- Obstetric Sepsis Screening Tool
- Obstetric response tool: Sepsis Six**Plus Two
- Obstetric SBAR reporting tool
- Obstetric Sepsis prompt cards/aide memoir

### All-Wales Consensus Policy Exemplar Guide (PEG)

**Sepsis in Pregnancy**

<table>
<thead>
<tr>
<th>Date of issue:</th>
<th>January 2013</th>
<th>Date to be reviewed:</th>
<th>January 2014</th>
</tr>
</thead>
</table>
| Authors:      | Philip Banfield  
                Catherine Roberts | Number of pages: | 22 |
| Approved by:  | National Steering Group  
                NSAG/WEC RCOG | Date:          |          |
All-Wales Consensus Policy Exemplar Guide (PEG)  
Sepsis in Pregnancy

The overall aim of the Transforming Maternity Services Mini-Collaborative is to improve the experience and outcomes for women, babies and their families within Maternity Services. One of the key drivers is to improve the recognition and response to the acutely deteriorating woman. The major challenge has been that there was limited use of obstetric recognition tools and no sepsis response tool.

Through learning sessions and consensus meetings, clinicians from all Health Boards and key stakeholders have agreed an exemplar minimum standard for recognising and responding to sepsis. Health Boards are encouraged to localise these tools in order to specifically meet their needs. Outcomes should be measured and reviewed on a regular basis.

Page 3 & 4 are copies of the agreed tools.

A Note to Health Boards

Implementation of Tools

- Health Boards are advised to gain approval via their local ‘Quality & Safety Committee’ (or equivalent).
- Localisation is important: additions of logo, and any specific changes that will meet local needs.
- It is also important for Health Boards to consider devising local written guidance to accompany this tool.
- Implement in clinical areas using improvement Methodology. Please refer to: http://www.1000livesplus.wales.nhs.uk/methodology

Effectiveness of Tool

These tools are based on the evidence available but it is important that we monitor effectiveness:

- Please review case notes of any woman who, despite use of this tool, develops sepsis/severe sepsis. It is important to identify anything that may be potentially added to the tool in order to improve its effectiveness.

The following process and outcome measures are also linked to this tool:

-Percentage compliance with ‘sepsis six’

-Number of calls for rapid response to medium and high risk acute illness

-Number of women escalated to higher level of care
**EXEMPLAR SEPSIS SCREENING TOOL AND SEPSIS SIX**
**PLUS TWO RESPONSE BUNDLE FOR USE IN PREGNANCY (20 WEEKS TO 48HRS POSTNATAL)**

**Obstetric Sepsis / Severe Sepsis Screening Tool**

Does the woman have 2 Signs and Symptoms of Infection?

<table>
<thead>
<tr>
<th>Temperature &lt;36 or &gt;38 °C</th>
<th>Respiratory rate &gt; 20bpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate &gt;100 bpm (AN &amp; Intrapartum) &gt; 90bpm (PN)</td>
<td>Acutely altered mental state</td>
</tr>
<tr>
<td>WCC &gt;12 or &lt;4 x10^9/l (higher threshold in labour)</td>
<td>Hyperglycaemia (Blood sugar &gt;7.7) in the absence of diabetes</td>
</tr>
</tbody>
</table>

If YES

Does the woman have a history or signs of a new infection or infective source?

| Prolonged ruptured membranes or offensive liquor | Breast redness and / or tenderness / mastitis |
| Unexplained fetal tachycardia in the absence of a maternal tachycardia | Fetal demise |
| Recent delivery / offensive lochia | Cough / sputum / chest pain |
| Catheter or Dysuria | Abdominal pain distension / diarrhoea |
| Line infection | Cellulitis / wound infection / septic arthritis |
| Headache with neck stiffness | Other |
| Endocarditis | |

If Yes the woman has SEPSIS

Does the woman have any signs of organ dysfunction?

| SBP < 90 or MAP <70 mmHg | Lactate > 2mmols/l |
| Urine output<0.5 ml/kg/hr for 2 hours | New need for Oxygen to keep SaO_2 >90% |
| Platelets < 100 x 10^9/l | INR > 1.5 or aPTT > 60s |
| Creatinine rise of > 44.2mmol/l or level of >177 mmol/l | Bilirubin > 70µmol/l |

NO YES

If NO, treat for SEPSIS:

**Start Sepsis Six**
**Plus Two**
- Oxygen
- Blood cultures
- Lactate
- IV antibiotics
- Fluid therapy
- Fluid balance and catheter
- **Consideration of delivery & VTE prophylaxis**

If YES, the woman has SEVERE SEPSIS:

**Start Sepsis Six**
**Plus Two**
- Start the clock........
- Refer the woman to Critical Care.
- Give IV Antibiotics within 1 hour
- Start with Stat Dose

Obstetric Sepsis diagnosis & sepsis bundle CR July 2012 (V3)
Obstetric Sepsis Care Pathway
First Hour Care Duties

Name
Address
Hospital number

Date
Ward

Could this woman have Sepsis?

