Guidelines for Obstetric Anaesthesia

Contents

Disclaimer 6
Introduction 7
Lines of Communication 7
Daily Responsibilities: 8
Roles & Responsibilities of Consultants 9
Patients with medical problems likely to affect anaesthetic/analgesic management 10
UHW Fluid Administration Guideline For Women In Labour On Consultant Led Unit 10
Maintenance Fluids 11
Epidurals for labour 13
Skin preparation prior to epidural insertion 14
Patient 14
Anaesthetic Assistant 14
Equipment and drugs required for technique 14
Anaesthetist 14
Epidural documentation 15
Establishing epidural analgesia 16
Patient position for regional analgesia/anaesthesia 16
Procedure: 16
Combined Spinal/Epidural (CSE) 18
Needle-through-needle technique 18
Separate spinal and epidural injections 18
Drug management for both techniques 18
Troubleshooting – epidurals 19
Epidurals and pyrexia 20
PCA Remifentanil in labour: For anaesthetists 21
Indications 21
General analgesic management 21
Contraindications 21
Before the PCA is set up 21
Preparation of Remifentanil and pump programme 22
Pump programme 23
Observations after this 24
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indications for contacting anaesthetist</td>
<td>24</td>
</tr>
<tr>
<td>Points of safety</td>
<td>24</td>
</tr>
<tr>
<td>Sedation score to be recorded on a scale of 1-5</td>
<td>24</td>
</tr>
<tr>
<td>PCA Remifentanil in labour: for midwives</td>
<td>25</td>
</tr>
<tr>
<td>Remifentanil</td>
<td>25</td>
</tr>
<tr>
<td>Indications</td>
<td>25</td>
</tr>
<tr>
<td>Contraindications</td>
<td>25</td>
</tr>
<tr>
<td>Other information</td>
<td>25</td>
</tr>
<tr>
<td>Observations for the first 30 minutes - mandatory</td>
<td>25</td>
</tr>
<tr>
<td>Observations after this</td>
<td>26</td>
</tr>
<tr>
<td>Indications for contacting anaesthetist</td>
<td>26</td>
</tr>
<tr>
<td>Points of safety</td>
<td>26</td>
</tr>
<tr>
<td>Sedation score to be recorded on a scale of 1-5</td>
<td>26</td>
</tr>
<tr>
<td>PCA Remifentanil in labour: for patients</td>
<td>27</td>
</tr>
<tr>
<td>What is remifentanil?</td>
<td>27</td>
</tr>
<tr>
<td>How is it given?</td>
<td>27</td>
</tr>
<tr>
<td>Who is it suitable for?</td>
<td>27</td>
</tr>
<tr>
<td>What are the side effects?</td>
<td>27</td>
</tr>
<tr>
<td>Where can I get more information?</td>
<td>27</td>
</tr>
<tr>
<td>Caesarean sections</td>
<td>28</td>
</tr>
<tr>
<td>Assessment</td>
<td>28</td>
</tr>
<tr>
<td>Basic requirements</td>
<td>28</td>
</tr>
<tr>
<td>WHO checklist – Safer Surgery</td>
<td>29</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>29</td>
</tr>
<tr>
<td>Electives</td>
<td>29</td>
</tr>
<tr>
<td>Emergencies</td>
<td>29</td>
</tr>
<tr>
<td>General Anaesthesia</td>
<td>30</td>
</tr>
<tr>
<td>Postoperative analgesia</td>
<td>31</td>
</tr>
<tr>
<td>Epidural LSCS - Fractionated top-up of epidural</td>
<td>32</td>
</tr>
<tr>
<td>Subarachnoid block for LSCS.</td>
<td>33</td>
</tr>
<tr>
<td>Measures to prevent hypotension during regional anaesthesia</td>
<td>34</td>
</tr>
<tr>
<td>Management of pain during CS under regional anaesthesia</td>
<td>34</td>
</tr>
<tr>
<td>Spinal anaesthesia after failed epidural blockade</td>
<td>35</td>
</tr>
<tr>
<td>Other Procedures Requiring Anaesthesia</td>
<td>36</td>
</tr>
<tr>
<td>Manual removal of placenta</td>
<td>36</td>
</tr>
<tr>
<td>Trial of instrumental delivery</td>
<td>36</td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Prophylactic Antibiotics</td>
<td>36</td>
</tr>
<tr>
<td>Guidelines for the use of non-steroidal anti-inflammatory drugs after delivery</td>
<td>37</td>
</tr>
<tr>
<td>Background</td>
<td>37</td>
</tr>
<tr>
<td>Management of Accidental Dural Puncture</td>
<td>38</td>
</tr>
<tr>
<td>Post Dural Puncture Headache (PDPH)</td>
<td>38</td>
</tr>
<tr>
<td>Performing Epidural Blood Patch</td>
<td>38</td>
</tr>
<tr>
<td>Management of Total Spinal</td>
<td>40</td>
</tr>
<tr>
<td>Causes</td>
<td>40</td>
</tr>
<tr>
<td>Presentation</td>
<td>40</td>
</tr>
<tr>
<td>Assessment and Management</td>
<td>40</td>
</tr>
<tr>
<td>Postnatal Neurological Review</td>
<td>41</td>
</tr>
<tr>
<td>Background</td>
<td>41</td>
</tr>
<tr>
<td>Compressive Neuropathies</td>
<td>41</td>
</tr>
<tr>
<td>Injuries related to regional anaesthesia</td>
<td>41</td>
</tr>
<tr>
<td>Assessment and management</td>
<td>42</td>
</tr>
<tr>
<td>Management of Hypertensive Disease of Pregnancy</td>
<td>44</td>
</tr>
<tr>
<td>The key principles of anaesthetic involvement are:</td>
<td>44</td>
</tr>
<tr>
<td>Blood pressure measurement in pre-eclamptic and eclamptic patients</td>
<td>44</td>
</tr>
<tr>
<td>General anaesthesia in PET</td>
<td>44</td>
</tr>
<tr>
<td>Regional anaesthesia in PET</td>
<td>44</td>
</tr>
<tr>
<td>Oxytocic Agents and PET</td>
<td>44</td>
</tr>
<tr>
<td>Fluid balance in pre-eclampsia</td>
<td>45</td>
</tr>
<tr>
<td>Antenatal Fluid Management</td>
<td>45</td>
</tr>
<tr>
<td>Anaesthesia and Fluids</td>
<td>45</td>
</tr>
<tr>
<td>Postpartum Fluid Management (see Flowchart below)</td>
<td>45</td>
</tr>
<tr>
<td>Algorithm for Fluid management in pre-eclampsia</td>
<td>46</td>
</tr>
<tr>
<td>Pre-eclampsia, coagulation, and regional blockade</td>
<td>47</td>
</tr>
<tr>
<td>Obstetric Cholestasis, coagulation, and regional blockade</td>
<td>47</td>
</tr>
<tr>
<td>DVT/PE prophylaxis and neuraxial blockade</td>
<td>47</td>
</tr>
<tr>
<td>Cardiac Arrest</td>
<td>49</td>
</tr>
<tr>
<td>Background</td>
<td>49</td>
</tr>
<tr>
<td>Key interventions to prevent arrest</td>
<td>49</td>
</tr>
<tr>
<td>BLS modifications</td>
<td>49</td>
</tr>
<tr>
<td>ALS modifications during arrest</td>
<td>49</td>
</tr>
<tr>
<td>Resuscitation following bupivacaine toxicity</td>
<td>50</td>
</tr>
<tr>
<td>LipidRescue™</td>
<td>50</td>
</tr>
<tr>
<td>Algorithm for Fluid management in pre-eclampsia</td>
<td>46</td>
</tr>
<tr>
<td>Pre-eclampsia, coagulation, and regional blockade</td>
<td>47</td>
</tr>
<tr>
<td>Obstetric Cholestasis, coagulation, and regional blockade</td>
<td>47</td>
</tr>
<tr>
<td>DVT/PE prophylaxis and neuraxial blockade</td>
<td>47</td>
</tr>
<tr>
<td>Cardiac Arrest</td>
<td>49</td>
</tr>
<tr>
<td>Background</td>
<td>49</td>
</tr>
<tr>
<td>Key interventions to prevent arrest</td>
<td>49</td>
</tr>
<tr>
<td>BLS modifications</td>
<td>49</td>
</tr>
<tr>
<td>ALS modifications during arrest</td>
<td>49</td>
</tr>
<tr>
<td>Resuscitation following bupivacaine toxicity</td>
<td>50</td>
</tr>
<tr>
<td>LipidRescue™</td>
<td>50</td>
</tr>
</tbody>
</table>
### Management of Post-Partum Haemorrhage

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>51</td>
</tr>
<tr>
<td>Definitions</td>
<td>51</td>
</tr>
<tr>
<td>Causes of PPH</td>
<td>51</td>
</tr>
<tr>
<td>Risk factors for PPH</td>
<td>52</td>
</tr>
<tr>
<td>Activation of the massive obstetric haemorrhage protocol</td>
<td>54</td>
</tr>
<tr>
<td>Team roles</td>
<td>54</td>
</tr>
<tr>
<td>Surgical options</td>
<td>55</td>
</tr>
</tbody>
</table>

### Anaesthesia for major obstetric haemorrhage

- Specific considerations for providing anaesthesia
- Emergency
- Elective
- PPH: Appendix 1 OBS Cymru Checklist
- PPH: Appendix 2 Cardiff & Vale UHB PPH Flowchart
- PPH: Appendix 3 Vocera™ Broadcast
- PPH: Appendix 4 Portertrac

**PPH Appendix 5: Algorithm for the use of FIBTEM during PPH follows:**

### Difficult and Failed Intubation

- Pre-operative Assessment
- Factors Indicating the Need for Continuing with General Anaesthetic
- No Urgent Need to Continue
- Urgent Need to Continue with General Anaesthetic
- Failure of Regional Technique
- Postoperatively

### Unexpected Intrauterine Death

### Analgesia for labour following Intrauterine Death

### Therapeutic Feticide

### Guidelines for transfer of women from Maternity Unit to Critical Care Unit

### Patients with opioid dependency

### Appendix 1 - Quadratus Lumborum Block for analgesia following LSCS

### Appendix 2 – Postnatal Neurological Review Proforma

### Appendix 3

- Guidelines for the use of intraosseous access on Labour Ward
- Introduction
- Suitable sites for IO access
Contraindications to IO access 77
Complications 77
Infusions 77
Insertion Technique 78

Appendix 4 79
STANDARD OPERATING PROCEDURE: MEDICINES FOR IMMEDIATE USE BY ANAESTHETIST IN OBSTETRIC THEATRES 79
Disclaimer 79
Disclaimer 80

Appendix 5 83
ANAESTHETIC DATABASE USER INSTRUCTION: 83

Appendix 6 83
Use of PCA Opioids in Obstetric practice
Prescription chart
Infusion Pump record sheet
Complications
Disclaimer

This guideline is not a standard of medical care. The ultimate judgement with regard to a particular clinical procedure or treatment plan must be made by the clinician in the light of the clinical data presented and the diagnostic and treatment options available.
Introduction

These guidelines are intended to give guidance to anaesthetic trainees. They provide essential information and should be read before starting an attachment in obstetrics. They are also useful for later reference. As with any guidelines, professional freedom is maintained but any departure should be justified and discussion with senior colleagues is advised.

The basic role of the obstetric anaesthetist is to provide:

1. Safe and effective anaesthesia for obstetric operative procedures.
2. Safe and effective epidural analgesia for the first and second stages of labour.
3. Help and advice for mothers, midwives and medical staff with particular regard to obstetric analgesia.

Lines of Communication

Senior help and advice is always available:

There will be at least one Consultant Obstetric Anaesthetist on duty for delivery suite every day (8am-5pm) and a dedicated Consultant obstetric anaesthetist at night (5pm-8am Monday-Friday and for 48 hours at weekends). The ‘out of hours’ obstetric anaesthetic consultant rota is displayed on delivery suite, with preferred telephone numbers, and is also available on CLW rota with mobile numbers.

During the daytime, there is often a StR Year 6-7 on their advanced training module to also assist.

In an emergency, help may also be obtained from the UHW anaesthetic department on ext. 43107/43255 OR Out of hours, the co-ordinating resident senior trainee (bleep 6000) or cardiac anaesthetic trainee may also be called for assistance.

Consultants:

Dr Mark Stacey
Dr Rachel Collis
Dr Sarah Harries
Dr Korede Adekanye
Dr Rafal Baraz
Dr Lucy DeLloyd
Dr Abrie Theron
Dr Sarah Bell
Dr David Leslie
Dr Mike Adamson
Dr Thomas Kitchen (LOCUM)
Dr Yavor Metodieiev (LOCUM)

Communication of potential or actual problems to the Senior StR and/or Consultant is expected.
Daily Responsibilities:

At the start of every duty period the anaesthetic trainees must:

- Conduct handover of all patients on delivery suite with the anaesthetists from the previous shift. On weekday mornings, there is a debrief of the night-shift work at 8am, followed by review of all post-natal patients who have received regional anaesthesia/HDU patients. This is followed by formal multi-disciplinary handover of ‘the board’ with the midwife in charge and the obstetric team.
- Check all anaesthetic equipment including the anaesthetic machines and intubation equipment. There may not be time to do so later if an emergency anaesthetic is suddenly required (e.g. for cord prolapse).
- Ensure that a tray of routine general anaesthetic drugs is prepared and kept in each theatre fridge. This should be dated, signed and replaced every 24 hours.

**Tray Contents:**
- 1. Thiopental 2.5% - 20 ml drawn up
- 2. Suxamethonium – 100 mg drawn up
- 3. Ampoule of Atracurium with syringe but not drawn up.
- 4. Ampoule of Propofol with syringe and needle but not drawn up.
- 5. Second ampoule of Suxamethonium, not drawn up.
- 6. 30ml Sodium Citrate 0.3M Oral Solution

- There should be access to the following as per the agreed SOP (See Appendix 5 for detail):
  - IV access tray
  - Atropine – 0.6 mg with syringe but not drawn up.
  - Glycopyrronium - 600mcg with syringe but not drawn up.
  - Ephedrine – 3 mg/ml drawn up
  - Phenylephrine 500 mcg in 10 mls – prefilled
  - Syntocinon – 5IU diluted in 5ml syringe

- If a Syntocinon infusion is required in theatre (Syntocinon 40 Units in 500ml Hartmann’s Solution) this should be made up the prep room. Adding 30 units to an existing infusion is strongly discouraged.

- Ensure that the board is kept up to date with the names and contact numbers of the Consultant, Obs1 and Obs2 anaesthetists.
- In addition to labouring mothers, obstetric patients are kept on delivery suite if they require high dependency care; anaesthetic involvement in such patients is usually desirable.
- An anaesthetic workbook is kept at the main desk, which contains the details of all patients, who receive an anaesthetic intervention and whether they have been reviewed. A note of any problems should also be made. This should be kept up to date as it is an important means of communication and audit. Please do not remove this book from delivery suite for personal audit.
- All patients who receive anaesthetic care must be entered onto the obstetric anaesthetic electronic database.
- Ensure that the anaesthetic procedure / epidural record forms are completed including any current audit forms (e.g. Dural tap/PDPH)
- Visit patients on the postnatal ward who have had anaesthetic interventions and enquire about morbidity and patient satisfaction, and record appropriate information in the workbook.
- There is a responsibility to teach midwives/students about obstetric anaesthesia and maternal/neonatal resuscitation.
- The anaesthetic trainees also provide medical support to the acute pain service. Either the acute pain or ward nurses will notify the anaesthetist of particular problems. Any pain problems should be referred in a similar way to obstetric anaesthetic ones.
- The anaesthetic trainees also provide medical support to the acute pain service. Either the acute pain or ward nurses will notify the anaesthetist of particular problems. Any pain problems should be referred in a similar way to obstetric anaesthetic ones.

**Roles & Responsibilities of Consultants**

The Consultant Obstetric Anaesthetists have differing roles and responsibilities as set out in the attached table. As well as completion of your IAOAC or Obstetric CUT form, you will be encouraged to take up teaching, QI, research projects or any other interests to help build your training portfolio during your placement in Cardiff. Please approach any of the Consultants to discuss the possibilities.

<table>
<thead>
<tr>
<th>S Harries</th>
<th>L de Lloyd</th>
<th>S Bell</th>
<th>R Collis</th>
<th>R Baraz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultant Lead</td>
<td>Research</td>
<td>QI/audit lead</td>
<td>Research</td>
<td>Obstetric trainee induction</td>
</tr>
<tr>
<td>Attendance at Lead meetings, negotiating sessional cover and new Consultant appointments</td>
<td>Organise research meetings/club outside specific projects</td>
<td>Quality and Safety lead (risk register) Liaise with HOM</td>
<td>Clinical governance lead</td>
<td>Obstetric database</td>
</tr>
<tr>
<td>Advanced training Lead – interviews, appraisal and sign-off</td>
<td>PROMPT Consultant coordinator (inform JG)</td>
<td>Maternity network lead</td>
<td>Midwife top up (to liaise with Jane Grey)</td>
<td>Consultant Obs rota</td>
</tr>
<tr>
<td>Maternity Prof Forum</td>
<td>OAA surveys Lead responder</td>
<td>T2 Lead</td>
<td>Maternity Prof Forum</td>
<td>Datix response for Obs Anaes reports</td>
</tr>
<tr>
<td>M Stacey</td>
<td>O Adekanye</td>
<td>A Theron</td>
<td>D Leslie</td>
<td>M Adamson</td>
</tr>
<tr>
<td>Trainee wellbeing lead</td>
<td>Acute pain lead</td>
<td>Clinical Director for Perioperative Medicine</td>
<td>Core training lead – IAOC sign off</td>
<td>UKOSS Anaesthetic Lead</td>
</tr>
<tr>
<td>DS Multi-professional team &amp; resilience training</td>
<td>Intermediate and Higher training Lead for CUT form sign off</td>
<td>Trainee rota</td>
<td>PROMPT CIPPS Lead</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PROMPT trainee coordinator (inform JG)</td>
<td></td>
</tr>
</tbody>
</table>
Patients with medical problems likely to affect anaesthetic/analgesic management

The obstetricians are encouraged to warn us of any antenatal patients who have medical problems that may affect their anaesthetic or analgesic management. This allows us time to assess, formulate and document an appropriate plan for the patient’s management during labour.

