WALES MATERNITY NETWORK

Maternity Sepsis Screening and Management: Guidelines and Standards for Practice




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Published:
August 2018

Review date:
August 2019

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GIG CYMRU NHS WALES

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NHS Wales Health Collaborative

Introduction

Sepsis is responsible for 1 out of every 4 deaths in the UK during pregnancy and within 6 weeks of childbirth.

The most common pathogen responsible for puerperal sepsis is E. Coli closely followed by Group A Streptococcus. Group A Streptococcus is an extremely virulent organism and is often the cause of a rapid deterioration in clinical condition over a very short time period.

Whilst there has been a reduction in deaths from genital tract sepsis in recent years, cases of E. coli sepsis resulting from chorioamnionitis due to prolonged preterm rupture of membranes have increased together with respiratory deaths due to influenza. (MBRRACE-UK 2010-2012)

The diagnosis of sepsis is complex particularly in the pregnant population where the evidence base is poor and physiological adaptations to pregnancy may overlap with the clinical features of evolving sepsis.

In pregnancy the immune system is regulated to accept foreign proteins. This is essential to accept the immunologically different feto-placental unit. This means a pregnant woman is particularly vulnerable to overwhelming infection and sepsis. Pregnant and postpartum women are generally young and fit and consequently compensate for the physiological changes that occur with sepsis often up to the stage of collapse.

Women with co-existing medical problems or those who have recently undergone surgical interventions such as caesarean delivery or ERPC are at increased risk of developing sepsis (see figure 1. Risk Factors for Maternal Sepsis).

Regular training to increase awareness, together with a structured approach to assessment and recognition can improve early diagnosis with good care in both community and hospital settings can save lives.

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Think Sepsis

Figure 1. Risk Factors for Maternal Sepsis

- 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

Recognition of Sepsis

Clinical features of sepsis include:

- Tachycardia >100 bpm (110bpm in Labour)
- Tachypnoea (respiratory rate >20) or hypoxia with O2 sats <94% on air
- Systolic hypotension BP< 100mmHg
- Oliguria (urine output <0.5ml/kg/hr for 2 hrs)
- Rigors or temperature <36 - Pyrexia alone is an unreliable sign
- Abdominal pain or distension
- Offensive vaginal discharge
- Urinary symptoms
- Productive cough
- Altered conscious level, hypothermia and ashen appearance all represent late signs

It is important that we acknowledge and investigate women who simply feel unwell or particularly those whose family members describe as not behaving like themselves.

Women with sepsis often appear deceptively well with no distinctive clinical signs or symptoms until they are close to collapse. Therefore it is important that we acknowledge and investigate women who simply feel unwell or particularly those whose family members describe as not behaving like themselves.

All observations should be recorded on an early warning or MEOWS chart.

- Investigations following full clinical examination include;
- Full blood count, CRP, U&E's, lactate, glucose, clotting screen incl. fibrinogen
- Blood cultures (even if the woman is on antibiotics)
- Midstream urine
- Any other relevant swabs of wound, pus, vagina, placenta, sputum
- Throats swabs in presence of sore throats or respiratory symptoms
- Chest X-ray if clinically indicated

Appropriate investigations to exclude retained products or pelvic collection postpartum (ultrasound or CT)

Principles of therapy – "Sepsis 6" plus 1 (fetus)

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.
2	**Take blood cultures even if already on antibiotics.** Do not delay starting antibiotics if blood culture bottles are not available.
3	**Give intravenous antibiotics – see local antibiotic policy.**
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)**
5	**Check serial lactate levels. 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 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 chorionamnionitis is the source of infection or with any source of sepsis if the maternal condition does not improve with treatment.**

Continuing Care

Retained products of conception should be removed as soon as the maternal condition is stable. This may require a laparotomy or even a hysterectomy. Do not defer definitive surgical treatment if the maternal condition does not respond to treatment. Laparotomy to eliminate the source of intra-abdominal sepsis or hysterectomy can be life saving.