YES  NO

Apply Sepsis Screening Tool

Negative
Reassess the woman
Apply appropriate management plan

Start the clock

Sepsis Six **Plus Two

<table>
<thead>
<tr>
<th></th>
<th>Time</th>
<th>Initial</th>
<th>Reason not done</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Oxygen:</strong> high flow 15l/min via non-rebreathe mask. Target saturations &gt;94%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td><strong>Blood Cultures:</strong> Take at least one set prior to antibiotics. Use sterile gloves and barrier precautions. Plus all relevant blood tests eg FBC, U+E, LFT, clotting, glucose, CRP. Consider urine/sputum/swabs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td><strong>Serum Lactate:</strong> if &gt;2 with signs of organ dysfunction Inform ITU. Ensure Hb &gt; 8g/dl, ABG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td><strong>IV Antibiotics</strong> as per HB guidelines and recommendations. Give 1st dose within 1 hour.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td><strong>Fluid Resuscitation:</strong> if hypotensive give boluses of 0.9% saline or Hartmann’s: 20 ml/Kg (x3) to a max of 60 ml/Kg NB: if severe pre-eclampsia, ?lower threshold for invasive monitoring – discuss with senior in critical care.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td><strong>Catheterise,</strong> commence fluid balance &amp; record hourly urine output.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Plus 2**

**Consideration of delivery or ERPC**

**VTE prophylaxis**

Have all the above been completed and the woman reviewed within one hour?

<table>
<thead>
<tr>
<th>One hour time check:</th>
<th>All steps done?</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
</table>

Name:    Sign:
Designation:  Bleep:

Obstetric Sepsis diagnosis & sepsis bundle CR July 2012 (V3)

The key questions considered in this document:

1/ How do we define sepsis in pregnancy, or – if this is impossible to define accurately scientifically for all cases - is there a pragmatic definition that can is more useful to you in clinical practice?
2/ Is sepsis defined the same at all stages of pregnancy and the puerperium?
3/ Is there a simple screening tool for sepsis in pregnancy?
4/ Can general advice be given on the management of sepsis in pregnancy? In other words, is the general ‘sepsis six’ care bundle appropriate for use in pregnancy or are modifications necessary?
5/ Can you live with the advice suggested?

The product of this debate, the Policy Exemplar Guide (PEG) informs local policies. The responsibility for individual care remains with the responsible clinician as there are many areas of uncertainty with respect to sepsis in pregnancy. Prompt recognition and treatment, with early involvement of a multidisciplinary team of appropriate seniority and experience would appear to be key features in reducing mortality and morbidity from sepsis.

**Situation**

**Introduction**

This discussion has been initiated by maternity staff in Wales with the aim of producing clarity in the diagnosis and management of sepsis in pregnancy. This seeks to outline briefly the issues required for a pragmatic consensus approach to the management of pregnancy-related sepsis for use in Welsh maternity units.

This document explores a strategy that identifies areas for agreement or cut-off points beyond which the appropriate intervention or clinical action is agreed for all. It also discusses areas of uncertainty, where there is currently not enough evidence to give specific advice, but where a pragmatic solution will aid local development and implementation of effective interventions that will reduce morbidity and mortality. After reading this, you should ask whether you can agree with the principal recommendations, even if you would treat more women in your own or local practice.

**Mandate**

The need for a consensus view in Wales has been expressed by maternity care staff at every maternity unit in Wales, the NSAG / WEC of the RCOG and HOMAG. The driver for these tools has been the rise in maternal deaths associated with sepsis in the 2011 CEMACE report.
Background:

Introduction to the Mini-Collaborative

The 1000 Lives Plus Transforming Maternity Services Mini-Collaborative provides the mechanism to discuss, agree and implement bundles of care that are based on an evidence base or, where this is variable or contentious, a consensus view, drawn from experts in maternity care – midwives, obstetricians, obstetric anaesthetists, haematologists, critical care and other staff. The key component is that the bundles are developed and owned by those providing patient care directly – and are thus felt both to meet a clinical need and to be more likely implemented to improve the experiences and outcomes of maternity care in Wales. Monitoring of compliance and outcomes, to measure improved care, is an integral part of the mini-collaborative.

Each Health Board has committed to the 1000 Lives Plus principles of reducing harm, waste and unnecessary variation, with all Health Boards actively engaged in the 1000 lives Plus Transforming Maternity Services Mini-Collaborative. Further details are available from: http://www.wales.nhs.uk/sites3/page.cfm?orgid=781&pid=52130

A brief summary of why this is not straightforward

The latest CMACE 2006-8 Report (2011) showed that, although overall mortality was declining – about 11/100,000 – pregnancy associated sepsis was the leading direct cause (26 deaths = about 11 / million). There were also a further 12 deaths from H1N1 flu virus between April 2009 and January 2010.

The diagnosis of sepsis in the non-pregnant woman has been widely agreed (box) through work by the surviving sepsis campaign, which aims to reduce mortality and morbidity from sepsis over a 5 year time-frame. Within maternity, we believe that we can achieve this in a much shorter timescale through the consensus work of the mini-collaborative.