High risk anaesthetic antenatal clinics run on Tuesday and Wednesday afternoons each week for such patients, plus an alternative week clinic for high risk cardiac patients. These are held in the antenatal clinic at UHW. Trainees are encouraged to attend. Check whether there are any patients attending the clinic and at what time it starts, usually 1.30pm.

All patients who attend the clinic will have a written management plan on a grey Obstetric Anaesthesia sheet in their hand-held maternity notes. More complex patients will have a typed plan on clinic portal +/- a typed plan in separate loose-leaf folder at the main delivery suite desk. Inside the folder are forms which should detail the management plan of any obstetric patient due for delivery and who has been identified antenatally as having potential significant anaesthetic problems.

Be proactive and assess any high risk patients who attend delivery suite with potential for significant anaesthetic or obstetric concern.

UHW Fluid Administration Guideline For Women In Labour On Consultant Led Unit

This guideline is a starting point for fluid administration on the consultant led unit (CLU), UHW. It is recognised that this will need to be adapted in special circumstances e.g. cardiac patients and for those conditions already with guidelines on fluid administration e.g. PET, diabetes. If in doubt discuss with senior obstetrician/anaesthetist.

It is important to think about why a patient needs fluids. Excessive fluid administration can cause harm. When considering a person’s fluid requirement, it is important to consider the following 3 categories and treat each separately:

- Maintenance fluids
- Fluid deficit
- Resuscitation fluids

Maintenance fluids

Everyone requires a minimum amount of fluid each day to replace ongoing natural losses. This is termed maintenance fluid and equates to 35 mL/kg/day (2000-3000 mL/day). Where possible, fluid replacement should be achieved orally, this allows the body to optimise its own fluid intake. Where this is not possible, we need to judge fluid requirements and aim to replace them intravenously.

Fluid deficit

Fluid deficits fall into 2 categories:

- Reduced intake (prolonged starvation, nausea and vomiting)
- Increased losses (sweating, hyperventilation, pyrexia, diarrhoea, vomiting, bleeding, etc.)
An assessment of fluid deficit should be made on all women on admission to hospital and is calculated following a detailed history and examination. Examination should look for signs of hypovolaemia and compromised maternal circulation, these include thirst, dry mucous membranes, cool peripheries, hypotension, tachycardia, low urine output, tachypnoea, maternal acidosis and fetal compromise.

**Resuscitation fluids**

Patients with a compromised circulation may require additional resuscitation fluid that is given in the form of a stat bolus. This is termed a fluid challenge, and after administration it is necessary to assess the response of the patient. If there is an improvement in patient parameters fluid replacement is probably the correct treatment, and this may be repeated as necessary. However if there is no response to several boluses, then another cause and treatment option should be sought.

**Maintenance Fluids**

*For patients tolerating oral fluids:*

- Encourage patient to drink clear fluids.
- Intravenous maintenance fluids are not routinely required
- If an epidural is sited, IV access must be secured and cannula flushed, but fluids only administered as required (maintenance IV fluids if not tolerating oral fluids, or as a bolus if there are signs of a compromised circulation)

*For patients not tolerating oral fluids:*

- Initially, IV crystalloid (usually Hartmann’s) infusion to make a total IV fluid administration of 100 mL/hr (i.e. 500 mL over 5 hours). This fluid should be prescribed as follows:
  
  - **Total** is the sum of:
    - Syntocinon infusion
    - Intravenous maintenance fluids
    - Any other IV infusion
  
  **Note:** Only one bag of fluid is to be given for every line of fluids prescribed, i.e. both the “prescriber to initial if continuous” and the additional 2 lines on the right (see above) should be crossed out for all maintenance fluid prescribed on the consultant led unit. To avoid the risk of inadvertent fluid overload fluids should usually be administered from a 500ml bag.

- To determine the required drip rate to achieve the desired mL/hr rate (N.B. 1 drip = 0.04 mL):
Desired rate | Drip rate
---|---
40 mL/hr | 17 drops/min | 1 drop every 4 seconds
60 mL/hr | 25 drops/min | 1 drop every 3 seconds
80 mL/hr | 33 drops/min | 1 drop every 2 seconds
100 mL/hr | 42 drops/min | 2 drops every 3 seconds

**Please note:**

**All patients requiring IV fluids require a fluid balance chart** to accurately monitor fluid input and output.

**Fluid Challenge / Bolus** (for resuscitation and to replace deficits)

Signs of hypovolaemia and compromised maternal circulation include thirst, dry mucous membranes, cool peripheries, hypotension, tachycardia, low urine output, tachypnoea and maternal acidosis*. A fluid challenge may also be given for fetal compromise, and the following principles apply equally:

- A single fluid bolus should be given over 10-15 minutes and should not exceed 500mL of Hartmann’s solution. The response to the fluid challenge (see * above) should then be considered.

- If indicated the fluid bolus can be repeated after 1 hour.

- After 2 consecutive boluses have been given a senior obstetrician or anaesthetist must review the patient response to the fluid challenge and document in the notes whether further fluid boluses or maintenance fluids are indicated.

- The patient may require an increased level of monitoring, including hourly urine output, regular U&Es and venous lactate. Senior review is required if there is no improvement in patient parameters after the administration of two consecutive fluid boluses.

For all patients requiring IV fluids, a fluid balance chart should be commenced to monitor input and output.
Epidurals for labour

General information and planning

Plan to attend mother for an epidural within 30 minutes of request. If both trainees are busy, try bleep 6000 or the on-call consultant. Placement of an epidural catheter should be completed within approximately 20 minutes after starting, or after 3 attempts. If a trainee is having difficulty and taking longer than this, they should stop and seek senior assistance. Consider a low-dose (3-5 ml of standard epidural mixture) spinal whilst help is on the way.

Epidurals should only be attempted unsupervised if the trainee is confident about their technique and is certified as competent by the consultant or senior registrar.

- Before establishing epidural analgesia, the anaesthetist should explain the procedure and explain common complications (see anaesthetic chart): The length and depth of the explanation should be patient specific depending on the clinical situation and the amount of information the mother wants. It should briefly cover all the areas indicated on the anaesthetic chart, ticked and documented.
  - Accidental dural puncture & risk of severe headache
  - Association with instrumental delivery
  - Incomplete analgesia, including need for re-siting

- Nerve damage and infection should be mentioned as rare complications.

- Backache is common after childbirth and is multifactorial in aetiology. Contemporary prospective controlled studies have shown that the incidence of long-term backache is no more frequent in women who have received an epidural or spinal than those who have not. Naturally there is an increased incidence of localised tenderness at the site of the epidural that lasts about 48 hours and is related to localised bruising. If the mother enquires about backache then she should be reassured.

- The NICE intrapartum care document, regarding the impact of epidural opiates on breast feeding (below) for women who ask this question. (December 2014)

Evidence statement

There is a moderate level of evidence on the use of fentanyl to reduce the total dose of bupivacaine, which results in less motor block, a longer duration of analgesia but also increases the incidence of pruritus.

Evidence from small studies, of variable quality, suggests a weak association between the dose of fentanyl and the duration and success of breastfeeding.

- A large number of epidural/CS information translations are available on the OAA/Labour pains website. These can be printed for viewed on a mobile device. https://www.oaa-anaes.ac.uk/home or https://www.labourpains.com/home

- Language line or preferably language line via the “i-pad” should be used for the mother that speaks No or Limited English. Ideally translation via a partner or relative should not be relied on but may be used in an emergency or if there is No alternative.
● Women should have an obstetric review and plan written in the notes before an epidural is sited. This includes women from the MLU who are transferred because of a request for an epidural.

● Continuous CTG monitoring for a minimum of 15 minutes is required before inserting an epidural.

● An IV cannula (preferably 16G) should be sited and flushed before epidural insertion.

● A base-line heart rate and BP must be recorded.

● Epidurals should be performed under strict aseptic conditions with operator gowned wearing hat, gloves and mask. The Acute Pain Service guidelines for skin preparation prior to epidural insertion should be followed as below:

**Skin preparation prior to epidural insertion**

**Patient**
- Explain procedure to patient, position patient and mark up your spaces prior to scrubbing

**Anaesthetic Assistant**
- Wear mask
- Wash hands thoroughly
- Wash procedure trolley with soap and water
- Clean trolley with alcohol wipes and allow to dry before placing pack on trolley
- Open all packs and solutions using aseptic technique

**Equipment and drugs required for technique**
- Sterile pack
- Sterile gown
- Sterile gloves (2 pairs)
- Theatre hat and mask
- Pink 0.5% chlorhexidine in 70% alcohol delivered by a pump-squirt bottle
- Local anaesthetics – Sterile wrapped lidocaine 1% or 2%
- Sterile wrapped 0.9% Saline – 100ml bag
- Portex minipack plus required needles and syringes
- IV 3000 dressing
- 4 inch Mefix. (Sleek should not be used)
- Steristrips
- Lock-it device

**Anaesthetist**
- Wear theatre hat and mask
- Identify the anatomy prior to skin preparation
- Surgical scrub, then wear sterile gown and sterile gloves.
- Assistant to squirt back with pink chlorhexidine in 70% alcohol, including the area on the upper back where epidural catheter is to be taped to skin.
Avoid contamination of the epidural or spinal tray with chorhexidine spray.

Rub the back for ~30 seconds using foam sticks or forceps and sterile swabs, in a circular motion from the centre to the periphery, whilst the solution is still wet.

Assistant to squirt area again with pink chlorhexidine in 70% alcohol solution.

Skin must be allowed to dry for 2 minutes before commencing the procedure.

Use sterile drapes.

Following insertion, fix to skin using 2 steristrips, cover with a sterile, transparent, occlusive dressing.

Use 4 inch Mefix to make a window around the dressing and secure epidural catheter up the back. Ensure that the sufficient cm markings on the epidural catheter are visible to determine whether the catheter has moved.

Ensure that the filter is secured to the front of the patient.

Dispose of sharps safely.

The precise technique for performing epidural catheter insertion will inevitably depend upon the previous training of the trainee. However, loss of resistance to saline is preferred because of the reported lower incidence of accidental dural puncture and missed segments.

A minimal length of catheter should be left in the epidural space (≤ 4 cm) as this is associated with fewer missed segments. It is unacceptable to withdraw the catheter through the needle as this can result in the catheter shearing. Remove needle and then pull catheter back to required length.

A careful aspiration test and observation for free flow of CSF or blood in the catheter should be performed. The drop test with a flushed open epidural catheter raised above the patient with a clear meniscus drop is a good indication that the epidural catheter is in the epidural space. In addition, lower the open proximal end of the catheter to below the level of spine. A few drops of clear fluid seen dripping is normal but continuous dripping of clear fluid may indicate inadvertent intrathecal catheter placement. Even after negative aspiration, a continuous column of blood indicates intravenous placement. Accidental intravenous injection of local anaesthetic remains a danger, though if small doses are used and not repeated, without evidence of local anaesthesia, this danger should be minimised.

All mothers having epidural analgesia for labour should be prescribed omeprazole oral 40mg BD for the remainder of their labour.

Epidural documentation

- Name and grade of anaesthetist
- Time/Date.
- Verbal request for epidural for labour or indication for therapeutic epidural - verbal consent.
- Warned re failure/instrumental delivery /headache
- IV access site and gauge 14 or 16.
- Position of patient (e.g. sitting/left lateral).
- Full asepsis (Gown Gloves Hat Mask Drape No. of sprays of Chlorhexidine)
- Intervertebral space and approach (midline or paramedian).
- Lidocaine to skin.
- Type of needle (e.g. Portex 16G).
- LOR to saline or air.
- Presence of paraesthesia
Establishing epidural analgesia

Epidural analgesia should make the mother comfortable and in control of her pain. Not all mothers wish to abolish all sensation, particularly if this results in profound muscle weakness. The aim should be to provide analgesia not anaesthesia - the latter should be reserved for Caesarean section.

Patient position for regional analgesia/anaesthesia

Poor patient positioning is responsible for many failures to site epidurals/spinals.

If using the sitting position:

- Place the woman’s feet flat on a stool, try to prevent the knees falling laterally.
- Ensure the knees are higher than the hips (to reduce the lumbar lordosis)
- If sitting on the operating table, tilt the table 5° towards you (to reduce the lumbar lordosis)

If using the lateral position:

- Place a pillow under the woman’s shoulders
- Place another pillow between her knees to prevent the pelvis tilting away from you.

Procedure:

- Establish IV access with a 14 or 16G cannula and take blood for FBC / G+S. Trust transfusion policy states that the person taking the G+S must complete the details on the bottle/form.
- Routine IV fluids are not required (see administration of IV fluids in special circumstances)
- Measure and record a pre-epidural blood pressure.
- Site the epidural, giving due consideration to the points made under “Epidurals for labour” above.
- The “Lock-it” is currently the favoured fixation device.
- The solution used for labour epidurals is 0.1% bupivacaine + 2mcg/ml fentanyl in pre-filled syringes.
- Give 10ml of premixed solution as the test dose, and after 10 minutes test the block. A test dose using high concentrations of bupivacaine is not recommended.
- A pain score, sensory block and record of SLR (motor block) should be recorded after the test dose and after each dose to establish analgesia.
- Ice should be used to establish the extent of loss or reduction of cold discrimination (ethyl chloride is not recommended and not available on delivery suite). The ice fridge is located in the clean utility next to room 8.
● If there is excessive/rapid sensory or motor block (especially of S1), suspect intrathecal placement. This should be evident in 10 minutes.

● 20-30mL of low dose pre-filled epidural mixture (including initial dose) is usually required to establish analgesia.

● Each bolus will act as a ‘test dose’ and will be safe if inadvertently injected intrathecally—high concentrations are unnecessary.

● The block should be assessed 20 minutes after completion of the establishing pain relief. Ask the patient if her pain relief is adequate. Fill in her pain scores on the epidural chart. The upper and lower dermatome levels on each side must be recorded on the anaesthetic chart by the anaesthetist. In practice, if S1 (the largest sacral nerve root) is blocked the rest of the sacral roots will be also, so formal testing of the perineum is unnecessary. Test the lateral borders of the feet (S1) for loss of cold discrimination. Both soles of the feet should be warm and dry. The mother should be able to SLR although it is normal for the mother to report that her legs feel a “little” heavy. She should have a bilateral block to ice to at least T10.

● If analgesia is inadequate after 30mL of solution over 40 minutes, ie. Pain scores remaining > 30-40, consider early re-siting of the epidural.

● Monitor maternal blood pressure at 5 min intervals and continuous FHR monitoring for the first 20 minutes after placement of epidural.

● Maternal hypotension (fall >20% systolic or < 100 mmHg) may make the mother dizzy and nauseated and cause fetal heart rate trace abnormalities.
  ▪ Ensure that aorto-caval compression is absent by placing the mother in the full left lateral position.
  ▪ Give 12.5-25mg of phenylephrine IV every 1-2 minutes until blood pressure is satisfactory.

● Maintenance of epidural analgesia is by 10ml ‘top ups’ of the same solution with which analgesia is established. Maternal BP and FHR should be monitored every 5 minutes for 10 minutes after each ‘top up’. Most of the midwives have been trained in the administration of ‘top ups’ and can give them hourly. If top ups are required more frequently than hourly or need stronger solutions then this IS the responsibility of the anaesthetist.

● In the event that there is not a midwife on duty that has been trained in epidural ‘top ups’, this task remains the responsibility of the resident anaesthetists. Midwives undergoing ‘top up’ training may require supervision by the resident anaesthetist. Use of infusions to maintain epidural analgesia is discouraged.

● Failure to establish an adequate block must be reported and discussed early with the SpR or consultant. Always think: “could I top this epidural up for a trial/LCS?”

● Any doubts concerning the suitability for epidural analgesia or the inability to achieve an effective block should be discussed with the SpR or consultant.

● Any complications must be discussed with the SpR or consultant.
Combined Spinal/Epidural (CSE)

This is a useful technique where rapid onset of analgesia is desirable (e.g. request for epidural late in labour).

This may be conducted as a single needle-through-needle technique, which can be taught at elective caesarean section, or as insertion of a short spinal needle followed by epidural catheter in the usual manner. The second technique is more suitable in less experienced hands or if the mother is very restless.

Consent and general planning should be the same as for epidurals

Needle-through-needle technique

- Locate epidural space with Tuohy needle.
- Pass a long (119mm), 25G spinal needle through the Tuohy needle. (use locking kit if familiar and available)
- There should be a palpable ‘click’ as the spinal needle passes through the dura, into the subarachnoid space, and a flash back of CSF. If the stilette is removed from the spinal needle before insertion then CSF is seen almost immediately on puncturing the dura.
- If saline has been used for loss of resistance it can be confused with CSF. Ensure free aspiration of CSF.
- Inject drug (see below), remove spinal needle and insert epidural catheter.
- Do not keep mother sitting for too long whilst fixing epidural catheter if the spinal injection has been done in the sitting position. Put her into the lateral position to fix catheter.
- If the CSE has been performed in the lateral position, turn the mother to the other full lateral position after 5 minutes, to prevent a unilateral block.