Early advice should be sought from other specialists particularly Anaesthetist, Microbiologist or Intensive Care. Senior involvement in the early stages can save lives.

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Observations

Monitor respiratory rate, pulse, BP and O2 saturations every 15 mins until stabilised, then reduce to 30 mins.

Recheck temperature at least 4 hourly.

Urinary catheter should have urometer for hourly urine output measurement.

Response to treatment

In those women starting the sepsis 6 pathway a clinical response should be evident within 1 hour of completion of fluid resuscitation and giving intravenous antibiotics.

Failure to respond to treatment is consistent with:

- Systolic BP <90mmHg
- Reduced level of consciousness
- Respiratory rate >25
- Lactate not reduced by at least 25%

Alert a Consultant to attend in person if the woman fails respond to treatment.

Thromboprophylaxis

Pregnant and postpartum women with sepsis are at increased risk of venous thromboembolism and should be given thromboprophylaxis with low molecular weight heparin unless there are any ongoing issues with haemostasis or coagulopathy.

Continuing Care

Maternal pyrexia is not well tolerated by the fetus. Fetal core temperature is thought to be approximately 1 degree centigrade higher than maternal and persistent elevated temperature is associated with damage to the developing fetal brain.

The maternal inflammatory response associated with infection, particularly sepsis can lead to a fetal systemic inflammatory response syndrome (SIRS) which is associated with poor fetal outcomes due to fetal neurological injury.

Maternal chorioamnionitis can also result in congenital fetal infections particularly pneumonia.

The pattern of intrapartum fetal heart rate abnormalities seen on CTG associated with maternal sepsis are not always characteristic or predictable. CTG changes include fetal tachycardia, reduced variability, lack of accelerations, presence of decelerations and lack of cycling. Saltatory pattern may also be seen.

If fetal tachycardia and reduced variability are seen without preceeding or ongoing decelerations, consideration should be given to infection as the primary cause. It is important to review any previous CTGs to establish the baseline fetal heart rate as any rise in baseline should raise the question of infection.

The CTG alone cannot be relied upon as a test of fetal wellbeing when infection is suspected. It is essential that the CTG is reviewed within the clinical context.

Hypoxic stress further increases the risk of neurological injury in the presence of infection/sepsis. Consider expediting delivery when sepsis is suspected. The plan for delivery may need to include emergency caesarean section if spontaneous delivery is not imminent. Additional hypoxic stress due to the effects of uterine contractions on umbilical cord compression or reduced utero-placental oxygenation should be avoided.
The passage of meconium in the presence of infection/sepsis is also associated with poorer fetal outcomes. Co-existence of hypoxia and infection have an even higher risk of brain injury.

There is increasing evidence that the presence of meconium within amniotic fluid increases the growth of E.coli organisms.

Recommendations

1	**All Maternity Units should use a Sepsis Screening Tool for all pregnant or recently pregnant women (6 weeks postpartum).** This tool should include an early warning chart for recording and plotting maternal observations such as MEOWS.
2	**This Sepsis Screening Tool should trigger entry into a defined Sepsis Pathway.** This pathway should include further screening components to allow for risk stratification and de-escalation or escalation. **De-escalation** should allow women to either exit the pathway altogether or exit into a different pathway such as for The Management of Pyrexia in Labour. **Escalation** should involve treatment along a Sepsis 6 plus 1 pathway together with recommendations for senior medical review. It should also include a plan for monitoring clinical response to treatment and a definition of treatment failure together with a system for recognising the deteriorating mother (and fetus) and when to consider referral to Intensive Care. Examples of both national and local Sepsis Pathways can be found in the Appendix below.
3	**All Maternity Units should routinely collect data to evaluate the effectiveness of their sepsis screening tool and sepsis pathway.** This should be shared at an all-Wales level via the Quality and Safety subgroup of the Maternity Network in an effort to increase the knowledge base for sepsis markers in pregnancy and to further inform and refine the management of sepsis in Wales.