<table>
<thead>
<tr>
<th>History or signs of new infection outside pregnancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Cough / sputum / chest pain</td>
</tr>
<tr>
<td>• Abdo pain / distension / diarrhoea</td>
</tr>
<tr>
<td>• Line infection</td>
</tr>
<tr>
<td>• Endocarditis</td>
</tr>
<tr>
<td>• Dysuria</td>
</tr>
<tr>
<td>• Headache with neck stiffness</td>
</tr>
<tr>
<td>• Cellulitis / wound infection / septic arthropathy</td>
</tr>
</tbody>
</table>

If these symptoms or signs or investigations are abnormal, this confirms Signs and Symptoms of Infection (SSI) which enters a pathway looking at potential sources of sepsis and then what to do about them.
If ‘yes’ then this suggests sepsis, and the further management depends on the presence of objective evidence (or not) of organ damage.

### Objective measures used in the diagnosis of sepsis outside pregnancy

- **Temperature**  \(<36^\circ C \text{ or } >38.3^\circ C\)**
- **Heart rate**  \(> 90 \text{ bpm}\)**
- **Respiratory rate**  \(>20/\text{minute}\)**
- **Acutely altered mental state**
- **Wbc**  \(>12 \text{ or } <4 \times 10^9/\text{l}\)**
- **Hyperglycaemia in the absence of (known) diabetes**

There is an exemplar sepsis screening tool for use outside pregnancy (appendix 2).

### Signs of organ dysfunction outside pregnancy

- **Systolic BP**  \(<90 \text{mmHg or MAP } < 65 \text{mmHg}\)**
- **Urine output**  \(<0.5 \text{mm/kg/hr for 2hrs}\)**
- **INR**  \(> 1.5 \text{ or aPPT } > 60 \text{s}\)**
- **Bilirubin**  \(> 34 \mu \text{mol/l}\)**
- **Lactate**  \(> 2 \text{mmol/l}\)**
- **New need for oxygen to keep SpO\text{\textsubscript{2}} > 90\%**
- **Platelets**  \(< 100 \times 10^9\)**
- **Creatinine**  \(> 170 \text{mmol/l}\)**

There is an exemplar sepsis screening tool for use outside pregnancy (appendix 2).

Being unwell with an URTI is common in pregnancy and many innocuous and self limiting infections occur all the time in the community. Mortality from severe sepsis is very RARE, but early warning signs may go unrecognised, there was a clear lack of clinical knowledge in some of the deaths and there were issues regarding clinical support and backup. There is a particular challenge because deterioration from a healthy state in pregnancy can be so rapid.

In normal pregnancy the following parameters are commonly encountered in normal women (box). Furthermore, not all women with a high temperature or flu-like symptoms in pregnancy or the puerperium have, or are at risk of developing, sepsis. Because pregnancy and childbirth are promoted as a ‘natural’ event, there is a need to avoid over diagnosis and unnecessary medicalisation of well women.
It is relatively straightforward to add to the list looking for possible causes of infection to account for pregnancy with the addition of, for example:

- Prolonged ruptured membranes or offensive liquor
- Unexplained fetal tachycardia in the absence of a maternal tachycardia
- Recent delivery / offensive lochia
- Breast redness and / or tenderness / mastitis

**Objective measures used in the diagnosis of sepsis compared to physiological changes in pregnancy**

- **Temperature**  $<36^\circ C$ or $>38.3^\circ C$

  Women vasodilate in pregnancy and are generally more prone to raise their temperature disproportionately. Many women, for example, will become pyrexia after an epidural in labour for any great length of time, because they cannot sweat from their lower limb from sympathetic blockade, in the absence of sepsis.

- **Heart rate**  $> 90$ bpm

  The pulse rate increases slightly in normal pregnancy. It is not uncommon for women to have a pulse rate at or just over 90 bpm. This leads either to use of the non-pregnant parameter and over inclusion of women or a change in limit that varies between units.

- **Respiratory rate**  $>20$/minute

  There appears to be a consensus emerging from the steering group, learning sessions and mini-collaborative that this is the most sensitive parameter for use in pregnancy.

- **Acutely altered mental state**

- **Wbc**  $>12$ or $<4 \times 10^9/l$

  The white cell count can increase in normal pregnancy and there is a leucocytosis in labour. This makes the wbc an unreliable marker of infection in pregnancy. The upper limit of wbc in normal pregnancy has a wide distribution. This has led units to pick an arbitrary upper limit.

- **Hyperglycaemia in the absence of (known) diabetes**

  Preterm labour and spontaneous rupture of membranes are associated with clinical and subclinical infection that may lead to premature spontaneous or iatrogenic delivery. A course of antenatal steroids is usually given to help fetal lung maturity and reduce perinatal mortality and morbidity. Raised blood sugars can occur in those with pre-existing, known or previously undiagnosed gestational diabetes.
The following needs to be considered when looking at organ dysfunction in pregnancy.