Separate spinal and epidural injections

- Use a short (90mm or 103mm) spinal needle
- If the spinal has been performed in the sitting position, place the mother in the lateral position until she is comfortable.
- Insert the epidural catheter in the usual way. This is best carried out in the lateral position because it reduces the incidence of hypotension.

Drug management for both techniques

- Inject 3-5ml of the standard epidural solution. If sterile, the standard epidural solution can be emptied into the plastic tray, in the epidural procedure pack, and drawn up with the filter.
- Assess pain relief after 10 minutes.
- If analgesia is inadequate top-up epidural catheter.
- Do not use more than 5ml at a time of any epidural solution if the spinal injection has been given within the last 20 minutes. Give 5ml of the epidural solution every 5 minutes until analgesia is adequate. Any epidural injection will squeeze the CSF with a risk of cephalad spread.
- When the intrathecal dose starts to wear off, the epidural is managed in the usual way and the first epidural dose given as a test dose by the anaesthetist.
Troubleshooting – epidurals

- **Blood in catheter** - gently flush with saline and aspirate. If still aspirating blood, withdraw the catheter (if able) and repeat flush/aspiration until a minimum of 3cm of catheter remains within the epidural space. Hold the open end of the epidural catheter below the level of the patient’s heart and confirm that blood is no longer seen in the catheter. If it is still in a vein, resite the epidural. Any blood in the catheter will make a dextrose stick +ve

- **Fluid in catheter**
  - Possible CSF Dextrose +ve
  - Possible saline from epidural placement Dextrose –ve (will become mildly +ve with time)
  - Possible oedema in epidural space Dextrose +ve. (common in women with pre-eclampsia)

- If the catheter is in the CSF then aspiration is usually easy and often continuous. If other fluid (N/Saline or oedema) is seen then aspiration of more than a few drops is unusual. If in any doubt, give 2-3ml boluses of standard solution into the catheter and look for a spinal effect i.e. instant profound analgesia.

- **Unilateral blocks/missed segments** – There is usually a difference in temperature between the two feet and/or the soles of the feet are not equally warm and dry. Try positioning the patient with the unblocked side down if possible before administering another bolus. If this fails try withdrawing the catheter 1-2 cm, if possible, and then administer another bolus. If this fails, resite the epidural early.

- **Failed block** - suggests catheter in wrong place: i.e. outside the epidural space or in an epidural vein. Therefore resite epidural early.

- **Inadequate sacral analgesia** (in late 1st stage or 2nd stage) - frequently associated with an OP presentation. Remember to test and record the S1 component of the block.
  - Sit patient up
  - Give a bolus of dilute local anaesthetic to encourage a wider spread of drug.
  - Consider adding extra fentanyl to the solution, 25-50 micrograms bolus in addition to the standard top-up.
  - Occasionally a stronger solution is needed. 0.25-0.5% levobupivacaine.

- **Missed segment** (i.e. mother complains of pain in the groin) - usually a unilateral block, or inadequate height of block on one side, and can be identified by careful assessment of temperature discrimination and by examining the sympathetic block in the feet (warm/dry soles of feet). Treatment is as for unilateral block.

- More concentrated local anaesthetic solutions should only be used when there is breakthrough pain (suggesting insufficient density of block) in a mother who has an adequate distribution of cold discrimination.
Epidurals and pyrexia

- You may be asked to provide epidural analgesia for women who have are pyrexial; eg induction of labour for prolonged rupture of membranes and chorioamnionitis.
- Unfortunately there is no good evidence in the literature as to what is safe.
- If WBC ≤ 25 and Temp ≤ 38°C an epidural may be inserted provided that blood cultures have been taken and antibiotics have been given.
- If WBC > 20 and Temp > 38°C discuss each case with the Consultant on call.
- Explain to the patient that if epidural is refused the clinical picture will be kept under review and if circumstances change, it may be allowed later in labour.
PCA Remifentanil in labour: For anaesthetists

Indications

- For mothers unable to receive epidural analgesia. This includes mothers with coagulopathy, thrombocytopaenia or taking anti-coagulants. Also major abnormalities of the lumbar spine including major surgical procedures and in the presence of proven or possible sepsis (see guidelines on temperature and white cell count in labour).

- Patient choice

General analgesic management

- Mothers may be offered Entonox and/or TENS in addition to remifentanil
- Mothers MUST NOT have received IM pethidine or any other opioids within the last 4 hours
- The mother must be in established labour

Contraindications

- Allergy to opioid drugs
- Unestablished labour
- Post operative analgesia
- The use in the following cases must be discussed with a consultant anaesthetist
  - Multiple pregnancy
  - Pre-eclampsia
  - Premature labour

Before the PCA is set up

- The patient should be informed of the possible side-effects of drowsiness, itch, nausea, dizziness and inadequate analgesia and documentation of this made in the notes
- The patient must be shown how to use the PCA and should be told to press the button just before or at the start of a contraction i.e. when she first feels a ‘tightening’ not when the ‘tightening’ becomes painful
- The anaesthetist must have attended the pump training session run by Clinical Engineering and be familiar with the Alaris P5000 PCA pump
- An anaesthetist with the required training must be available on delivery suite during pump use
- Only the Alaris P5000 pump is to be used
- A dedicated IV cannula must be used (pink 20g or blue 22g)
Preparation of Remifentanil and pump programme

The standard regimen for Remifentanil in labour is 40mcg bolus with 2 minute lockout. There is scope to increase the bolus to 60 or 80 mcg but it is rare for this to be required.

- 2mg ampoule of Remifentanil should be obtained from labour ward CD cupboard, checked and signed for either with the midwife looking after the mother or with the labour ward co-ordinator.

- 2mg of Remifentanil should be reconstituted and diluted to 50ml with normal saline in a Luer-lock 50ml syringe.

- A "Drug additive" label must be stuck to the syringe, in a way that it can be clearly seen once in the pump, with "Remifentanil 2mg/50ml", the time it was made up and signed by the anaesthetist.

- The final solution contains 40 micrograms/ml of Remifentanil.

- A Vygon "Protect-a-line" with built in anti-syphon valve (dead space 2 mls) must be connected to the syringe, primed and the safety clamp closed.

- The Remifentanil must be prescribed on the patient’s drug chart and a PCA record of administration chart used for observations. Pre-printed prescription stickers are available in theatres.

- Remifentanil is stable for 24 hours at room temperature after reconstitution.
Pump programme

● Open PCA cover (keyhole on left end of pump), insert syringe and position correctly
● Insert key into front of device and turn 1 click to right
● "Clear previous patient info" – YES
● "Confirm new patient" – YES
● Press NEXT PROTOCOL (6 times) until Remifentanil protocol (G) appears
● Press "Clinician Override"
● Enter Access code (last 3 digits of serial number on back of pump), press OK
● Press MODIFY PROTOCOL
● Press Down arrow to LOCKOUT PERIOD
● Press ALTER
● Press Down arrow to 2 MIN
● Press CONFIRM
● Press OK
● Turn key to ON (Green circle)
● Review settings (Remifentanil 40 ug/ml, PCA Dose 40 ug, Lockout 2 min, Continuous 0 ug/h) Press OK
● Confirm syringe OK
● Release safety clamp
● Press Green START button

● If initial programme is inadequate and the mother does not show signs of excessive sedation, consider increasing the bolus to 1.5ml (60 mcg) then 2ml (80 mcg)

Setting up a PCA must be documented in the green book
Observations for the first 30 minutes

- A pulse oximeter must be placed on the mother’s toe (less likely to be dislodged than a finger) continuously for the first 30 minutes.
- If oxygen saturation falls below 94% the PCA should be taken away from the mother and the anaesthetist contacted.
- A sedation score to be recorded at 10, 20 and 30 minutes (see below for scale)

Observations after this

- Sedation score to be recorded every 30 minutes
- Hourly recordings of “balance in syringe”, “volume used”, “total demands”, and “good demands” to be made by the midwife on the PCA Record of Administration sheet.
- Following any dose/lockout change or period of discontinuation, observations should restart as for new PCA

Indications for contacting anaesthetist

Take the PCA pump away from the mother
- Oxygen saturation < 94% at any point
- A sedation score of ≥3
- A respiratory rate < 8 breaths per minute for more than one minute

Points of safety

- Always use a dedicated cannula
- Always flush the cannula with 5ml saline immediately after PCA is removed
- Do not give any other drugs via the PCA cannula
- Only the mother is to use the PCA button
- The PCA button must not be pressed by the midwifery staff or patient’s relatives
- The PCA can be used during delivery and repair of tears or episiotomies.
- A paediatrician should be contacted to attend the delivery and **naloxone must be available** to administer to the baby if required

Sedation score to be recorded on a scale of 1-5

- 1. Fully awake
- 2. Drowsy
- 3. Eyes closed but rousable by voice
- 4. Eyes closed but rousable by physical stimulus
- 5. Eyes closed and not rousable

A laminated “aide memoire” is attached to the PCA pump
PCA Remifentanil in labour: for midwives

Remifentanil

- Remifentanil (Ultiva™) is a potent, ultra short-acting, synthetic, opioid analgesic drug
- It is administered via a patient-controlled-analgesia (PCA) pump which is set up by the anaesthetist
- The drug is delivered on demand from the patient by pressing the button attached to the pump
- The pump will automatically lock out for 2 minutes after each demand
- Remifentanil can cause marked respiratory depression, therefore careful observation is necessary during use. The mother should not be left unattended.
- Remifentanil can transfer across the placenta but is metabolised rapidly by the fetus

Indications

- For mothers unable to receive epidural analgesia. This includes mothers with coagulopathy, thrombocytopenia or taking anti-coagulants. Also major abnormalities of the lumbar spine including major surgical procedures and in the presence of proven or possible sepsis
- Patient choice
- Remifentanil is suitable for all stages of labour

Contraindications

- Allergy to opioid drugs

The use in the following cases must be discussed with a Consultant Anaesthetist:
- Multiple pregnancy
- Pre-eclampsia
- Premature labour

Other information

- Mothers may be offered Entonox and/or TENS in addition to Remifentanil
- Mothers MUST NOT have received IM pethidine or any other opioids within the last 4 hours
- The mother must be in established labour

Observations for the first 30 minutes - mandatory

- Oxygen saturations must be measured continuously during remifentanil PCA usage
- If oxygen saturation falls below 94% the PCA should be taken away from the mother and the anaesthetist contacted.
- A sedation score to be recorded at 10, 20 and 30 minutes (see below for scale)
Observations after this

- Continuous oxygen saturation monitoring (record every 30 minutes)
- Sedation score to be recorded every 30 minutes
- Hourly recordings of “balance in syringe”, “volume used”, “total demands”, and “good demands” to be made by the midwife on the PCA Record of Administration sheet (provided in PCA pack).
- Following any dose/lockout change or period of discontinuation (for >30 minutes), observations should restart as for new PCA

Indications for contacting anaesthetist

Take the PCA pump away from the mother
- Oxygen saturation < 94% at any point
- A sedation score of ≥ 3
- A respiratory rate < 8 breaths per minute

Points of safety

- Always use a dedicated cannula (22g or 20g)
- Upon completion of PCA usage, immediately remove cannula without flushing
- Do not give any other drugs via the PCA cannula
- Only the mother is to use the PCA button
- The PCA button must not be pressed by the midwifery staff or patient’s relatives
- The PCA can be used during delivery and repair of tears or episiotomies.
- A paediatrician should be contacted to attend the delivery and naloxone must be available to administer to the baby if required
- A midwife, who has undergone local training in the use of remifentanil, must be assigned to give one to one care. The patient should under no circumstances have access to the PCA if the midwife is not present.

Sedation score to be recorded on a scale of 1-5

1. Fully awake
2. Drowsy
3. Eyes closed but rousable by voice
4. Eyes closed but rousable by physical stimulus
5. Eyes closed and not rousable

A laminated “aide memoire” is attached to the PCA pump
PCA Remifentanil in labour: for patients

What is remifentanil?
Remifentanil is a short acting pain killer, similar to pethidine. It starts to work very quickly, and wears off very quickly, so you can have pain relief timed with your contractions.

Remifentanil was not originally designed for use in labour (i.e. is being used outside of the licence); however, it has now been used safely in the UK for many years.

How is it given?
Remifentanil is administered via a pump (called a PCA), which is pre-programmed. It gives a dose directly into your vein via a drip when you press a button. It has a safety ‘lock out’ - a short period when no more dose will be given, so you cannot give yourself too much. The pump is set up by the anaesthetist on duty.

The drug starts to work very quickly, so you should try to press the button right at the start of a contraction when you first feel a ‘tightening but before it becomes painful. The drug will then take effect as the contraction builds. Try not to press the button when you do not have a contraction.

It is extremely important that only you press the button. Your birth partner should never press the button for you.

Who is it suitable for?
Anyone in labour can have a remifentanil PCA. We commonly use them for women who cannot have, or do not want an epidural.

There are a few people who it may not be suitable for, particularly those who are allergic to related drugs such as morphine. In certain circumstances, we may advise you that an epidural would be better.

Having a PCA does not prevent you from using gas and air or TENS at the same time, and does not prevent you changing to an epidural later if you would prefer provided you can have one.

What are the side effects?
Some people experience a light headed or dizzy feeling when using the PCA, this is not harmful, but may feel unusual to you.

Around one in ten women experience low oxygen levels.
You will be monitored closely when you have the PCA connected. If your oxygen levels become low, you may need to be given oxygen, and we may have to stop the PCA.

Although remifentanil does transfer to the baby, the short acting effect means that it is very unusual for it to affect the baby once born.

Although the pain relief using this PCA may start well, you may find the PCA less effective near or at full dilatation

Where can I get more information?
The anaesthetist on duty can give you more information about remifentanil, and answer any questions that you might have.
Caesarean sections

Assessment

All patients should be seen before surgery. The front page of the anaesthetic chart is the pre-operative assessment form. Take and document history on the anaesthetic chart, with special emphasis on:

- Indication for LSCS (e.g. placenta previa)
- Past medical/anaesthetic/obstetric history
- Drug history
- Allergies
- Airway assessment
- Discuss anaesthetic options (GA v regional), including complications
- For regional:
  - headache
  - failure and conversion to GA
  - expected sensation during operation, including possibility of pain
  - hypotension/nausea/vomiting
  - itching (if intrathecal opioids used)
- Infection and nerve damage may be described as ‘very rare’

Also explain:
- Preop Omeprazole
- Starvation instructions and energy drink on morning of surgery.
- PR Diclofenac

Basic requirements

- Anaesthetic machine and intubation equipment are checked at the beginning of each day.
- Functioning large-bore iv cannula (14g is preferred)
- No patient in the third trimester should be lying on her back. Either place a wedge under the R hip or 12°-15° L lateral tilt of the table to minimise aortocaval compression. In cases of fetal distress, the only reliable way to avoid aortocaval compression is the full left lateral position until immediately prior to surgery.
- Trained assistant
- Full (ECG, NIBP, pulse oximeter, ET CO2) monitoring prior to induction of anaesthesia.
WHO checklist – Safer Surgery

The WHO ‘Sign In’ ‘Time Out’ and ‘Sign Out’ checklist should be performed for every theatre case. Please include the checklist in the patient’s care plan.

Antibiotics

Refer to latest UHB MicroGuide under Guidelines for Specialty use only. Currently Cefuroxime 1.5mg and Metronidazole 500mg IV.

http://microguide.horizonsp.co.uk/viewer/cavuhsb/

Electives

- Elective patients are seen on the Day assessment unit for a short period the day before surgery, and then go home for the night. Please see as early as possible to avoid delay.
- Assess; prescribe and explain 2 doses of Omeprazole 20mg before surgery (usually 22:00 and 07:00).
- Sodium citrate can be omitted for elective CS under regional anaesthesia because it:
  - Contributes to N/V, especially if hypotension occurs.
  - May be ineffective if GA required >30 mins after beginning regional technique (e.g. conversion post-delivery).