Appendix

See adjacent page

Risk Assessment & Action for Suspected Maternal Sepsis
(adapted from UK Sepsis Trust Inpatient Maternal Sepsis Tool – 2016)

1. **Has MOEWS been triggered?**
2. **Does the woman look sick?**
3. **Is the fetal heart rate ≥ 160 bpm?**
4. **Could this woman have an infection?**

Common infections include:

- Chorioamnionitis/endometritis
- Urinary tract infection
- Wound infection
- Influenza/pneumonia
- Mastitis/breast abscess

Affix Patient ID

If YES to any of the above, complete risk assessment

High Risk criteria
(tick all those that are appropriate)

- Respiratory rate ≥ 25 ☐
- SpO_2 < 92% without O_2 ☐
- Heart rate > 130 ☐
- Systolic BP ≤ 90 ☐
- Altered mental status/ Responds only to voice, pain or unresponsive ☐
- Blood Lactate ≥ 2.0* ☐
- Non-blanching rash/mottled/ cyanotic ☐
- Urine < 0.5 ml/kg/hr ☐
- No urine for 18 hrs ☐

If <u>ONE</u> criteria is present:

Commence 'Sepsis Six' NOW

- **Immediate obstetric review ST3 or higher** (transfer to Obstetric Unit if in the community)
- **Inform Consultant Obstetrician & Consultant Anaesthetist**
- **Commence Maternal Critical Care Chart**
- **Commence 'High Risk of Maternal Sepsis' Pro forma**

Moderate Risk criteria
(tick all those that are appropriate)

- Respiratory rate 21–24 ☐
- Heart rate 100–130 ☐
- Systolic BP 91–100 ☐
- Temperature < 36 °C ☐
- No urine output for 12–18 hours ☐
- Fetal heart > 160bpm/Pathological CTG ☐
- Prolonged SRM ☐
- Recent invasive procedure ☐
- Bleeding/wound infection/vaginal discharge/abdominal pain ☐
- Close contact with Group A Strep ☐
- Relatives concerned about mental/ functional status ☐
- Diabetes/ gestational diabetes/ immunosuppressed ☐

If <u>TWO</u> criteria are present (also consider if only ONE criteria):

Send bloods:

FBC, lactate, CRP, U+Es, LFTs, clotting

OBSTETRIC REVIEW (ST3 or higher) within one hour

Consider 'Sepsis Six'

Review Bloods: If lactate ≥ 2 or Acute Kidney Injury present, follow HIGH Risk Pathway

Low Risk criteria
(tick all those that are appropriate)

- Respiratory rate ≤ 20 ☐
- Heart rate < 100 ☐
- Systolic BP > 100 ☐
- Normal mental status ☐
- Temperature: 36–37.3 °C ☐
- Looks well ☐
- Normal CTG ☐
- Normal urine output ☐

If <u>ALL</u> criteria are present:

LOW RISK OF SEPSIS

Review & monitor for improvement or deterioration

Consider obstetric needs & full clinical picture

*** NB: Lactate measurement may be transiently elevated during and immediately after normal labour and birth. If unsure, repeat sample.**

Completed by:

Name: Designation: Time:

Signature: Date:

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 ☐

Sepsis 6

1	Give oxygen to maintain saturations >94%
2	Take blood cultures
3	Give intravenous antibiotics
4	Give intravenous fluids. Start with 500mls stat.
5	Check lactate level. Lactate >4.0 represents SEPTIC SHOCK: consider referral to ITU
6	Measure urine output and record on fluid balance chart Consider urinary catheter
plus 1	Monitor fetus and consider expediting delivery or emptying the uterus

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Acknowledgements

The Wales Maternity Network would like to thank the All Wales Sepsis Task and Finish Group for their valuable input, guidance and encouragement with the creation of this document. We would also like to extend our appreciation to Heads of Services across Health Boards for their involvement and support.