**Signs of organ dysfunction**

- **Systolic BP** < 90mmHg or MAP < 65mmHg  
  Supine hypotension in late pregnancy should be excluded. In the UK, we do not treat relative hypotension in the otherwise fit asymptomatic patient and thus this may be an appropriate level in the context of someone manifestly ill.

- **Urine output** < 0.5mm/kg/hr for 2hrs  
  This would be acceptable for women who did NOT have severe pre-eclampsia, in who oliguria (but not anuria) is expected, who will still undergo a diuresis with the appropriate restriction of fluids.

- **INR** > 1.5 or **aPPT** >60s  
- **Bilirubin** > 34µmol/l  
  Probably OK – not many women with cholestasis have this high a bilirubin?

- **Lactate** > 2mmol/l  
  There appears to be a consensus emerging from the steering group, learning sessions and mini-collaborative that this is the most sensitive investigation in assessing the severity of sepsis for use in pregnancy. Although most ITUs will have ready access to this test, many Labour Wards do not (although SBCUs usually do). It is recommended that any maternity unit dealing with HDU level pregnant women should have immediate access to blood gas machines that can provide a rapid assessment of serum lactate levels.

- **New need for oxygen to keep SpO₂ > 90%**  
  Most obstetric emergency drills now follow a structured approach that encourages early use of supplemental high flow oxygen. However, it is usually obvious when the oxygen saturation is compromised.

- **Platelets** < 100 x 10⁹/l  
  Some women do have lower platelet counts as part of their ‘normal’ pregnancy, but one is always cautious because ITP does occur in the same age group and there is an association between pre-eclampsia and low platelet count (HELLP syndrome) that is associated with increased adverse outcome for both mother and baby.

- **Creatinine** > 170mmol/l  
  As GFR increases significantly in pregnancy, the creatinine taken as indicating abnormal renal function is generally lower.
Some screening tools have used PCO₂ as an indicator of an associated metabolic acidosis with a cut off of 7.34kPa, but the relative hyperventilation of pregnancy, in order to maintain a diffusion gradient of waste CO₂ from the feto-placental unit, means many normal women exhibit this relative respiratory alkalosis.

**What does this mean in practice?**

In the absence of an adequate tool validated for pregnancy, the two most important questions are:

Is the woman unwell?

**COULD** she have SEPSIS?

There are tools being implemented that use some or all of the parameters from outside pregnancy through to tools that attempt to modify cut-offs that account for the physiological changes in pregnancy. It is **USING THE TOOL** that is measurable for compliance with the care bundle. Either may help to decide whether further observations or medical attention is required both in regard to possible sepsis and for acutely ill pregnant or immediately past pregnant women in general. The development and use of track and trigger tools in general are discussed in the PEG on the diagnosis and management of the acutely deteriorating woman.

To demonstrate the dilemma, in their joint handbook, the WHO and UNICEF defined postpartum sepsis:

**Postpartum sepsis**

- A temperature of 38 ºC or higher more than 24 h after delivery (with at least two readings, as labour alone can cause some fever) and any one of the following signs and symptoms: lower abdominal pain, purulent, offensive vaginal discharge (lochia), tender uterus, uterus not well contracted, history of heavy vaginal bleeding. (Rule out malaria)

And when looking to record severe sepsis in pregnancy UKOSS have also taken a largely pragmatic approach:

**Severe Sepsis:**

1. Death related to infection or suspected infection
2. Any woman requiring level 2 or level 3 critical care (or obstetric HDU type care) due to severe sepsis or suspected severe sepsis
3. A clinical diagnosis of severe sepsis

**As a guide,** clinical diagnosis of severe sepsis would usually be associated with 2 or more of the following:

- Temperature >38°C or <36°C measured on two occasions at least 4 hours apart
- Heart rate >100 beats/minute measured on two occasions at least 4 hours apart
- Respiratory rate >20/minute measured on two occasions at least 4 hours apart
- White cell count >17x10⁹/L or <4x10⁹/L or with >10% immature band forms, measured on 2 occasions
**Assessment**

**Consensus questions for Sepsis diagnosis and management**

The areas for agreement divide into 5 areas:

1. How do we define sepsis in pregnancy?
2. Is sepsis defined the same at all stages of pregnancy and the puerperium?
3. Is there a simple screening tool for sepsis in pregnancy?
4. Can general advice be given on the management of sepsis in pregnancy?
5. Can you live with the advice suggested?

This produces three complimentary outputs for use in drawing up a local policy or guideline:

i/ An agreed set of parameters **beyond which** everyone within the mini-collaborative would agree that further investigation and management is required.