Emergencies

Emergency LSCS fall into three categories agreed by RCA, RCOG and adopted by NICE/WRP

- Grade 1: immediate threat to life of woman or fetus
- Grade 2: maternal or fetal compromise which is not immediately life-threatening
- Grade 3: No maternal or fetal compromise, but needs early delivery

The decision as to which anaesthetic technique is most appropriate will depend on
1. Discussion with obstetricians as to urgency
2. Confidence and experience of anaesthetist
3. Patient factors such as recent solid intake, weight, airway assessment, coagulation studies, medical problems (PET, asthma)
4. Presence of working epidural

- Each patient must be individually assessed - medical problems should have been identified early in labour and, following discussion with senior SpR or consultant, a plan formulated.
- Full assessment (see above)
- Intravenous ranitidine if not given in labour (will take 30 mins to be effective but will help at extubation)
- Consider 10mg iv metoclopramide
- Sodium citrate 0.3M 30mls.
General Anaesthesia

The following is a recommended standard technique, which can be modified to suit special circumstances:

- Check suction/table tilt
- Ensure ranitidine 150mg po has been given within the last 2 hours or administer ranitidine 50mg IV as a slow bolus
- Give sodium citrate 0.3M 30mls
- Pre-oxygenate: apply O₂ via nasal cannulae at 4L/min and a tight fitting facemask >10 L/min 100% O₂ until ETO₂ >90%. Alternatively, 8 vital capacity breaths or 3 minutes. Ensure the head is correctly positioned, with flexion of the neck and extension of the head on the neck. 15° head up tilt will speed up pre-oxygenation
- Induction:
  - 5mg/kg (booking weight) thiopental
  - 100mg suxamethonium when unconscious; you may need more if mother is > 100kg. For PIH/PET add 20mcg/kg alfentanil immediately prior to thiopental and warn the paediatrician
  - Increase O₂ flow rate via nasal cannulae to 15L/min on loss of consciousness
- Cricoid force: 30N as soon as consciousness is lost (practice on scales: 1kg = 10N). Ideally bimanual with one hand supporting patient’s neck. Single-handed cricoid tends to reduce atlanto-occipital extension and may contribute to poor view at laryngoscopy. However, it has the advantage of freeing one of the assistant’s hands
- Maintenance: 50% O₂ in N₂O (or adjust FiO₂ to keep SpO₂ > 95%) and Isoflurane or Sevoflurane with overpressure to rapidly increase the ET agent. IPPV to ET CO₂ 35mmHg. Avoid hyperventilation. The resulting alkalosis will result in a left shift of the oxyhaemoglobin dissociation curve and may worsen or cause fetal hypoxia.
- Relaxation: Wait for suxamethonium to wear off, then give atracurium or vecuronium – see “Management of Hypertensive Disease of Pregnancy” for MgSO₄
- After delivery:
  - Give IV syntocinon 5 IU slowly after clamping of cord, with additional 5 IU if required
  - FiO₂ can be reduced to 0.3.
  - Give opioid of choice e.g. morphine 10-20mg IV +/- fentanyl 100mcg.
- During emergency GA LSCS consider trying to empty stomach by carefully passing a large orogastric tube and aspirating while manipulating tube. This should be removed before the end of the anaesthetic.
- Consider bilateral TAP blocks with 20ml 0.25% levobupivacaine each side OR bilateral Quadratus Lumborum blocks, as set out in Appendix 1.
- Prior to extubation, give PR diclofenac 100 mg (unless contraindicated) and IV paracetamol 1g.
• Extubation:
Reverse neuromuscular block, and extubate awake on left side. For obese patients the sitting position is acceptable. Patients with PIH/PET may become hypertensive at extubation- consider IV bolus of antihypertensive agent being used.

Postoperative analgesia

• Continuous epidural analgesia can only be provided if the mother remains on delivery suite and receives high dependency care.

• If mother has an epidural in situ give morphine 4mg through catheter, even if general anaesthesia has been given for the CS.

• If no regional block, give PCA morphine with 1mg bolus and 5 min lockout.

• Balanced analgesia:
  Diclofenac (unless contraindicated) 100mg po/pr 12 hourly for two days then 50 mg tds.
  (Diclofenac 100mg BD 2/7 followed by Diclofenac 50mg TDS 5/7)
  Paracetamol 1g QDS. This may need to be increased to Co-codamol on the second postoperative day. Consider Lactulose 15 mls BD for mothers receiving Codeine.
  Tramadol as per ‘spinal opioid’ sticker.
  Ondansetron 4-8mg PRN 8hrly for antiemesis.
Epidural LSCS - Fractionated top-up of epidural

Levobupivacaine 0.5%
OR
Lidocaine 2% +1:200,000 adrenaline (add 1ml of 1:10,000 adrenaline to 20mls lidocaine)
OR
Levobupivacaine 0.5% / lidocaine 2% with adrenaline as a 50:50 mixture

The adrenaline must be preservative-free.

- Add 50-100µg fentanyl to all mixtures
- Do not combine 2% lidocaine plain with levobupivacaine

A minimum of 20ml, in divided doses, of any of these mixtures is usually required to extend an epidural that has only had standard epidural top-ups for labour. Occasionally more local anaesthetic is required, and up to 30mls levobupivacaine may be used.

- The block from lidocaine usually starts faster than bupivacaine but can be less dense than bupivacaine and may wear off suddenly. If time is not too important then bupivacaine will give a more reliable block.

On the rare occasion that the anaesthetist needs to start the fractionated top-up in the delivery room before transfer to theatre, there must be a mechanism to measure the mother’s blood pressure and heart rate, and the anaesthetist must stay with the mother at all times and have ephedrine immediately available. Top-ups can only be started in the delivery room if the theatre is immediately available.

The block required for caesarean section:

- Test the block bilaterally for loss of cold sensation from S2 to above T4
- Loss of light touch on the soles of the feet up to T5
- Loss of motor power of hip flexion
- Reduced motor power of ankle flexion

- The adequacy of regional blockade must be fully tested before commencing surgery and clearly documented. Inadequate epidural or subarachnoid anaesthesia can then be more safely converted to general anaesthesia.

- O₂ via Hudson mask if SpO₂ <95%.
- Treatment of hypotension should be aggressive (see below).

- 4mg of morphine or 2.5mg diamorphine epidurally provides good postoperative analgesia. (Remember that the epidural filter and catheter have a combined dead space of 1ml)
- The epidural should be removed immediately postoperatively (provided platelets and clotting are satisfactory).
- If the epidural catheter is left in place for postoperative analgesia it is essential to time its removal to 12 hours after the last dose of Clexane.
Subarachnoid block for LSCS.

- Easy to perform even when time is limited.
- Produces a more reliable block compared with epidural anaesthesia.
- Greater incidence of hypotension than epidural blockade.
  - Position mother to avoid aorto-caval compression.
  - The mother must be placed in the full lateral position until the start of surgery if she gives a history of troublesome aorto-caval compression symptoms or if she has a multiple pregnancy.
  - Place pillow/wedge under head and shoulders to prevent excessive cephalad spread of block.
  - Give boluses of phenylephrine if the systolic blood pressure falls by 20% or if the mother feels nauseous or light-headed.
  - If the fall in BP is persistent then increase the tilt of the table or turn the mother into the full lateral position.

A useful technique is to introduce a long (12 cm) needle through a Tuohy needle inserted below L3, prior to feeding an epidural catheter (see CSE). However, a ‘single shot’ spinal technique is a well established, acceptable alternative.

Spinal anaesthesia should never be performed above the 3rd lumbar vertebra. For safety, the L3/4 interspace is preferred. Remember that assessment of spinal level is inaccurate and for that reason it is best to avoid the L2/3 inter-space as it may be L1/2 and consequently risk spinal cord trauma. Use the line between the iliac crest (Tuffier's line) as your upper margin for spinals and CSEs.

Fine pencil point needles (24-27 g Sprotte or Whitacre needles) should be used.

For obese mothers the 22g Sprotte (90mm, 120mm or 150mm) is very useful.

2.0 to 2.5 mls of heavy bupivacaine in combination with fentanyl 10 - 20µg and morphine 100µg usually provide an adequate block to T4 or above

In the event of an inadequate height of block after a ‘single shot’ spinal, an epidural catheter may be inserted (with patient in the lateral position) to extend the block.

Diamorphine 300 mcg is an acceptable alternative to the fentanyl/morphine combination (but see bacterial filter below).

Aspirate drugs from glass ampoules using a filter needle (the filter needle supplied in spinal packs is a 5 µm particle filter).

Because of the risk of contamination during aspiration, spinal drugs not in a wrapped, sterile ampoule should ideally be drawn up using a bacterial filter (0.2 µm).

Documentation should be as for an epidural.

Although the block is more reliable than epidural blockade, the block must be tested and documented in the same way as for an epidural.
Measures to prevent hypotension during regional anaesthesia

- CVS instability is more of a problem during subarachnoid anaesthesia.
- NIBP readings every 2 minutes during establishment of spinal anaesthesia and until the baby is delivered.
- Modest crystalloid pre-loading with up to 1 litre of Hartmanns solution is recommended.
- Aorto-caval compression is less in the lateral than in the supine wedged or tilted position. Therefore, the lateral position is preferred (changed from one side to the other to ensure a bilateral block) whilst the block is being established. If the wedge or tilted position is chosen then visible uterine displacement must be present.
- Phenylephrine is the preferred vasopressor – It is currently supplied prefilled as 50mcg/ml and can be titrated to effect. Phenylephrine may result in a reflex bradycardia.
- Alternatively use ephedrine 3mg/ml in 6mg boluses, particularly if the pulse rate is <70/min.
- Be alert to clinical symptoms and signs of sudden hypotension - light headedness, nausea, loss of colour, bradycardia
- Nausea is a common feature during LSCS under regional anaesthesia and its aetiology is multifactorial. In addition to acute hypotension and cerebral hypoperfusion, visceral vagal stimulation may be the cause. In such cases, IV cyclizine may provide symptomatic relief, usually given slowly after delivery. Intrathecal opioids also contribute to nausea.
- Beware of the 10mg/ml concentration of phenylephrine – if you find any ampoules on delivery suite please notify the consultant immediately.

Management of pain during CS under regional anaesthesia

- Establish whether patient is feeling pressure or pain. If in pain, the management will depend on the grade of the caesarean section, the type of regional anaesthetic and at what stage of the procedure the pain occurs.
- If the pain occurs before uterine incision, it is likely that general anaesthesia will be required.
- If pain occurs at uterine incision, the baby must be delivered without delay (before GA).
- If pain occurs after delivery:
  Give N2O/ O2 from anaesthetic machine via tight-fitting mask.
  If an epidural or CSE is in place, a further top-up can be given.
  Try incremental iv doses of short-acting opioid (fentanyl/alfentanil).
  If the pain occurs on wound closure, ask the obstetrician to infiltrate with lignocaine 1%
- The mother should always be asked whether she wishes to receive general anaesthesia. If the mother wishes it, then provided it can be carried out safely, inadequate anaesthesia should be treated with conversion to a GA.
- If general anaesthesia is offered but declined this MUST be documented on the anaesthetic chart.
Spinal anaesthesia after failed epidural blockade

- There is an increased incidence of high block when giving a spinal anaesthetic in this situation.

  If this anaesthetic has been chosen then there must be increased vigilance for:
  - Motor block in the upper limbs. NB the mother does not have a total spinal if she can squeeze the anaesthetist’s hand with hers.
  - Mother complaining of difficulty breathing.
  - Excessive sedation.

- If the epidural has failed because the catheter has fallen out and the last epidural top-up was more than 45 minutes before, then a usual spinal dose 2-2.5ml heavy bupivacaine can be used.

- If the epidural has failed after repeated epidural top-ups, then because fluid in the epidural space squeezes the CSF and reduces its compliance, a reduced spinal dose must be used. Reduce the amount of heavy bupivacaine by 25% and position the mother with an extra pillow or wedge behind her shoulders and head.

- Consider keeping the patient in the full lateral position to minimise aorto-caval compression

- If you are uncertain then it may better to give a controlled general anaesthetic.
Other Procedures Requiring Anaesthesia

Manual removal of placenta

Subarachnoid or epidural anaesthesia is the technique of choice. An adequate, dense block to T6 or above is required i.e. loss of light touch sensation to T8 (although the innervation of the uterus is no higher than T10, movement of the uterus within the peritoneal cavity, requires a higher block). If general anaesthesia is performed, routine anti-aspiration precautions and a rapid sequence induction should be carried out for the first 2 days after delivery.

Trial of instrumental delivery

Two scenarios may present themselves. In either case, communication with the obstetrician is paramount.

1. No epidural in place.

- It is suggested that a combined spinal/epidural technique is employed, so that in the event of the block being inadequate further doses of local anaesthetic can be administered through the epidural catheter.
- If there is a high likelihood of success, a low dose CSE eg. bupivacaine 5mg with 15µg fentanyl can be used to maximise maternal effort.
- If obstetric difficulty is anticipated, the delivery should be attempted in theatre with a spinal block suitable for caesarean delivery.
- Remember that even with a full caesarean spinal dose, the block will begin to wear off after 60-80 minutes. If prolonged attempts at vaginal delivery have been made before decision for caesarean section, then the spinal block may begin to wear off before the end of the operation. If in any doubt place an epidural catheter when doing the spinal injection.
- The CSE has the added advantage that the morphine can be omitted from the spinal injection and given epidurally if the instrumental delivery fails and a caesarean section is required.
- If a patient receives intrathecal morphine for what turns out to be an instrumental delivery they must be nursed in the appropriate area. The drug chart should clearly state that intrathecal morphine has been given and a clear hand-over given to the midwife.

2. Epidural already in place.

A modest top up, of 10ml of 0.25% bupivacaine + 25µg fentanyl or 15-20 ml of standard mixture should be adequate if the obstetrician is confident of being successful with the instrumental delivery. If there is any doubt, the epidural should be topped up as for LSCS.

Prophylactic Antibiotics

All the patients having instrumental deliveries should receive one dose of prophylactic antibiotics at the time of delivery.

Refer to latest UHB MicroGuide under Guidelines for Specialty use only.
Current practice is Augmentin 1.2gm IV, provided no patient allergy to penicillin.

http://microguide.horizonsp.co.uk/viewer/cavuhb/
Guidelines for the use of non-steroidal anti-inflammatory drugs after delivery

Background

- NSAIDs have been shown to reduce opioid requirements when combined with paracetamol after operative delivery.
- Concerns exist regarding their use in patients with known renal impairment / risk factors for its development.
- NSAIDs act by inhibiting cyclo-oxygenase, thereby inhibiting prostaglandin synthesis which leads to constriction of the afferent renal arteriole and consequently reduces renal perfusion pressure.
- The normal physiological changes of pregnancy are associated with a 40-50% increase in glomerular filtration rate, with a resultant decrease in serum creatinine and urea (table 1).

<table>
<thead>
<tr>
<th></th>
<th>Non-pregnant</th>
<th>Trimester 1</th>
<th>Trimester 2</th>
<th>Trimester 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urea (mmol/L)</td>
<td>2.5-7.5</td>
<td>2.8-4.2</td>
<td>2.5-4.1</td>
<td>2.4-3.8</td>
</tr>
<tr>
<td>Creatinine (µmol/L)</td>
<td>65-101</td>
<td>52-68</td>
<td>44-64</td>
<td>55-73</td>
</tr>
</tbody>
</table>

Table 1 – Values for urea and creatinine in pregnancy

- A creatinine which may be considered normal within the non-obstetric population may in fact indicate acute kidney injury (AKI) in a pregnant patient.

Recommendations

1) **NSAIDs should be avoided in patients with any of the following:**
   - Pre-eclampsia
   - Acute kidney injury of any cause
   - Reduced urine output
   - Pre-existing renal disease
   - Severe sepsis
   - Major obstetric haemorrhage
   - Thrombocytopenia/ platelet dysfunction

NSAIDs should only be prescribed for these patients when the renal function has returned to normal, urine output is adequate and any precipitating factors for AKI have resolved. The U+Es should be repeated 6 hours after delivery.

2) **NSAIDs should only be given after careful consideration in the following patients:**
   - Sepsis
   - Hypertensive disease
   - Diabetes mellitus
   - Obstetric cholestasis

If used, monitor closely for any signs of renal dysfunction

3) **Renal function should be checked 6 hours after delivery in patients with any of the following:**
   - Pre-eclampsia
   - PPH >1000ml
   - Sepsis
   - Reduced urine output
Management of Accidental Dural Puncture

If the epidural hasn’t been successful after 20 minutes or 3 attempts seek senior/more experienced help. Repeated attempts when in difficulty will increase the risk of a dural puncture.

CSF can usually be distinguished from local anaesthetic or saline by temperature (warm) and positive reaction to glucose testing.

- If the catheter can be easily threaded into the subarachnoid space, then do so and give a small dose of bupivacaine to establish adequate analgesia (2-3ml of standard epidural solution).
- Leave the catheter in place, clearly labelling it as "SPINAL", until after delivery, as this possibly reduces the incidence of spinal headache.
- All subsequent top-ups into the subarachnoid space should be from a 5ml syringe to maintain accuracy - all given by anaesthetist.
- If unable to thread the epidural catheter into the CSF then resite catheter in the interspace above and manage the epidural with intermittent top-ups - all given by anaesthetist.
- If the catheter punctured the dura, then leave in the subarachnoid space and use small top-ups of bupivacaine (as above) to achieve adequate analgesia - all given by anaesthetist.
- Explain to the mother and inform the obstetric staff.
- Inform SpR/consultant and document in anaesthetic workbook.
- There is no reason to depart from the normal management of the 2nd stage.
- If the catheter is resited following dural puncture, top up for CS must be carried out very carefully (use small increments of LA) due to risk of LA migration into the CSF through the dural puncture.

Post Dural Puncture Headache (PDPH)

A post-dural puncture headache (from whatever cause) is characteristically felt across the forehead radiating to the temples, occiput, or neck and is aggravated by the upright posture. It is variable in severity but may be quite incapacitating. If left alone it usually disappears within 7-10 days but if distressing, an epidural blood patch should be offered usually after 24-48 hours. It may be associated with hearing and visual disturbance.

- Exclude infection before considering any treatment
- Mild PDPH can sometimes be treated with sumatriptan 6mg SC or 50mg PO. Please note that mothers should discontinue breastfeeding for 24 hours following a dose of sumatriptan.
- If the headache is severe after 24 hours or persistent after 48 hours despite other treatments, consider a blood patch.
- Discuss case with Consultant on call.

Performing Epidural Blood Patch

Because of the theoretical danger of producing an epidural abscess, systemic infection is a contraindication to performing a blood patch. Check WBC, temperature and CRP. Note that the WBC may be raised after an operative delivery.

