis is severe if creatinine level >176 µmol/l
- Coagulation abnormalities (International Normalised Ratio [INR] >1.5 or activated partial thromboplastin time [APTT] >60s)
- Thrombocytopaenia (platelet count <100 x 109/l)
- Hyperbilirubinaemia (plasma total bilirubin 70 µmol/l)
- Ileus (absent bowel sounds)

Appendix B- Severe Sepsis Tool