<table>
<thead>
<tr>
<th><strong>Objective measures used in the diagnosis of sepsis in pregnancy</strong></th>
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<tbody>
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<td><strong>Acutely altered mental state</strong></td>
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<td><strong>Wbc</strong> $&gt;$20 or $&lt;$4 x $10^9$/l</td>
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<table>
<thead>
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<th><strong>History or signs of new infection, including:</strong></th>
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</tr>
<tr>
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</tr>
<tr>
<td>Endocarditis</td>
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<tr>
<td>Catheter or Dysuria</td>
</tr>
<tr>
<td>Headache with neck stiffness</td>
</tr>
</tbody>
</table>
These parameters probably apply to pregnancy AFTER the first 20 weeks and up until the immediate postnatal period. **Under 20 weeks and more than 48 hours after delivery, it is probably safer to use the non-pregnant values, especially if the woman reports feeling unwell.**

This leads to two vital points:

- it is much less likely that a woman (or her relatives) report she is well in the presence of severe sepsis – the systemic response USUALLY makes the women feel unwell.

- as a screening tool in the community and / or primary care it is VITAL that a history is taken, plus a temperature AND a respiratory rate if there is a history of actual or recent pregnancy. Mechanisms should exist in primary care or emergency services for immediate referral to a midwife to make a more detailed assessment or a hospital if sepsis is suspected. If there are any doubts any woman, family member or health worker should know how to contact the emergency maternity service directly.

An example of **an exemplar tool for the diagnosis of sepsis**, will quite possibly need to account for the acceptance of uncertainty and the need for senior clinical judgement.

There are some great tools being developed throughout Wales. It is important that these are tested formally and it would be helpful for any results to be fed back to the mini-collaborative, appendix 3.

An example of a simple **screening tool** card is given in appendix 4.

An agreed **exemplar tool for immediate management**, multidisciplinary input and escalation for further advice or treatment. Direct implementation of the validated Sepsis Six bundle would involve the following:

1. Involve the consultant obstetrician / consultant obstetric anaesthetist and critical care team IMMEDIATELY, but do not wait to implement sepsis six bundle.
2. A discussion on more guidance for maternity teams e.g. levels for lactate on the reverse of the sepsis six sheet?
3. Inclusion of LOCAL instructions for escalation and place of care or transfer.
4. Use of the validated Sepsis Six bundle:

   **SEPSIS SIX**

<table>
<thead>
<tr>
<th></th>
<th>Should begin immediately, but must all be done within 1 hr for patients with severe sepsis or septic shock</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><strong>Oxygen:</strong> high flow 15L/min via non-re-breathe mask – TARGET saturations &gt;94%</td>
</tr>
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<td>2.</td>
<td><strong>Blood Culture:</strong> take at least one set plus all relevant bloods tests e.g. FBC, U&amp;E, LFT, Clotting, glucose. Consider urine, sputum swabs samples.</td>
</tr>
<tr>
<td>3.</td>
<td><strong>IV antibiotics:</strong> broad spectrum</td>
</tr>
<tr>
<td>4.</td>
<td><strong>Fluid Resuscitation:</strong> if hypotensive, give boluses of 0.9% saline or Hartmann’s 20ml/kg up to max 60ml/kg.</td>
</tr>
<tr>
<td>5.</td>
<td><strong>Serum Lactate and Hb:</strong> Ensure Hb &gt;7g/dl</td>
</tr>
<tr>
<td>6.</td>
<td><strong>Catheterise</strong> and commence fluid balance.</td>
</tr>
</tbody>
</table>
Members of the mini-collaborative have correctly pointed out 2 crucial additional considerations:

- A woman may need delivery or evacuation of retained products of conception (and ERPC)

- Women in pregnancy with sepsis are particularly vulnerable to venous thromboembolism and should properly receive low molecular weight heparin thromboprophylaxis after assessment of her haematological status.

Thus, in pregnancy, the sepsis 6 response bundle has been renamed: **Sepsis Six** Plus Two bundle (appendix 3).

A public health, patient and relative campaign would raise awareness of the risks of sepsis in pregnancy. There should be local information available in a format and language that is easily understood. This information should exist in antenatal clinics and GP surgeries. The mini-collaborative will work on this with the Welsh Government for inclusion in the update of the Welsh ‘Pregnancy Book’ or its equivalent.

**Do we need to agree ALL parameters?**

No, but there are two key questions that remain crucial:

- Does the woman have a history or clinical findings that might suggest sepsis?

- If admission is not warranted, what is the mechanism for review or escalation in the presence of deterioration?

Local policies in the community and secondary care may account for these. If in doubt, ask for specialist advice.

**Recommendation**

**AT BOOKING**

Minimum standard:

All women should have sepsis discussed, including the need for hand hygiene and precautions when being around people with coughs and sore throats. This includes instructing women to avoid contamination of the perineum by washing hands before and after using the toilet or changing sanitary towels. This is especially necessary when the woman or her family or close contacts have a sore throat or upper respiratory infection.

**ANTENATAL VISITS / IN THE COMMUNITY**

All women should be asked about whether they feel well (currently part of the community bundle). If they feel unwell, observations will be undertaken with early warning triggers calculated. Signs and Symptoms of Infection and the Systemic Inflammatory Response Syndrome should be actively sought.
An ‘aide memoir’ card for sepsis should be readily available for all clinical staff dealing with pregnant women (Appendix 4).

Any woman who is obviously unwell should be admitted for further assessment.