Explain the procedure to the patient including the risk of a second dural puncture and an estimate of the likely success: 75% of mothers will have significant relief after one patch, rising to 90% after three patches.
• Blood patch should be performed in the delivery suite (by a senior STR/Consultant) and requires the assistance of a second doctor to aseptically draw blood.
• Epidural performed under usual full aseptic conditions using a convenient interspace, ideally at the level of the previous puncture or one level below.
• When the epidural space is located, the second anaesthetist aseptically draws 30 ml of blood from the patient. The first anaesthetist then slowly injects up to 20 ml blood through the Tuohy needle retaining the remainder for blood cultures.
• Injection of blood must be stopped if mother complains of pain in her back or radiating down her legs.
• Afterwards the patient should remain in bed for at least 30 minutes before attempting mobilisation.
• The patient must be followed up regularly until discharge and the blood culture result chased to confirm no growth. If any problems, contact the senior SpR or Consultant.
• If the mother is well she may be sent home at 3 hours but she must know how to contact the obstetric anaesthetist.
  • A PDPH leaflet detailing the direct telephone numbers and who to contact on delivery suite, must be given to every patient with a suspected headache.
  • A letter to the GP must be completed on all suspected PDPH patients and patients who have received an epidural blood patch. The letter template is on the desktop of the PC behind reception.
• Phone patient at home the next day and record your findings in the diary.
• If blood patch fails to relieve headache, consider other causes.
Management of Total Spinal

Total spinal occurs when the block extends to the upper cervical dermatomes and brainstem which leads to respiratory failure, airway compromise, rapid desaturation and cardiac arrest if not managed swiftly.

**Causes**
- Total spinal may occur after any epidural top-up due to catheter migration from the epidural space to the subarachnoid space.
- If an epidural catheter is re-sited following an inadvertent dural puncture there can be flux of local anaesthetic from the epidural space into the subarachnoid space leading to total spinal.
- It may occur with a spinal injection following a failed epidural top-up (subarachnoid space is squeezed by volume of local anaesthetic already in the space).

**Presentation**
- The mother may initially complain of nausea and vomiting, tingling of the fingers, upper extremity weakness.
- This progresses to difficulty breathing (due to paralysis of intercostal muscles), followed by inability to speak (patient starts to whisper) and loss of airway reflexes (paralysis of cranial nerves). Respiratory arrest may occur without warning.
- Hypotension (due to blockade of sympathetic outflow T1-L2) and bradycardia (due to blockade of cardio-acceleratory fibres T1-T4) occur. If aortocaval compression is avoided she should not suffer complete cardiovascular collapse.
- The patient will then become unconscious if LA spreads to brainstem.

**Assessment and Management**
- Total spinal can be life threatening - call for senior help and manage in an ABC manner.
- Ensure adequate oxygenation with O2 and commence IPPV using bag and mask if hypoventilating.
- It is likely the patient will need intubating in order to prevent aspiration and ensure adequate oxygenation and ventilation. Intubate using standard precautions (induction agents and an intubating dose of muscles relaxant should be used).
- Treat hypotension with the lateral position, IV fluids and vasopressors. Treat bradycardia with IV atropine and consider sympathomimetic agent i.e. ephedrine or adrenaline (10 µg aliquots = 1ml of 1:100,000). An adrenaline infusion may be required to maintain a satisfactory BP and HR.
- If good cardiovascular stability has not been achieved after 5 minutes, the mother must have an immediate caesarean section.
- When mother is stable, check foetal wellbeing by means of the foetal heart rate.
- The duration of block depends on the type and dose of LA injected in the subarachnoid space.
- If the CVS and respiratory features of total spinal are recognised early and treated effectively the outcome for mother and baby is good.
Postnatal Neurological Review

Background
The majority of postnatal neurological complications are due to compressive neuropathy as a result of prolonged labour, patient positioning or mode of delivery. The temporal relationship between anaesthetic interventions and onset of neurological symptoms often means that anaesthetists are consulted early in the presentation of postnatal neurological deficit (despite the majority of nerve injury being related to factors other than regional anaesthesia). It is thus important to have knowledge of diagnosis, investigation and management of neurological injury.

Compressive Neuropathies

<table>
<thead>
<tr>
<th>Injury</th>
<th>Nerves affected</th>
<th>Common causes</th>
<th>Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumbrosacral plexus injury</td>
<td>L4/5, S1/5</td>
<td>Compression of lumbrosacral plexus against the sacrum by the head of the foetus</td>
<td>Sensory: Lateral aspect of thigh, lower leg and foot. Motor: Foot drop</td>
</tr>
<tr>
<td>Common peroneal neuropathy</td>
<td>L4/5, S1/2</td>
<td>Compression of common peroneal nerve over the head of the fibular (associated with lithotomy)</td>
<td>Sensory: Lateral aspect of lower leg and dorsum of foot. Motor: Foot drop Ankle reflex intact.</td>
</tr>
<tr>
<td>Femoral Neuropathy</td>
<td>L2/4</td>
<td>Forced flexion of hips causes the femoral nerve to be compressed against the inguinal ligament</td>
<td>Sensory: Anterior thigh and inner aspect of lower leg Motor: Weak knee extension. Weak knee jerk reflex.</td>
</tr>
<tr>
<td>Obturator neuropathy</td>
<td>L2/4</td>
<td>Compression of nerve by the foetal head or forceps. 25% bilateral, hence often confused for an intraspinal lesion.</td>
<td>Sensory: Inner thigh Motor: Weak hip adduction and internal rotation.</td>
</tr>
<tr>
<td>Perineal Nerve Injury</td>
<td>S3/5</td>
<td>Deep arrest of the foetal head</td>
<td>Saddle anaesthesia and bladder disturbance.</td>
</tr>
<tr>
<td>Sciatic Nerve Injury</td>
<td>L4-S1</td>
<td>Compression due to prolonged periods of sitting.</td>
<td>Sensory: Posterolateral thigh and leg Motor: Foot drop Ankle reflex may be weak</td>
</tr>
<tr>
<td>Lateral cutaneous nerve of thigh</td>
<td>L2/3</td>
<td>Compression of the nerve as it passes under the inguinal ligament (usually with prolonged lithotomy)</td>
<td>Sensory: Anterolateral aspect of thigh</td>
</tr>
</tbody>
</table>

Injuries related to regional anaesthesia

<table>
<thead>
<tr>
<th>Injury</th>
<th>Causes</th>
<th>Symptoms</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve root damage</td>
<td>Direct needle or catheter trauma or due to intraneural injection of LA</td>
<td>Pain or paraesthesia at time of insertion. Paraesthesia, pain, loss of sensation and muscular weakness in the distribution of the nerve.</td>
<td>If severe or persistent pain felt on insertion of epidural catheter, the catheter and needle should be removed.</td>
</tr>
<tr>
<td>Spinal cord damage</td>
<td>Direct damage to the conus medularis (usually L1 level).</td>
<td>Pain on needle insertion. Prolonged motor and sensory weakness at and below the level of injury. Can be unilateral or bilateral. May have urinary symptoms.</td>
<td>If pain on needle insertion or injection of LA then withdraw needle.</td>
</tr>
</tbody>
</table>
The conus medullaris usually ends at L1 but can be L2 (20% people).

### Epidural/Spinal haematoma
- Usually occurs in the epidural space. Nerve damage occurs due to compression of expanding haematoma.
- Back pain, nerve root pain, weakness and paralysis (late).
- Consider patient’s coagulation status and review any anticoagulation medication.

### Epidural/spinal abscess
- Causative organism usually staph aureus.
- Backache, nerve root pain, weakness, paralysis, fever, raised inflammatory markers.
- Warrants urgent MRI. Caution in placement of epidural in infection, especially if pyrexial (WCC may be raised in labour). Strict aseptic technique for epidural insertion.

### Arachnoiditis
- Inflammation of the arachnoid meningeal layer and subarachnoid space (association with chlorhexidine use).
- Pain and progressive symptoms of paraesthesia, numbness or leg weakness.
- AAGBI guidance on use of chlorhexidine for CNB.

### Meningitis
- Complication following dural puncture (spinal or CSE).
- Headache, fever, backache, nausea.
- Asepsis on insertion of CNB.

### Cauda Equina Syndrome
- Damage to cauda equina nerves due to compression or trauma.
- Backache, nerve root pain, saddle anaesthesia, paraplegia, sphincter dysfunction.
- As with CNB insertion. Observe cautions in patients with coagulopathies, bleeding disorders and anticoagulants.

### Assessment and management

Appendix 2 (postnatal neurological review) will aid assessment, management and investigation of postnatal neurological injuries/deficits. Rapid assessment of neurological injury should include appropriate history, examination and investigation.

**History**
- Neurological - including conditions predisposing to neuropathy e.g. backache, obesity, disc disease, diabetes, malignancy, coagulopathy, infection, previous trauma).
- Deteriorating symptoms or onset after a symptom free interval should be treated seriously (this implies changing pathology i.e. compression from enlarging mass).
- Labour/Mode of delivery - Instrumental delivery(type), posture during labour, use of retractors or diathermy, period of full dilatation, injections given by obstetrician, and hypotension.
- Drugs - particularly anticoagulants, steroids, hypoglycaemics.
- Anaesthetic - type of block, degree of technical difficulty, possibility of inadvertent dural puncture, bloody tap, spinal catheters, type/baricity/concentration of anaesthetic, additives, details of aseptic technique, site of injection, pain/paraesthesia during procedure.

**Examination**
- Full neurological examination including examination of the back.
Investigations

- If sinister symptoms elucidated (acute onset back pain, radicular leg pain, urinary and anal dysfunction, lower limb numbness and weakness) urgent MRI is required to exclude central lesion. Neurosurgical and neurology referral should also be considered.
- If nerve injury is suspected, nerve conduction studies and outpatient neurological review at 6 weeks postdelivery is appropriate. Early and close liaison with neurology should be considered.
Management of Hypertensive Disease of Pregnancy

Please familiarise yourself with the obstetric guidelines for the management of PET.

The key principles of anaesthetic involvement are:
- The anaesthetist should be aware of and involved in the management of all pre-eclamptic patients on the delivery suite. Do not wait to be invited but become involved early.
- Anaesthetic intervention on patients with severe hypertensive disease of pregnancy should first be discussed with the anaesthetic senior StR or consultant.

Blood pressure measurement in pre-eclamptic and eclamptic patients
- Always check blood pressure with 2 different devices (Dinamap and manual) before starting treatment.
- Obtain normal width, but long BP cuffs for obese woman with short but thick upper arms.
- In an obese woman where it is difficult to get accurate BP readings - have a low threshold to use an arterial line.
- When IV infusions are used to control BP consider the use of an arterial line.

General anaesthesia in PET
- General anaesthesia is hazardous because of potential for laryngeal oedema and an exaggerated pressor response to laryngoscopy and intubation.
- A microlaryngoscopy tube (or uncut size 5 or 6 tube) should be available to aid intubation in laryngeal oedema.
- The pressor response can be obtunded by adequate blood pressure control prior to induction and the administration of alfentanil 10-20 micrograms/kg (booking weight) at induction. The attending paediatrician should be informed of any opioid administration before delivery.
- Reduce dose of non-depolarising relaxant if MgSO4 given, and measure N-M block with peripheral nerve stimulator. MgSO4 may have to be continued into the recovery period.
- If general anaesthesia is required in a patient with severe pre-eclampsia, consider insertion of a central line when patient is asleep.

Regional anaesthesia in PET
- Epidural and spinal anaesthesia are contraindicated in the presence of abnormal coagulation. See below for guidelines on platelet counts.
- Hypotension secondary to spinal anaesthesia is less severe in preeclampsia (even in patients with severe PET). There is no more cardiovascular instability compared with epidural anaesthesia.

Oxytocic Agents and PET
- Mechanical methods to facilitate uterine contraction should be utilised
- Syntocinon is the drug of choice for uterine contraction in the setting of severe hypertension and should be titrated to haemodynamic responses.
- Ergometrine has been associated with hypertensive crisis and death in women with pre-eclampsia and should not be used.
- Misoprostol is associated with elevation in blood pressure (to a lesser extent than ergometrine).
Fluid balance in pre-eclampsia

Antenatal Fluid Management
Careful fluid balance is aimed at avoiding fluid overload. Total intravenous input should be limited to 80mL/hour (approximately 1mL/kg/hr). If syntocinon is used it should be at high concentration and the volume of fluid included in the total input. Oliguria at this point should not precipitate any specific intervention except to encourage early delivery. As these women are at high risk of caesarean section oral fluids should also be limited.

Anaesthesia and Fluids
Patients with pre-eclampsia tend to maintain their blood pressure, despite regional blockade. When this happens, fluid load is unnecessary and may complicate fluid balance. Hypotension, when it occurs, can be easily controlled with very small doses of ephedrine. In women with pre-eclampsia fluid requirements at caesarean section should be carefully considered and use of more than 500mLs of fluid, unless to replace blood loss, should be exceptional.

Postpartum Fluid Management (see Flowchart below)
The risk of death from pulmonary oedema is much greater than that from oliguric renal failure. The cause of pulmonary oedema in pre-eclampsia is often multifactorial; iatrogenic fluid overload, severe diastolic dysfunction, increased pulmonary capillary permeability and hypoalbuminaemia. Consequently, fluid restriction to 80mLhr⁻¹ (oral, drugs and IV fluid combined) is recommended for women with severe pre-eclampsia, provided there are no ongoing fluid losses. It is important to avoid excessive use of crystalloid solutions, and never >2 litres/day. After caesarean section, withhold Diclofenac for 6 hours until urine output and renal function have been reassessed. Consider TAP or Quadratus Lumborum blocks. Consider reducing volumes of infusions i.e. Syntocinon 40 units in 50mLs (instead of 500mL) and oral or PR Paracetamol instead of intravenous.

Fluid management requires frequent clinical assessment (RR, SpO₂, HR and BP) with meticulous attention to charting of input and output and calculation of fluid balance. Urine output should be recorded hourly and each 4-hour block should be totalled and recorded on the chart. Each 4-hour block should total in excess of 100 mL. If two consecutive blocks fail to achieve 100 mL then further action should be as follows (see also appendix 1):

1) If total input is more than 700mL in excess of output since delivery or in the last 24 hours (whichever is the shorter) then 20 mg of IV frusemide should be given
   OR
2) If total input is less than 700mL in excess of output since starting delivery or in the last 24 hours (whichever is the shorter) then 250mL of Gelospan over 20 minutes should be given.

The urine output should be recorded until the end of the next 4-hour block. If the urine output remains low, then 20mg of IV frusemide should be given. If after the frusemide a diuresis in excess of 250 mL occurs in the next hour the fluid should be replaced with 250mL of Gelospan in addition to baseline fluids. If the urine output fails to respond to frusemide in either situation then the patient should be reviewed by the consultant (if not done so already). If persisting oliguria, then the electrolytes need to be carefully assessed and checked six hourly and renal referral should be considered. If the woman has dropping oxygen saturation it is most likely to be due to fluid overload – a portable chest x-ray is probably the most sensitive detector of early pulmonary oedema.
Significant haemorrhage or HELLP needs to be managed by someone with plenty of experience. Cases requiring large volumes of colloid such as fresh frozen plasma, blood or platelets can easily lead to fluid overload.

**Algorithm for Fluid management in pre-eclampsia**

- **Admission/Delivery**
  - 80ml/hr Hartmann’s
  - UOP < 100ml/4hrs
  - Review fluid balance: If <50ml consider volume expansion using colloid (e.g. blood if indicated)
  - UOP < 100ml/4hrs & no signs of improvement
- If < 700ml/24hr balance:
  - Give 20mg iv frusemide
  - UOP < 25ml/hr
- UOP < 25ml/hr
- Consultant Review
  - Consider CVP line
  - Consider ITU admission

Continue 80ml/hr
Pre-eclampsia, coagulation, and regional blockade

Pre-eclampsia is commonly associated with a coagulopathy that may range from a mild thrombocytopenia to full-blown DIC. This clearly has implications for the use of neuraxial blockade in pre-eclamptic patients.

If the platelet count is >150,000, experience shows that coagulation will be normal. In reality, the obstetricians will probably check both platelet count and coagulation screen. If relying on just the platelet count before inserting an epidural/spinal in a patient with severe pre-eclampsia, the result should not be more than 2 hours old.

If the platelet count is <150 but >100 and the INR is ≤ 1.2, and APTT is within the normal range it is safe to proceed with neuraxial anaesthesia/analgesia.

If platelet count is <100, trainees should discuss epidural analgesia with consultant. However, you may proceed with spinal anaesthesia with a platelet count of ≥ 70. This assumes INR/APTT is ≤ 1.2

If in doubt, discuss the case with the consultant on call.

Obstetric Cholestasis, coagulation, and regional blockade

Patients with obstetric cholestasis are at risk of deranged coagulation secondary to vitamin K malabsorption.

All OC patients should have a coagulation screen on admission for induction, elective section and when admitted to delivery suite during labour.

DVT/PE prophylaxis and neuraxial blockade

Increasingly, patients with or at risk of DVT/PE are being treated with low molecular weight heparins such as enoxaparin, in doses ranging from 20 to 80mg per day.

<table>
<thead>
<tr>
<th>Most recent weight (kg)</th>
<th>Enoxaparin dose (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In patient</td>
</tr>
<tr>
<td>&lt;50</td>
<td>20mg OD</td>
</tr>
<tr>
<td>50-100</td>
<td>40mg OD</td>
</tr>
<tr>
<td>101-150</td>
<td>40mg BD</td>
</tr>
<tr>
<td>&gt;150</td>
<td>60mg BD</td>
</tr>
</tbody>
</table>

Conventional coagulation screens appear normal in patients treated with LMW heparin, and the anti-Xa assay is impractical as a clinical investigation prior to central neural blockade.

The following is a guide for insertion of epidurals or spinals:
- 20mg enoxaparin Wait 12 hours
- 40mg enoxaparin Wait 12 hours
- > 40 mg enoxaparin if >101kg, this is a prophylactic dose - Wait 12 hours
  If <100kg – Wait 24 hours
- **5000U SC heparin**  
  Wait 12 hrs or do clotting screen.  
  If normal, it is safe to proceed before 12 hours.

- **Heparin infusion**  
  Stop, check KCCT after 90 minutes.  
  Discuss with senior anaesthetist

The above guide also applies to the removal of epidurals.

For DVT/PE prophylaxis after LSCS, the first dose of enoxaparin can be safely given 4 hours following the spinal/CSE procedure or removal of the epidural catheter.

If an epidural or spinal has been performed in association with heparin of any type, then close follow up of the mother is essential to recognise any neurological problems early.

Below is the comprehensive table from the 2013 AAGBI guidelines for regional anesthesia in patients with problems with coagulation.
Cardiac Arrest

**Background**  
Cardiac arrest is rare in pregnancy; it is estimated to occur once in every 30000 deliveries.

Significant changes in maternal physiology occur in pregnancy, with increases in cardiac output, blood volume, minute ventilation and oxygen consumption. Furthermore, the gravid uterus may cause significant compression of iliac and abdominal vessels when the mother is in the supine position, resulting in reduction in cardiac output and hypotension.

It is also important to recognise that the aetiology of cardiac arrest may be different and includes amniotic fluid embolism, pulmonary embolism, eclampsia, drug toxicity (magnesium sulphate, local anaesthetics), congestive cardiomyopathy, aortic dissection, trauma and haemorrhage.  

Prompt consideration of immediate Caesarean section (within 5 min of arrest) must be made. This may improve the outcome for both mother and foetus.

**Key interventions to prevent arrest**  
Place pregnant patient in the left lateral position (or manually displace uterus).  
Give 100% oxygen  
Give fluid bolus  
Immediate re-evaluation of any drugs being administered

**BLS modifications**  
Relieve aortocaval compression by manually displacing gravid uterus or using a wedge (pillow, rescuers' knees or upturned chair)

**ALS modifications during arrest**  
Standard ALS practice applies to the pregnant patient with the following modifications:  
- The patient must be resuscitated with a left lateral tilt of at least 15 degrees to minimise aortocaval compression  
- Perimortem C-section should be commenced within 4 mins of arrest and accomplished by 5 mins (relieves aortocaval compression thus improving venous return and encourages transfusion of blood from placental bed).  
- Consider possible aetiologies e.g. MgSO4 overdose (treat with IV calcium).  
- Involve obstetric and neonatal personnel wherever possible (especially if >20 weeks gestation).
Resuscitation following bupivacaine toxicity

There is increasing evidence from the literature to suggest that an infusion of intralipid can help in the resuscitation of patients suffering cardiac arrest as a result of bupivacaine toxicity.

LipidRescue™
TREATMENT FOR LOCAL ANAESTHETIC-INDUCED CARDIAC ARREST
PLEASE KEEP THIS PROTOCOL ATTACHED TO THE INTRALIPID BAG

In the event of local anaesthetic-induced cardiac arrest that is unresponsive to standard therapy, in addition to standard cardio-pulmonary resuscitation, Intralipid 20% should be given IV in the following dose regime:

- Intralipid 20% 1.5 ml/kg over 1 minute
- Follow immediately with an infusion at a rate of 0.25 ml/kg/min,
- Continue chest compressions (lipid must circulate)
- Repeat bolus every 3-5 minutes up to 3 ml/kg total dose until circulation is restored
- Continue infusion until haemodynamic stability is restored. Increase the rate to 0.5 ml/kg/min if BP declines
- A maximum total dose of 8 ml/kg is recommended

In practice, in resuscitating an adult weighing 70kg:

- Take a 500ml bag of Intralipid 20% and a 50ml syringe.
- Draw up 50ml and give stat IV x 2
- Then attach the Intralipid bag to a giving set and run it IV over the next 15 minutes
- Repeat the initial bolus up to twice more – if spontaneous circulation has not returned.

If you use Intralipid to treat a case of local anaesthetic toxicity, please report the case at www.lipidrescue.org and ensure that a new bag of Intralipid replaces what’s been used.
Management of Post-Partum Haemorrhage

Introduction

The process of childbirth is inexorably associated with risk of maternal haemorrhage. Physiological adaptations occur during pregnancy to help the body cope with haemorrhage.

Estimated blood volume rises 40% from non-pregnant levels to 100 ml/Kg at term (an average 70 kg woman-total blood volume of 7000 ml).

The pregnant woman is in a hyper-coaguable state. Apart from FXI and FXIII, plasma concentrations of all the clotting factors and fibrinogen increase during pregnancy. The normal range of fibrinogen rises to 4-6g/L at term.

Uterine blood flow at term rises to 700 ml per minute, hence when PPH occurs blood loss can be very rapid, resulting in a quickly deteriorating patient requiring effective teamwork to resuscitate.

Definitions

Primary PPH loss of 500 ml or more of blood from the genital tract within 24 hours of birth
Secondary PPH occurs after this time
PPH is classed as minor (500–1000 ml) or major (more than 1000 ml)
Severe obstetric haemorrhage is generally defined as an estimated blood loss >1500 ml, peripartum fall in haemoglobin concentration >40 g/l, or acute transfusion of 4 or more units of blood.

'Usual' blood loss associated with vaginal birth is 300-500ml. For caesarean delivery this is up to 1000ml.

Any patients showing signs of shock should be treated as for massive obstetric haemorrhage. However, other causes such as inverted uterus, amniotic fluid embolism, ruptured uterus and sepsis must be considered.

Causes of PPH

Causes of PPH can be largely divided into 4 categories. There will often be contribution from more than one of these to any bleed. It is useful to use the pneumonic of the 4 T's

1) Tone  Failure of uterine contraction, or atony. A well contracted uterus will physically tamponade and crush vessels to stop bleeding. This is a common cause of PPH.

2) Tissue  Retained products within the uterine cavity need to be removed to allow uterine contraction and haemostasis

3) Trauma  Tears and lacerations to tissue will often bleed until surgically repaired
4) *Thrombin*  
Impaired ability of the blood to clot due to an impairment of the coagulation system. This is *important to identify and correct* to allow haemostasis to occur.

Although it can be unexpected a large number of PPH can be predicted and it is therefore important to identify mothers with risk factors for haemorrhage. *Many women on the consultant led unit will have one or more risk factor and haemorrhage in these women should be anticipated and acted upon.*

**Risk factors for PPH**

These can be classified in terms of the 4T’s

1) **Atony**  
Grand multip, induced labour, syntocion augmentation, obstructed/ prolonged labour, uterine overdistension (macosomia /multiple births/ polyhydramnios), fibroid uterus, previous PPH

*Remember-* other causes of obstetric haemorrhage will often result in uterine atony, thus compounding the problem

2) **Trauma**  
Perineal tears, instrumental delivery, caesarean section- particularly emergency at full cervical dilation, difficult foetal extraction

3) **Tissue**  
Retained placenta/ membranes  
Abnormal placental implantation- praevia, accreta, percreta  
*There is increased risk of accreta in patients with placenta previa and previous caesarean delivery. Women with placenta accreta/percreta are at very high risk of major PPH.*

4) **Thrombin**  
There are multiple causes of coagulopathy which should be considered. Coagulopathy may precede the haemorrhage and be causal or develop secondary to the haemorrhage as a consequence of consumption and dilution of clotting factors. Profound coagulopathy may occur in placental abruption, especially when associated with an intra-uterine death. Other causes include HELLP, severe sepsis and amniotic fluid embolus.

**Risk factors for PPH should be documented in the OBS Cymru risk assessment and amended during labour if they alter.**

In any woman identified as being at increased risk of haemorrhage:

- *Ensure blood is available from blood bank-* either with 2 appropriate BBS samples to enable electronic issue of blood, or by requesting cross matched blood where electronic issue is not available.
- *Ensure adequate venous access is in place*
- *Ensure team awareness and planning for high risk cases*
- *Plan for active management of the 3rd stage*
- *Consider setting up cell salvage, fluid warmers and rapid infusion devices in theatre*
Management of Obstetric Haemorrhage

The OBS Cymru paperwork is present in every mothers’ notes (Appendix 1). This should act as the documentation and checklist for management. There is also a PPH protocol poster on the wall in each theatre (Appendix 2).

Remember
- Young and fit patients compensate very effectively for hypovolaemia. They will become peripherally shut down (capillary refill > 2 seconds) and tachycardic
- Hypotension is a late sign of haemorrhage
- Hypotension must be assumed to be due to haemorrhage until proven otherwise
- Large amounts of blood loss can be concealed in the abdomen, uterus and vagina

Uterotonic drugs

Active management of the 3rd stage

Vaginal birth
- Mothers with no risk factors for PPH should receive 10IU syntocinon IM (unless CI)
- Mothers with any risk for PPH should receive syntometrine 5/500 IM (unless CI)

Caesarean birth
- Mothers should receive 5iu slowly IV. In women with major cardiovascular disease a bolus may cause severe hypotension and an infusion may be indicated
- In high risk cases, an infusion of 40iu syntocinon to run over 4 hours may be prescribed. The usual dilution is 40iu in 500ml Hartmann’s solution (125ml/hr). The volume can be reduced if appropriate.

PPH management

Vaginal birth
- Syntometrine 5/500 IM (Max dose ergometrine 1000mcg, avoid in PET)

Caesarean birth
- Syntocinon
  - A second dose of 5IU syntocinon may be appropriate in emergency caesarean section cases when patients have received IV syntocinon during labour
  - An infusion of 40iu syntocinon to run over 4 hours may also be prescribed.
- Ergometrine
  - Dilute 500 mcg in 20 ml normal saline and administer slowly IV. It is strongly emetogenic so give after/with an antiemetic. Max dose 1000mcg, avoid in PET – may cause severe hypertension

All births
- Carboprost
  - Intra-muscular dose 250mcg every 15 minutes (Max 8 doses), avoid in asthma, may cause hypotension and fever
- Misoprostol
  - PR administration 800mcg

Once haemorrhage is on-going it is vital that a tally of on-going blood loss is kept, enabling timely action. Ensure swabs and clots are weighed and blood volume in the suction is measured. The tally should be documented on the OBS Cymru paperwork and communicated to the team.
OBS Cymru Stage 2 action: 1000ml blood loss with ongoing bleeding or clinical concern
- Ensure adequate venous access
- Take blood for: FBC, clotting x 2 (one for the lab and one for ROTEM), cross-match (if not already sent), U&E and a venous blood gas. This will give you an immediate value for Hb and acid-base status of the mother.
- Give tranexamic acid 1g

OBS Cymru Stage 3 action: 1500ml blood loss with on-going bleeding OR 1000ml blood loss with on-going bleeding AND FIBTEM A5 of <12
- Ask the Bank 7 Coordinator to activate the ‘massive obstetric haemorrhage protocol’
- Inform Consultant Anaesthetist
- Consider asking the Cardiac anaesthetist for help if immediate assistance is required

Activation of the massive obstetric haemorrhage protocol
The Band 7 Coordinator should activate the ‘massive obstetric haemorrhage protocol’
This will include alerting:
- a. The Obstetric Emergency Team
- b. The Blood bank ‘massive obstetric haemorrhage protocol’
- c. Porters via Portertrac
- d. A Vocera™ broadcast can also be used to alert labour ward staff. (Appendix 3) NB: using Vocera™ broadcast does NOT alert any of the laboratories or the porters (Appendix 4)

Blood bank will release 2 units of red blood cells on activation of the protocol. These can be collected by the porter and will be available in a bag to be used within 30minutes. A further 4 units of red blood cells will be made available and remain in blood bank until requested by the clinical team.

All coagulation products should be requested following the ROTEM protocol (Appendix 5). No coagulation products are thawed automatically.

Close communication between blood bank and the clinical team is essential. Once the massive obstetric haemorrhage protocol has been activated, the extension 41229 is available at all times.

Team roles

Delivery Suite Co-ordinator
Ensures all relevant staff are aware of protocol activation
- Contact porters via Portertrac, The Obstetric Emergency Team and Blood bank
- Direct manual delivery of samples via porters
- Notify labs that samples have been sent and ensure they have received samples
- Contact consultant obstetrician and anaesthetist if not already done
- Ensure on-going measurement of blood loss
- Confirm documentation taking place
- Inform switch board (if not already done) and main theatres
Anaesthetists and ODPs

- ABC assessment, consider oxygen
- Wide bore IV access
- Bloods – FBC, Coag x2 (ROTEM and lab samples) X-match, U&E, venous blood gas.
  - Repeat bloods every 500ml blood loss, after administration of coagulation products or if clinical concern
- Consider uterotonics (See above)
- Liaise with blood bank re products required

Unless otherwise advised, on being informed of Major Obstetric Haemorrhage blood bank will release 2 RBC
- Prepare Level 1 infuser
- Tranexamic acid 1g
- Consider cell salvage
- Maintain temperature with warmed fluids and Bair hugger
- Arterial line
- Ensure normal calcium

Obstetricians

- Identify source of bleeding (4 T’s)
- Consider
  - Bi-manual uterine compression
  - Uterotonics (See below)
  - Pressure and packing
  - Intra-uterine balloon tamponade
  - Haemostatic suture
  - Tisseel spray
  - Arterial ligation
  - Radiological embolisation (if CV stable)
  - Hysterectomy
- Liaise with gynaecology consultant (if hysterectomy)
- Liaise with vascular consultant (if arterial ligation)
- Liaise with radiology (if embolisation possible)

Surgical options

- EUA
  - On-going bleeding consider EUA to check for retained products and / or trauma
- Packing and pressure
- B-Lynch suture
  - On-going bleeding with atony then consider exploratory laparotomy and insertion of haemostatic brace suture (eg. B-Lynch suture)
  - Have a low threshold for insertion of haemostatic brace suture with atonic PPH at caesarean section
- SOS Bakri Balloon
  - Consider insertion of SOS Bakri Balloon for bleeding from lower uterine segment following placenta praevia
- Hysterectomy
  - Potentially life saving
  - Usually quicker and safer than internal iliac artery ligation
  - Decision to be made and surgery carried out by Consultant
Anaesthesia for major obstetric haemorrhage

- Careful consideration must be given to the anaesthetic choice
- Patient may have a strong preference
- Massive haemorrhage and haemorrhage with strong suspicion of coagulopathy are both indications for GA, however, remember volatile anaesthetics will make uterine atony worse
- If epidural in-situ then it is reasonable to use this
  - Useful to be able to discuss decisions about care with the awake patient eg. need for hysterectomy
  - GA “on top of” regional may make haemodynamic instability worse
- If time allows and no coagulopathy CSE would be the regional technique of choice
  - Gives good density of block for surgery
  - Duration of block can be extended for long surgery
  - Can communicate with patient

Fluids

- If crystalloids used will need to give 3 times as much volume as blood lost
- Transfuse blood to maintain Hb at 8 when haemorrhage is on-going
- Times for blood to be available from lab after receipt of sample. This does NOT take into account portering time to /from lab
  - O Negative: Almost immediate
  - Electronic issue: 5 minutes
  - Group specific: 10 minutes
  - Fully cross matched: 45 minutes, longer with antibodies

Coagulation products

- Give 1g IV bolus of tranexamic acid at 1000ml ongoing blood loss.
- Follow the OBS Cymru ROTEM protocol for administration of blood products UNLESS patient has severe sepsis (in which case liaise with consultant coagulation haematologist)

Monitoring / IV access

- All patients must have minimum mandatory monitoring
- All patients must have a urinary catheter to measure hourly urine output
- If haemodynamically unstable consider an arterial line for monitoring and sampling. Do not delay resuscitation or surgery to site this
- 2 large bore (14G) peripheral cannulae are the IV access of choice for resuscitation
- If IV access in the peripherally shut-down patient is difficult consider using intra-osseous (IO) access as a temporising measure. The EZ-Io kit is in the ODP room in theatres. Blood may be taken from the IO needle for cross match and FBC, although platelet count may be unreliable. It is unsuitable for assessment of coagulation or blood gas analysis. Alternatives for emergency vascular access are requesting a surgical cut-down or external jugular cannulation.
- CVP is seldom necessary in healthy patients but consider in patients with difficult IV access

On-going Care

- Once the patient is haemodynamically stable, adequately resuscitated and bleeding is controlled consideration needs to be given to on-going level of care i.e. HDU / ICU
- The team plan should be discussed at the WHO sign out and documented in the OBS Cymru post event checklist
Consideration should be given to:
- Safety of extubation
- Analgesia
- Anti-emetics
- Timing of epidural removal (ensure clotting normal and no risk of further bleeding)
- Enoxaparin dosing

- If the patient is acidic, hypothermic, coagulopathic or oliguric then it may be appropriate for them to remain intubated whilst these are corrected

All patients should have at least HDU level care after a major haemorrhage >1500mL
- HDU chart including: 15 minutely NIBP, HR, Oxygen Saturations, Resp Rate; Hourly blood loss and urine output, temperature, analgesia and nausea and vomiting scale and close monitoring of PV loss, Backri and drains
- Re-check bloods FBC, coag, lactate, (possibly ROTEM) 4-6 hours after bleeding episode or earlier if unstable
- NSAIDs should be avoided initially until urine output is adequate and renal function and coagulation is confirmed as normal
- Remember thromboprophylaxis. All patients need TEDs. Prescribe appropriate dose for 6 hours post epidural catheter removal once haemodynamically stable.