There should be an explicit mechanism and audit trail for following up any woman NOT admitted e.g. the next day to make sure that the woman is getting better. It should be emphasised to the woman and her relatives that, if she is getting worse, she should seek hospital attention immediately.

**IN HOSPITAL – A&E / MEDICAL / GYNAE / OBSTETRIC WARDS**

All ‘ill’ women of childbearing age should be asked in an appropriate manner whether they are or could be pregnant.

All ‘ill’ women of childbearing age should be asked for symptoms of infection and assessed for signs of sepsis using an appropriate screening tool. The validated tools used outside pregnancy are probably applicable to women less than 20 weeks pregnant and more or less immediately postnatally and certainly after 48 hours.

Escalation of observations and involvement of the senior multidisciplinary team should be clear and monitored regularly through local surveillance and audit mechanisms.

(See also the SBAR PEG on track / trigger tools for the acutely deteriorating woman in pregnancy).

**POSTNATAL ASSESSMENT**

It is important that every pregnant woman has the diagnosis of sepsis considered, that appropriate care bundles are implemented and that appropriate escalation of care is instituted promptly.

The simplified message might be:

Is the woman well or ill?

If ill, is she febrile?

Is there an obvious treatable cause that can be dealt with in the community?

If respiratory rate is >20, suggest secondary care review.

Any doubts – the local midwifery / maternity team will do a more thorough assessment (including a serum lactate).

In any ill pregnant or recently pregnant woman, sepsis should be considered and follow up arrangements made and documented (such as getting the maternity team to visit or call the next day).
**Next steps**

This document was agreed at NSAG / WEC in October 2011. It will be forwarded to Health Board teams and key stakeholders.

**Mechanism for revision**

It remains important that each organisation undertake multidisciplinary case reviews on all women who are diagnosed with sepsis during pregnancy and the postnatal period, especially if severe. Any concerns can be escalated by any clinician within the mini-collaborative for local and / or national review.

The aggregation of anonymous national data will enable a surveillance of severe sepsis in pregnancy to be carried out under the auspices of the 1000lives plus campaign.

**Feedback**

You do not need to agree with everything that this PEG suggests. The consensus and mini-collaborative is asking whether there is evidence that has not been considered that would materially affect implementation of these tools in pregnancy. All comments can be fed back to Phil Banfield or Cath Roberts. We will answer queries after consulting with local or national colleagues in a range of specialties.

**FAQs**

**Does this mean that the example given here will be national policy?**

It is possible that individual assessment may identify areas of uncertainty and a multidisciplinary approach is to be encouraged where there is doubt. Clinicians have a duty of care to individual women and their families. The examples given are suggested as suitable tools, but there may be others and individual hospital departments may need to alter parts for local circumstances – hence the suggestion of the phrase PEG – a policy exemplar guide – on which to hang local guidelines. This is very much on-going work and the mini-collaborative tools are likely to change as this progresses.

**Will I be criticised for not admitting all women who fulfil the sepsis criteria if I think they have another, self limiting condition?**

This is a matter for clinicians locally in conjunction with service users and health service managers. As risks, benefits and adverse events cannot be predicted accurately, there is always room for individual management in consultation with the women concerned.

It is hoped that, since the principle of the 1000 lives plus campaign is reduce unnecessary variations in practice, waste and harm, most clinicians within the mini-collaborative will adopt broadly similar criteria. We are aiming to agree principles as a mini-collaborative, not to be prescriptive. Local needs and ways of working differ and patients are certainly not standard in any way so a ‘one size fits all’ approach is neither desirable nor safe. A recurring theme is that it is important that **every pregnant woman has the diagnosis of sepsis considered**, that appropriate care bundles are implemented and that appropriate escalation of care is instituted promptly. As part of the mini-collaborative, outcome data and measures of improvement are integral to us knowing what is working and what needs to change or evolve in our practice.
The standard of care here is an expert consensus, which should form a defence under the ‘Bolam’ principle. As always, a key part to any defence will be accurate and clear documentation.

Who has taken responsibility for this document?

The expert clinicians of Wales looking after pregnant women, including midwives, obstetricians, obstetric anaesthetists and haematologists, collectively known as the 1000 lives plus Transforming Maternity Services Mini-Collaborative. This is supported by the Welsh Government, the NHS in Wales and the Professional Representative Bodies.

Acknowledgements

This work is the product of a large number of clinicians in several specialties in Wales. The Aneurin Bevan, Cwm Taf and BCU Teams have been extremely helpful in developing the thought processes around which this practical application of the original Surviving Sepsis Campaign to pregnancy have evolved.

The ABHB team presenting work at learning session 2 were listed as:

- Dr A Miskin, Registrar, ST5
- Mrs L Gokhale, Consultant O&G
- Dr P Richardson, Anaesthetist
- Dr E Kubiak, Consultant Microbiologist
- Ms Rebecca Granger, Pharmacist
- Mrs A Kumar, Clinical Director

With Matt Turner, Consultant Anaesthetist at ABHB, it has been their work that crystallised the Mini-Collaborative into developing the ’Sepsis Six** Plus Two’ for pregnancy.