Debrief for patient and relative - Senior anaesthetic and obstetric doctors should update the relatives and patient as soon as is feasible

1. RCOG “Heavy bleeding after birth (postpartum haemorrhage) - information for you.”
http://www.rcog.org.uk/womens-health/clinical-guidance/heaving-bleeding-after-birth-postpartum-heimorrhage-information-
Interventional Radiology for Obstetrics

**Intervention options** (requires discussion between Consultant Anaesthetist, Radiologist and Obstetrician):

1. Internal iliac/aortic balloon placement on labour ward theatre to reduce bleeding and enable surgical control and or stabilisation of patient prior to transfer to radiology suite for embolization (remote site, patient must be stable).
2. Transfer to radiology suite for balloon placement and embolization (remote site, patient must be stable).

**Specific considerations for providing anaesthesia**

1. Potentially long duration of anaesthesia required
2. Potentially unstable patient
   a. Monitoring, blood products
3. Need to minimise patient movement once femoral catheters are inserted
4. Options:
   a. GA
   b. Epidural top-up (be prepared for conversion to GA at any stage)
5. Post-operative analgesia
6. Post-operative monitoring in appropriate area

**Emergency**

Indication: PPH

Institute massive haemorrhage protocol
Obstetric and Anaesthetic Consultants should be present
Contact Radiologist on call via switchboard (Interventional Radiology 24hr on call rota)

**Elective**

Indications: Abnormal placental implantation with expected PPH
Any other indication for major PPH

**Communication:**

1. Delivery date
2. MDT (2-3 weeks prior to planned delivery date)
   a. Anaesthetics, Obstetrics, Midwifery, Radiology to be present.
   b. Delivery plan documented in patient notes (green sheet) and anaesthetic plan (white sheet) and in folder on delivery suite.
   c. Consider whether other surgical specialities need to be involved.
3. Discussion with neonatology
Preparations:

1. These patients will be identified antenatally and so should have consultant input in planning the timing and location of interventions and delivery.
   a. Max 1 additional elective LSCS to be booked on chosen date of delivery
2. Major PPH should be expected and planned for.
   a. Ensure availability of cell salvage, Level 1 transfusion device, patient warming, blood bank, porters.
3. Radiology, obstetric and anaesthetic consents to be completed prior to any intervention.
4. Ensure team briefing prior to any intervention:
   a. Discuss labour ward workload and prioritisation of deliveries.
   b. Plan for designated team of midwifery, obstetric and anaesthetic support in radiology suite
   c. Complete WHO checklist
   d. Continuous foetal monitoring
   e. Routes of contact for labour ward coordinator
   f. Theatre availability during radiology intervention
   g. Awareness and preparation for emergency LSCS in radiology suite/transfer to theatre
5. Anaesthetic options and considerations:
   a. Need to be ready for a GA at all times
   b. Intervention catheters placed under LA and then patient returns to theatre for GA (need to consider post op analgesia – TAP catheters/blocks and morphine PCA)
   c. CSE or epidural alone (low dose spinal if CSE, morphine in epidural component, aggressive treatment of hypotension)
   d. Large bore cannulae and arterial line placed prior to intervention
   e. Urinary catheter inserted prior to transfer to radiology suite
   f. Close attention to left tilt prior to delivery
6. Intraoperative
   a. Plan regarding balloon inflation and how to contact Interventional Radiologist if haemorrhage occurs despite balloon inflation
   b. Close monitoring and treatment of patient parameters (cardiorespiratory, haematological etc)
PPH: Appendix 1 OBS Cymru Checklist

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>PPH Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most recent haemoglobin (Hb)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>&gt;500ml ongoing bleed loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Help</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBS Cymru 1000 Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
</tr>
</tbody>
</table>
Massive Obstetric Haemorrhage Flow Chart
Cardiff and Vale UHB

>1.5L PPH with on-going blood loss
or
Clinical suspicion of major on-going blood loss

- Contact delivery suite team – Senior Obstetrician, Senior Anaesthetist, Delivery Suite Co-ordinator
- Ask Delivery suite co-ordinator to activate the massive Obstetric Haemorrhage protocol
- Consider transfer to theatre

Anaesthetists & ODPs
- ABC, Oxygen
- 2 large bore IV access
- Bloods – FBC, Coag, U&Es and Venous Blood Gas
- Uterotonics
- Liaise with blood bank
- Transfusion acid 1g
- Consider Coll salvage and level 1 infuser
- Warm patient
- Consider Arterial line
- Consider haemostasis advice
- Normalise calcium

Delivery Suite Co-ordinator
- Inform switch board via 2222 that ‘Obs Emergency Team’ is required
- Contact Blood Bank via 41229 in hours or via 3333 out of hours to activate massive obstetric haemorrhage protocol
- Contact porters via Portertrac
- Inform cons anaesthetist + obstetrician
- Direct delivery of blood samples and notify labs that urgent samples have been sent
- Ensure Obs Cymru documentation in progress
- Ensure gravimetric blood loss measurement and confirm ongoing tally of blood loss
- Inform main theatres

Obstetricians
- Identify source of bleeding (4T’s)
- Consider:
  - Bi-manual uterine compression
  - Uterotonics
  - Pressure and packing
  - Intracavity balloon tamponade
  - Haemostatic suture
  - Arterial ligation
  - Radiological embolisation
  - Hysterectomy
- Liaise with vascular surgeons
- Liaise with radiology
- Liaise with Gynae Consultant

Uterotonics
- Syntocinon
  - 5 Units slow IV
  - IVI 40 Units over 4 hours
  - Consider 2nd 5 Units bolus
- Ergometrine
  - 500 mcg – for C/S
  - Slow IV in 20 ml saline
- Syntometrine
  - 5/500 IM – for vaginal delivery
  - Maximum 1000 mcg
  - Avoid in PET
- Misoprostol
  - PR 800 mcg
- Carboprost
  - IM 250 mcg
  - Every 15 min
  - Maximum 4 doses
  - Avoid in asthma

Massive Haemorrhage Dedicated Phone
Ext 41229 in hours or hours fast bleep via 3333
Blood Bank Ext 42157 Bleep 5268
Haematology Ext 45087 Bleep 5269

Useful phone numbers
- Massive Haemorrhage Dedicated Phone: Ext 41229 in hours or hours fast bleep via 3333
- Blood Bank: Ext 42157 Bleep 5268
- Haematology: Ext 45087 Bleep 5269

Portertrac
- Select ‘Massive haemorrhage’ task
- In comments box state:
  - Patient’s full name, DoB, hospital number, 1st line of address
  - Porter to remain dedicated to delivery suite until stood down

Availability of blood products
- Cross-matched Blood
  - 30 min
- Group specific Blood
  - 10 min
- Electronic Issue
  - 5 min
- O-negative Blood
  - 5 min
- Fibrinogen
  - 5 min
- FFP
  - 20 min

COAGULATION
- Refer to ISTH protocol
- Platelets
  - >75
- APTT ratio: within normal range
- Haemoglobin: >8

Post-op considerations
- Hb on ICU
- Timing of epidural removal
- TESS, Encapsol
PPH: Appendix 3 Vocera™ Broadcast

This can be done to rapidly alert all users within the delivery suite team that carry a Vocera™

- Anaesthetic 1st on-call
- Anaesthetic 2nd on-call
- Anaesthetic consultant (During working hours)
- Obstetric junior registrar
- Obstetric senior registrar
- Obstetric consultant (During working hours)
- Delivery Suite Co-ordinator
- Advanced midwifery practitioner (If available)
- 2 Operating department practitioners

To do this

- Push the call button
- Wait for the prompt
- Say “Urgent Broadcast to Delivery suite”
- Then state “Major Obstetric Haemorrhage” followed by location of patient (repeat once more)
- i.e. “Major Obstetric Haemorrhage, room 8, consultant led unit”

Note using this does NOT alert any of the laboratories or the porters

PPH: Appendix 4 Portertrac

- Select “massive haemorrhage” task

- In comments box state patient’s full name, date of birth, hospital number and first line of address

- State where you want porter to go and what to do
  e.g. “Porter to take urgent blood samples from delivery suite to lab and return with 4 units red blood cells”

  Porter to remain dedicated to delivery suite until further notice
PPH Appendix 5: Algorithm for the use of FIBTEM during PPH follows:
Difficult and Failed Intubation

**Pre-operative Assessment**
Ideally potentially difficult patients should be flagged up before it becomes an emergency.
Clinical assessment of airway and risk of difficult intubation (can be performed in a matter of seconds):
• Mouth opening (should be greater than 5 cm or three finger breadths)
• Mallampati view (pharynx should be visible)
• Jaw slide (should be able to push the lower incisors anterior to the upper incisors)
• Neck movement (full, unhindered range of at least 90°)
• Weight (original 'booking' weight less than 90 kg)
• Evidence or possibility of laryngeal swelling (severe pre-eclampsia or URTI)
If two or more of the above are abnormal - avoid general anaesthesia and/or summon senior help.
The findings should be recorded on the anaesthetic procedure chart.

**Equipment that Should be Immediately Available:**
Get into the habit of checking before every C-section.
• Selection of laryngoscopes - disposable CMAC and conventional laryngoscope blades, including short-handled or polio blade
• Selection of tracheal tubes (including microlaryngeal tube or uncut size 5 tube)
• Gum elastic bougie with selected tracheal tube already threaded on/or stylet inserted down a prepared ETT
• Selection of oral and nasal airways
• Laryngeal mask airway (size 4)
• Surgical airway kit
It is advisable for you to rehearse the use of these items of equipment BEFORE using them in an emergency. (See VORTEX model)

**Standard Precautions at Induction of Anaesthesia:**
• Ensure adequate pre-oxygenation (this 'buys' time if a problem is encountered) – use nasal specs and THRIVE is available.
• Ensure proper positioning of patient – ideally head up, with head in best position, breasts not pushed into midline by folded-up arms) – this may require pillows under the shoulders as well as the head, but can usually be optimised using the operating table. The chin should be above the height of the breasts. Beware the inadequate spinal.
• Ensure adequate skilled assistance
• Ensure adequate equipment (see above)
• Ensure all are briefed including what to do if things go wrong
• Optimise the ergonomics-if using a CMAC (recommended), try and position the screen as close to the belly of the patient as possible.
• Rapid Sequence Induction

**Problems That Might be Encountered:**
Insertion of the Laryngoscope may be impossible because of:
• Suboptimal head and neck positioning. Ensure this is optimised prior to induction of anaesthesia.
• Cricoid hand in the way (adjust without releasing). Some anaesthetists advocate the application of cricoid pressure from the left side of the patient to avoid this problem.
• Breasts in the way (retract breasts or use short-handled or polio blade laryngoscope) – use a rotational technique i.e. left molar approach – see below
• Relaxant has not had time to work (wait – note the time the relaxant is injected)
• Muscle rigidity (could be malignant hyperthermia or can ordinarily occur with suxamethonium)
• Undiagnosed anatomical abnormality (should have been identified in pre-operative assessment)
• If unable to insert the laryngoscope, abandon attempts and proceed to Failed Laryngoscopy/Intubation Drill.

View at Laryngoscopy may be restricted:

Practice using the D-Blade CMAC routinely
• If only the epiglottis is visible, use bougie with a smaller than usual tube, e.g. size 6.5mm, and the tube should be rotated through 900 degrees anticlockwise to aid passage through the larynx.
• If epiglottis is not visible, try moving the hand applying cricoid, from left to right while maintaining a 'view' of the larynx. Cricoid pressure that is not applied directly into the midline can push the larynx left or right. If still no view try releasing the cricoid pressure momentarily.
Over vigorous application of cricoid pressure can occlude the cricoid ring and distort laryngeal anatomy. If still not visible, reapply cricoid pressure and abandon attempts at intubation.

Even if the glottis is visible, be prepared for laryngeal/tracheal swelling and have a selection of tracheal tubes readily available.

If intubation has been achieved without full visualisation of the glottis, check tube position very carefully, confirming tracheal position by observing adequate capnography trace during a number of breaths (ideally 6) and if in any doubt, take it out!

Maintain cricoid pressure until completely satisfied with the position.

If intubation is deemed impossible, ask someone to contact senior assistance for help, and proceed to Failed Intubation Drill. Give clear, concise instructions and remain calm. Alert everyone in theatre that you have a problem.

The use of a video laryngoscope i.e. in our unit a disposable CMAC, the D-blade can increase the chance of success, but practice using beforehand on the manikin. Additionally the left molar approach both with a video and conventional laryngoscope can improve your chance of a successful intubation.

Failed Intubation Drill (unable to insert laryngoscope or intubate):

OXYGENATE  OXYGENATE  OXYGENATE

• Act quickly, do not waste time with further attempts
• Do not give more suxamethonium. If the first dose did not help, why should a second?!
• Maintain cricoid pressure
• Do not turn - it is easier to maintain the airway and ventilate in the supine position. The cricoid pressure will protect against regurgitation
• Attempt to ventilate the lungs with 100% oxygen
• If able to ventilate, consider the urgency of the situation with regard to possible options (see later)
• If unable to OXYGENATE, proceed to CICO Drill (Can’t Intubate, Can’t Oxygenate)
CICO (Ref 3):
The objective is to ensure above all else, adequate maternal oxygenation (fetal wellbeing must be of secondary importance)
• Carefully ease the cricoid pressure. Wrongly or too forcefully applied cricoid pressure can cause airway obstruction
• Try 4 hand ventilation (ask midwife to help)
• If still unable to ventilate, insert Laryngeal Mask Airway (cricoid pressure will need to be released to allow passage and then reapplied after the LMA is in place).
• If still unable to OXYGENATE, perform a surgical airway (Cut Twist Bougie Tube - yup it’s as scary as it sounds!). Blood will almost certainly flood the operative field, unlike the manikins that you have practiced on. The current DAS recommendation is to use a surgical technique. Ensure correct placement using capnography before attempting ventilation for fear of causing extensive surgical emphysema of the neck if misplaced.

Once oxygenation is possible, the urgency of the need to continue with the anaesthetic should be considered.

Factors Indicating the Need for Continuing with General Anaesthetic
This should ideally be assessed pre-operatively and patients allocated a risk rating so that in the event of a failed intubation a line of management has been identified.

There is no option but to continue with a general anaesthetic if there is:
• Maternal cardiac arrest
• Extensive maternal bleeding
• In both situations, evacuation of the uterus is fundamental to a successful outcome
• No easy alternative to general anaesthesia e.g. clotting disorder, cardiac valvular disease
• Severe and sudden fetal distress, whilst not an absolute indication to continue with general anaesthesia, could be considered an indication

If the procedure is elective or for failure to progress in labour or maternal distress, there is no urgent need to continue immediately with the anaesthetic.

Fetal distress that is not severe and sudden, might not be considered indication enough to continue with a general anaesthetic. The degree of fetal distress that will warrant continuation should be part of a locally-decided policy.

If the airway has been secured with a tracheal tube passed through the LMA with the help of a fibrescope, the surgery can continue

No Urgent Need to Continue
• Wake up and turn mother into lateral position
• Utilise a regional technique
• If no fetal distress present, may use either a spinal or an epidural anaesthetic (or a combined approach). If an epidural is used, great care must be taken to avoid an inadvertent total spinal and the block should be established very slowly
• If there is fetal distress, a spinal may be preferable as it will allow surgery to commence with the minimum of delay

Urgent Need to Continue with General Anaesthetic
• Keep cricoid pressure applied (unless already removed to allow ventilation)
Use a simple spontaneously breathing technique with whatever airway management was used in the initial establishment of ventilation
Avoid further instrumentation of the pharynx unless essential to maintain the airway
Use any available agents and deepen anaesthetic as quickly as possible.
Consider fibreoptic intubation through the LMA, ensuring adequate depth of anaesthesia.
Ensure adequate depth of anaesthesia before commencing surgery - if too light, may get laryngeal reflexes to surgical stimulation
At end of surgery, pass an orogastric tube to empty the stomach, turn to lateral position and recover in the head down position

Failure of Regional Technique
Although rare, this can occur. If so:
Repeat the technique or try the other type (if spinal used first, try epidural and vice versa). However, watch carefully for an exaggerated block
Consider an awake fibreoptic intubation, but only if experienced at the technique – Read the new Awake Tracheal Intubation guidelines
Consider using a spontaneously breathing technique without intubation having taken steps to reduce gastric contents
Consider local anaesthetic infiltration by the surgeon on an 'inject and cut' basis

Postoperatively
Ensure that the patient has full control of her airway before handing over care to a nurse
Counsel the patient and give advice regards future management.

In any situation where there has been difficulty with intubation, it is essential to extubate the patient when wide awake, warm, with adequate hydration and analgesia.

In any event, it should be possible to ensure that there is always an alternative if one method of management has failed. Always remember that failure to intubate does not in itself cause permanent harm, but failure to oxygenate does. Maternal oxygenation must, therefore, be the main objective in managing difficult or failed intubation in obstetrics whilst fetal wellbeing is a secondary consideration.

Further reading
The 7 articles below are relevant to the successful management of an obstetric airway. You should have read them if you are doing an exam or intend to be an anaesthetist. We have a manikin in the office that allows you to practise some of the techniques recommended.

1. DAS guidelines on Awake Tracheal intubation
2. Obstetric airway
https://das.uk.com/guidelines/obstetric_airway_guidelines_2015
3. DAS intubation guidelines/Unanticipated difficult Intubation
https://das.uk.com/guidelines/das_intubation_guidelines
https://academic.oup.com/bja/article/115/6/827/241440
4. Extubation
http://files.hsjc-anest.com/200000078-4866f4960e/guideline_extubacao_em_via_aerea_dificil.pdf

5. Failed intubation in obstetrics
https://www.anaesthesiajournal.co.uk/article/S1472-0299(10)00125-6/abstract

6. “Fail to plan, plan to fail”
http://vortexapproach.org
The cognitive approach discussed here is really important.