John Burke, Outreach Nurse from Cwm Taf presented on the role of the Critical Care outreach team at learning session 4.

Chris Hancock, Programme Manager, RRAILS has provided valuable advice and support throughout.

There are many other contributors, with great work locally, collectively known as the ’Transforming Maternity Services Mini-Collaborative’.
APPENDIX 1

Abbreviations / definitions & glossary of terms:

HOMAG: Heads of Midwifery Advisory Group (to the WG)

MLC: Midwifery Led Care

NSAG: National Specialty Advisory Group (to the WG)

WEC: Welsh Executive Committee

Both National Committees (with identical membership) of obstetricians and gynaecologists, representing each hospital, the Royal College and Postgraduate Training in Wales, with additional membership from WAG and HOMAG

RCOG: Royal College of Obstetricians and Gynaecologists

SSI: Signs and Symptoms of Infection

SIRS: Systemic Inflammatory Response Syndrome

URTI: Upper Respiratory Tract Infection (often viral and self limiting e.g. ‘the common cold’)

VTE: Venous thrombo-embolism. The other condition currently being looked at as part of the Transforming Maternity Services Mini-Collaborative

WBC: White blood cell (Count)
APPENDIX 2: EXEMPLAR SEPSIS SCREENING TOOL USED OUTSIDE PREGNANCY

SEVERE SEPSIS CARE PATHWAY
(SEPSIS SIX BUNDLE)
To be completed within the FIRST HOUR Severe Sepsis is confirmed

<table>
<thead>
<tr>
<th>Patient label / Details</th>
<th>Date</th>
<th>Consultant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ward:</td>
<td>Weight:</td>
<td></td>
</tr>
</tbody>
</table>

**TIME ZERO:**

<table>
<thead>
<tr>
<th></th>
<th>TIME</th>
<th>EXCLUSION REASON</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**OXYGEN:**
15 L/min via non-rebreath mask (aim SpO2 >94%)
*Caution with COPD patients*  
INITIALS:  
TIME:      
EXCLUSION REASON:  

**BLOOD CULTURES:**
Take before antibiotics given.  
Send: FBC / UEC / CRP / LFT / COAG / GLUCOSE  
Consider: BC's from long lines.  
Urine / sputum / wound swabs / samples etc  
INITIALS:  
TIME:      
EXCLUSION REASON:  

**IV ANTIBIOTICS:**
As per trust guidelines  
INITIALS:  
TIME:      
EXCLUSION REASON:  

**FLUID RESUSCITATION:**
Boluses 20 ml/kg if hypotensive  
0.9% Saline / Hartmann’s solution  
INITIALS:  
TIME:      
EXCLUSION REASON:  

**SERUM LACTATE:**
Use Grey bottle  
Send to lab on ice.  
Notify lab lactate sampled on the way.  
INITIALS:  
TIME:      
EXCLUSION REASON:  

**CATHETERISE:**
Use hourly catheter bag  
Strict fluid balance. ONE hourly urine measurement.  
INITIALS:  
TIME:      
EXCLUSION REASON:  

<table>
<thead>
<tr>
<th>DESTINATION OF PATIENT:</th>
<th>Ward / Unit:</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>BLEEP ACUTE CARE TEAM: (BLEEP 4495)</th>
<th>Time / Initial:</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

"TIME ZERO" = THE TIME THE PATIENT FIRST FULFILLED THE CRITERIA ON THE SEVERE SEPSIS SCREENING TOOL.

Make copies of both Sepsis Six and Screening tool: Original with patient notes, Copy held on ward/unit for auditing.
APPENDIX 3: EXEMPLAR SEPSIS SCREENING TOOL AND SEPSIS SIX** PLUS TWO RESPONSE BUNDLE FOR USE IN PREGNANCY (20 WEEKS TO 48 HRS POSTNATAL)

Obstetric Sepsis / Severe Sepsis Screening Tool

Does the woman have 2 Signs and Symptoms of Infection?

<table>
<thead>
<tr>
<th>Temperature &lt;36 or &gt;38 °C</th>
<th>Respiratory rate &gt; 20bpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate &gt;100 bpm (AN &amp; Intrapartum) &gt;90bpm (PN)</td>
<td>Acutely altered mental state</td>
</tr>
<tr>
<td>WCC &gt;12 or &lt;4 x10^9/l (higher threshold in labour)</td>
<td>Hyperglycaemia (Blood sugar &gt;7.7) in the absence of diabetes</td>
</tr>
</tbody>
</table>

If YES

Does the woman have a history or signs of a new infection or infective source?

| Prolonged ruptured membranes or offensive liquor | Breast redness and / or tenderness / mastitis |
| Unexplained fetal tachycardia in the absence of a maternal tachycardia | Fetal demise |
| Recent delivery / offensive lochia | Cough / sputum / chest pain |
| Catheter or Dysuria | Abdominal pain distension/diarrhoea |
| Line infection | Cellulitis/wound infection/septic arthritis |
| Headache with neck stiffness | Other |
| Endocarditis |

If Yes the woman has SEPSIS

Does the woman have any signs of organ dysfunction?

<table>
<thead>
<tr>
<th>SBP &lt; 90 or MAP &lt;70 mmHg</th>
<th>Lactate &gt; 2mmol/l</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urine output&lt;0.5 ml/kg/hr for 2 hours</td>
<td>New need for Oxygen to keep SaO₂&gt;90%</td>
</tr>
<tr>
<td>Platelets &lt; 100 x 10^9/l</td>
<td>INR &gt; 1.5 or aPTT &gt; 60s</td>
</tr>
<tr>
<td>Creatinine rise of &gt; 44.2mmol/l or level of &gt;177 mmol/l</td>
<td>Bilirubin &gt; 70μmol/l</td>
</tr>
</tbody>
</table>

If NO YES

If NO, treat for SEPSIS:

**Start Sepsis Six** Plus Two
- Oxygen
- Blood cultures
- Lactate
- IV antibiotics
- Fluid therapy
- Fluid balance and catheter
- **Consideration of delivery & VTE prophylaxis**

If YES, the woman has SEVERE SEPSIS:

**Start Sepsis Six** Plus Two
- Start the clock........
- Refer the woman to Critical Care.
- Give IV Antibiotics within 1 hour
- Start with Stat Dose

Obstetric Sepsis diagnosis & sepsis bundle CR July 2012 (V3)
Obstetric Sepsis Care Pathway
First Hour Care Duties

Name
Address
Hospital number

Date.....................
Ward.....................

Could this woman have Sepsis?

YES
Apply Sepsis Screening Tool

NO
Reassess the woman
Apply appropriate management plan

YES

Start the clock..............h

Sepsis Six **Plus Two

<table>
<thead>
<tr>
<th>Time</th>
<th>Initial</th>
<th>Reason not done</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Oxygen: high flow 15l/min via non-rebreathe mask. Target saturations &gt;94%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Blood Cultures: Take at least one set prior to antibiotics. Use sterile gloves and barrier precautions. Plus all relevant blood tests eg FBC, U+E, LFT, clotting, glucose, CRP. Consider urine/sputum/swabs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Serum Lactate: if &gt;2 with signs of organ dysfunction Inform ITU. Ensure Hb &gt; 8g/dl, ABG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. IV Antibiotics as per HB guidelines and recommendations. Give 1st dose within 1 hour.</td>
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<td></td>
</tr>
<tr>
<td>5. Fluid Resuscitation: if hypotensive give boluses of 0.9% saline or Hartmann’s: 20 ml/Kg (x3) to a max of 60 ml/Kg NB: if severe pre-eclampsia, ?lower threshold for invasive monitoring – discuss with senior in critical care.</td>
<td></td>
<td></td>
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</tbody>
</table>

**Plus 2**
Consideration of delivery or ERPC

VTE prophylaxis

Have all the above been completed and the woman reviewed within one hour?

One hour time check: All steps done? YES NO
Name: Sign:
Designation: Bleep:

Obstetric Sepsis diagnosis & sepsis bundle CR July 2012 (V3)
<table>
<thead>
<tr>
<th>S</th>
<th>Situation</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Drs name</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>My name is</td>
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</tr>
<tr>
<td></td>
<td>From Ward/Dept</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I am calling about</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The problem is</td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>B</th>
<th>Background</th>
<th></th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>The woman was admitted on ...../...../.....</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gravida: Para: EDD: Gestation:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Past med/obs history</td>
<td></td>
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<table>
<thead>
<tr>
<th>A</th>
<th>Assessment</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>The MEOWS is</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clinical Impression/Actions/observations</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Other relevant factors, e.g. Sepsis screening, blood results, urine output</td>
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<thead>
<tr>
<th>R</th>
<th>Recommendation</th>
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<tbody>
<tr>
<td></td>
<td>I request you review this woman within the next ..........hrs/mins</td>
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<tr>
<td></td>
<td>Document any initial instructions</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Patient reviewed by Dr at</td>
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</tbody>
</table>

All handovers, referrals and reporting should use the SBAR format.

Obstetric Sepsis diagnosis & sepsis bundle CR July 2012 (V3)
APPENDIX 4: EXEMPLAR AIDE MEMOIRE

Obstetric Prompt
Could this woman have sepsis?
Signs and Symptoms of Sepsis

- Temperature < 36°C or > 38°C
- Heart rate > 100 bpm (AN & Intrapartum) >90 bpm (PN)
- Respiratory rate > 20/min
- WCC > 12 or < 4 x 109/l (higher threshold in labour)
- Acutely altered mental state
- Hyperglycaemia (>7.7 mmol/l)

Two or more of the above plus a history or signs of new infection:
Start Sepsis Six**Plus Two

Obstetric Sepsis Six **Plus Two

- Oxygen
- Blood cultures
- Lactate
- IV antibiotics
- Fluid therapy
- Fluid balance and catheter
- ** Consider delivery or ERPC
- ** VTE Prophylaxis

Re-assess hourly for severe sepsis