The aspiration of stomach contents into the lungs during obstetric anesthesia.
MENDELSON CL
Unexpected Intrauterine Death

Causes of unexpected intrauterine death include (1):
- Maternal: Pre-eclampsia, Prolonged pregnancy, DM, infection, etc
- Fetal: Multiple gestations, IUGR, Congenital malformations
- Placental: Abruption, Vasa praevia, cord accident

Complications include infection, coagulopathy and maternal distress (1)

It is important to maintain a high index of suspicion for women with a diagnosis of IUD and this must be maintained for the duration of their stay on delivery suite.

Women with delayed presentation of IUD or those with abruption can become critically unwell very quickly. Sensitive communication with the bereaved parents is crucial and should occur concurrently with medical management of the parturient. Trainees may wish to utilise SANDS multidisciplinary guidelines for professionals if they feel inexperienced in dealing with parents during this difficult time. [http://www.uk-sands.org](http://www.uk-sands.org)

**Infection:**
This can cause severe maternal sepsis and a derangement in clotting, including disseminated intravascular coagulation (DIC).

This seems to occur after 16 weeks gestation and more commonly when the fetus has been dead for >4 weeks.

It should be considered whenever a patient with an IUD presents to the labour ward (1).

**Coagulopathy:**
The risk of a coagulopathy increases in the presence of placental abruption or uterine perforation (2).

Severe abruption resulting in death of the fetus by extensive separation of the placental bed is commonly associated with severe maternal adverse effects (3), including DIC, massive haemorrhage and renal failure. A high index of suspicion should be maintained as haemorrhage is often concealed and may only be revealed after delivery of the fetus and placenta.

Blood tests, including venous blood gas, FBC, U+Es, sample for cross match and coagulation studies including a FibTEM sample should be carried out urgently. Consider serial tests if there is clinical concern.

Early resuscitation of the mother including the identification and aggressive treatment of coagulopathy prior to delivery of the fetus is key to successful management.

You must inform the obstetric consultant anaesthetist on-call and liaise with haematology for coagulation advice if a patient has a fibrinogen level of less than 2 g/l or if there is clinical concern.
Analgesia for labour following Intrauterine Death

It is not uncommon to be asked to provide analgesia +/- sedation for labour following an intrauterine death, in what are always difficult circumstances. Early discussion with the midwife and mother about pain relief options is important.

After confirmation of unexpected intrauterine, FBC and clotting screen must be checked prior to epidural insertion to exclude sepsis and coagulopathy.

A helpful leaflet is available, which outlines the pain relief options following an IUD. Ask the midwife to offer to the mother and partner.

Options for analgesia:
Add Entonox, paracetamol and NSAIDs as first option. Avoid NSAIDs in coagulopathy and sepsis.

PCA – consider in all second trimester IUDs, <28 weeks
Morphine 1mg bolus or fentanyl 10mcg bolus, each with 5-minute lock-out time is usually effective.

Remifentanil is not appropriate for mothers with an IUD.

May need loading dose if in established labour, plus additional bolus doses on occasions.
Using IV opioids has the addition benefit of providing the mother with some sedation during labour and delivery, although this is not considered beneficial for mothers dealing with the aftermath of an IUD in pregnancy.

Hourly monitoring of respiratory rate, sedation score and SpO2 is mandatory.

Epidural – Consider as 1st line analgesia management for all mothers in 3rd trimester, >28 weeks or on request if <28 weeks gestation if safe to do so
- Follow usual labour ward procedure - It is crucial to exclude systemic sepsis or coagulopathy.
- If CS is required (although rarely), a regional technique can be performed but it is a distressing for everyone and often best managed with a GA, especially in the presence of sepsis or coagulopathy.

References:
Therapeutic Feticide

• Most feticides are now done in fetal medicine under oral analgesia and oral sedation. However, occasionally the anaesthetist will need to get involved for the very anxious patient or difficult procedure.

• If on moral or ethical grounds you feel unable to help, then ask the midwife in charge first thing in the morning if a feticide is planned and contact senior SpR or consultant in good time to discuss case.

• Assess patient on admission.

Options for analgesia:

• PCA – Morphine 1mg bolus, 5-minute lock out (should be set up on admission), is usually successful. May need additional bolus doses on occasions.

• Epidural - usual labour ward procedure
  o The mother can have a light diet up to four hours prior to procedure.
  o Small quantities of water or isotonic sports drink (still) can be drunk.
  o Insert 16-G cannula.
  o Give oxygen via Hudson mask.
  o Give Midazolam 1mg incrementally for initial potassium injections, up to 5 mgs.

• This procedure can be conducted in room without an anaesthetic machine, but an Ambu bag must be available, although not necessarily in room.
Guidelines for transfer of women from Maternity Unit to Critical Care Unit

- Where possible, women should be cared for on the delivery suite with multi-professional care provided by Obstetricians, Anaesthetists and Midwives with opinions sought from other specialists as appropriate.
- There must be a dedicated area on delivery suite, appropriately staffed and equipped, to look after high-risk women in the ante- and postpartum periods.
- When the level of monitoring or degree of nursing care required exceeds that which can be provided on delivery suite, then the patient should be transferred to a Critical Care area.
- The presence of invasive haemodynamic monitoring is not necessarily an absolute indication for transfer.
- The decision to refer a patient to critical care will be made jointly by the Consultant Obstetrician and Anaesthetist responsible for the care of the patient. They will liaise with the Consultant Intensivist to expedite timely and appropriate transfer.
- Transfer may be required either because of a complication of pregnancy or delivery or because of pre-existing co-morbidity in a patient with an uncomplicated delivery.
- In patients at high risk of complications in the puerperium, (eg uncorrected complex congenital heart defects) elective transfer should be considered.
- Failure of one or more major organs/systems would always require transfer (eg patient requiring ventilatory support or continuous inotropic support of the cardiovascular system).
- Mild to moderate impairment of one or two organs/systems can often be managed on the delivery suite (eg minor clotting abnormality and renal impairment in a patient with pre-eclampsia). However, if there is a trend towards worsening of the impairment or an increase in the number of systems impaired, then consideration should be given to transfer.

Patients with opioid dependency

Please refer to these joint anaesthetic midwifery guidelines available through the Clinical Portal. (Select “O&G” in Clinical Speciality, then “Guidelines for Obs and Gynae”, then scroll down “Midwifery Guidelines” in the left hand column)

- Subutex- pain relief
  Guidelines for the management of pain relief in maternity inpatients prescribed Subutex (Buprenorphine)

- Substance abuse: guideline for the care of pregnant inpatients with opiate dependency
Appendix 1 - Quadratus Lumborum Block for analgesia following LSCS

Background
The ventral rami of the spinal nerves pass over the anterior aspect of quadratus lumborum (QL), with the potential for T7-L1 to be covered by this block. Injection of local anaesthetic around the quadratus lumborum muscle promotes spread towards the thoracic and lumbar paravertebral spaces and towards the thoracolumbar fascia. Thus, QLBs have the potential to provide both somatic and visceral analgesia. Trials have demonstrated that QLB provides improved analgesia after caesarean section under spinal anaesthesia. Further research has shown that QLBs provide superior analgesia compared to TAP blocks after caesarean section.

Procedure
Set-up and Material
- Position with patient supine/semi-lateral (with pillow under lumbar spine) or lateral
- Curvilinear or straight ultrasound probe depending on size of patient
- Ensure optimal depth and gain have been selected on the ultrasound machine
- 80mm block needle
- Position the probe transversely just above the iliac crest in the mid-clavicular line
- Identify the three abdominal wall muscles
  o External oblique (EOM) (superficial)
  o Internal oblique (IOM) (intermediate)
  o Transversus abdominis (TAM) (deep)
- Slide the probe posteriorly until you see the transversus abdominis muscle taper off to its aponeurosis (approximately at the level of the posterior axillary line), forming a roof over the quadratus lumborum muscle. Tilt/rotate the probe to optimise the image.
- Using an “in plane” technique the needle is passed in an anterior to posterior direction to the TAM aponeurosis. The needle must perforate the TAM aponeurosis/thoracolumbar fascia, giving a “pop”.
- Local anaesthetic is deposited at this position at the tapered end of the TAM, at the lateral aspect of the QL muscle. Local anaesthetic should be seen spreading around the QL muscle.

### Dose/Volume

<table>
<thead>
<tr>
<th>Dose</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-75kg</td>
<td>20mls of 0.25% levobupivacaine bilaterally</td>
</tr>
<tr>
<td>&gt;75kg</td>
<td>30mls of 0.25% levobupivacaine bilaterally</td>
</tr>
</tbody>
</table>

### Complications
- Infection (so far not described in the literature)
- Trauma to viscera (so far not described in the literature)
- Nerve injury (so far not described in the literature). It is safe to perform QLBs under GA/Regional.
- Femoral nerve block (leading to quadriceps weakness) due to spread on local anaesthetic in the fascia-ilaca plane. This is less likely with weaker solutions of local anaesthetic such as 0.25% levobupivacaine
- Local anaesthetic toxicity. Be careful to avoid toxic doses of LA following patients managed with epidural top-up in caesarean section.

### Proposed implementation
- For analgesia following LSCS under GA.
- Supplementary analgesia for patients in who NSAIDs are contra-indicated at LSCS under spinal anaesthetic (i.e. PET with low platelets, NSAIDs withheld following significant PPH at LSCS).
- As rescue for breakthrough pain following LSCS under spinal.
Appendix 2 - Postnatal Neurological Review Proforma

**Addressograph:**

<table>
<thead>
<tr>
<th>History</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of presenting complaint</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR</td>
</tr>
<tr>
<td>BP</td>
</tr>
<tr>
<td>Temp</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tone</th>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>left</td>
<td>right</td>
</tr>
<tr>
<td>L2 – Hip flexion</td>
<td>left</td>
<td>right</td>
</tr>
<tr>
<td>L3 – Knee extension</td>
<td>left</td>
<td>right</td>
</tr>
<tr>
<td>L4 – Ankle dorsiflexion</td>
<td>left</td>
<td>right</td>
</tr>
<tr>
<td>L5 – Great toe extension</td>
<td>left</td>
<td>right</td>
</tr>
<tr>
<td>S1 – Ankle plantar flexion</td>
<td>left</td>
<td>right</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reflexes</th>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plantar reflexes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sensation</th>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensory deficit consider:</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Dermatomal distribution</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Cutaneous nerve distribution</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Lower limit maps on right)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Impression/Plan |
MANAGEMENT OF NEUROLOGICAL DEFICIT FOLLOWING CENTRAL NEURAXIAL BLOCKADE

Full History, Anaesthetic chart, Operation Note and Neurological examination

Have a high index of suspicion for pathology if:
- Impaired coagulation (comorbidities, drugs & coagulation studies)
- Signs and symptoms of infection / immune compromised
- Difficult insertion

If Epidural with unexpectedly dense Sensory & Motor block only

Stop Epidural (consider alternative analgesia)

Recovery at 2 & 4 hrs?

Yes
- Restart Epidural at lower rate
- Reassess every 30 min

No
- Inform Consultant Obstetric Anaesthetist (Put pt sticker in diary)
- Ask Neurology for Urgent review (SpR Bleep 5423)
- Urgent MRI – Needs to be discussed with Neuroradiology (SpR Bleep 5359)
- Inform Neurosurgery once MRI requested (SpR Bleep 6464)

MRI positive for Central pathology

Yes:
- Urgent Neuro-Surgical Review (Inform CEPOD - Cat 1)

No:
- d/w Neurology
  - ? Nerve Conduction studies
Appendix 3

Guidelines for the use of Intraosseous access on Labour Ward

Introduction

Intraosseous (IO) access involves inserting a cannula into the marrow of a bone to provide a non-collapsible entry point into the systemic venous circulation. This technique is used in emergency situations to provide fluids and medications when attempts at intravenous access have failed. Studies have shown that the absorption of fluids and drugs into the central circulation is as at least as quick as from peripheral intravenous access, and that equivalent plasma concentrations of medications are achieved\(^1,2\). Intraosseous blood samples can be used for blood grouping and crossmatch\(^3\), and correlate well with venous Hb, and most biochemistry, although potassium may be inaccurate\(^4\).

Suitable sites for IO access

- **Proximal Tibia**: 1cm inferior and medial to the tibial tuberosity
- **Distal Tibia**: 3cm superior to the medial malleolus
- **Proximal Humerus**: Internally rotate the arm by placing the patient’s hand over their umbilicus. The EZ-IO should be placed in the greater trochanter of the humerus 1cm above the surgical neck.

Contraindications to IO access

- Insertion in fractured bone
- Infection at insertion site
- Inability to locate anatomical landmarks
- Previous orthopaedic procedure near insertion site
- IO procedure in the same bone in past 24 hours

Complications

Complications are rare, the most common being fluid extravasation following unrecognised misplacement. Other reported complications include: pain on injection, cellulitis/osteomyelitis, compartment syndrome, bone fracture & fat embolism.

Infusions

Any drug that can be given by the intravenous route can be given via the I-O route. Infusions will need to be administered under pressure to overcome the intra-osseous pressure of approximately 30mmHg.
Insertion Technique

1) Identify insertion site
2) Disinfect skin & maintain asepsis during insertion
3) Inject 1% Lignocaine under the skin & infiltrate down to the peri-osteum
4) Prepare infusion system & ensure driver and needle set are securely seated
5) With the needle at a 90-degree angle to the bone, insert without activating the drill until the tip touches bone.
6) Ensure at least 5mm of the needle is visible above the skin. The black mark 5mm distal to the needle hub must be visible once the needle tip has made contact with the bone, prior to commencing drilling.
7) Penetrate bony cortex by squeezing driver trigger and applying gentle, steady downward pressure. Release driver trigger when a ‘give’ is felt, upon entry into the medullary space. Let the drill driver do the work.
9) Flush catheter with 10mls saline and check for limb swelling and increased resistance. Remember, no flush, no flow.
10) If pain on injection, consider slowly injecting 2-4mls 1% Lignocaine
11) Secure IV access with dressing supplied
12) Connect IV fluids with pressure bag.
13) Remove IO catheter within 72 hours.

Only ONE insertion attempt must be made on any one suitable bone. This is because multiple punctures can result in extravasation of the pressurised fluid injection from the marrow space into the surrounding tissue, and consequent compartment syndrome.

| Indication | Any situation where IV access is urgently required but is difficult/unsuccessful |
| Contraindications | Fractured bone, local infection, previous orthopedic procedure at insertion site, IO access in same bone in previous 24 hours |
| Insertion sites | Proximal tibia - Below and medial to Tibial tubercle, Distal tibia - 3cm superior to Medial Malleolus, Proximal humerus - Adducted and internally rotated arm, into greater trochanter 1cm above surgical neck |
| Technique | Choose appropriate needle size & ensure needle correctly seated on drill. Clean & prepare area, maintaining asepsis during insertion. Infiltrate 1% Lignocaine under skin & down to periosteum. Insert at 90° to skin, without activating drill, until contact with bone is made. Ensure at least 5mm of needle clearance above skin. Using gentle, steady pressure deploy drill and advance until ‘give’ is felt. Stop. Remove stylet, and confirm position by aspirating blood. Mark all samples intra-osseous. Attach connector and flush rapidly with 10ml Saline. Extravasation indicates incorrect placement. Remove and attempt on a different bone. For pain on injection consider slowly injecting 3-4mls 1% Lignocaine. Secure with IO dressing. |
## Appendix 4

### STANDARD OPERATING PROCEDURE: MEDICINES FOR IMMEDIATE USE BY ANAESTHETIST IN OBSTETRIC THEATRES

<table>
<thead>
<tr>
<th>Reference No:</th>
<th>38</th>
<th>Version No:</th>
<th>4</th>
<th>Previous Trust / LHB Ref No:</th>
</tr>
</thead>
</table>

**Documents to read alongside this Policy, Procedure etc (delete as necessary)**

<table>
<thead>
<tr>
<th>Classification of document:</th>
<th>Departmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area for Circulation:</td>
<td>Obstetric theatres at Cardiff &amp; Vale UHB</td>
</tr>
<tr>
<td>Author/Reviewee:</td>
<td>Rafal Baraz – Consultant Anaesthetist</td>
</tr>
<tr>
<td>Executive Lead:</td>
<td>Ceri Chinn – Lead Nurse</td>
</tr>
<tr>
<td>Group Consulted Via/Committee:</td>
<td>Directorate governance forum</td>
</tr>
<tr>
<td>Approved by:</td>
<td>Directorate governance forum</td>
</tr>
<tr>
<td>Date of Approval:</td>
<td></td>
</tr>
<tr>
<td>Date of next review:</td>
<td></td>
</tr>
<tr>
<td>Date Published:</td>
<td>February 2016</td>
</tr>
</tbody>
</table>

**Disclaimer**

When using this document please ensure that the version you are using is the most up to date either by checking on the UHB database for any new versions. If the review date has passed please contact the author.

**OUT OF DATE POLICY DOCUMENTS MUST NOT BE RELIED ON**
1. INTRODUCTION

As the majority of cases arriving to the obstetric theatres are emergencies, it is deemed important to have the routine emergency medicines immediately available for use by the anaesthetist. These drugs are necessary to maintain stability of maternal condition.

Following a multidisciplinary meeting in Nov 2012 on medicines management in obstetrics theatres, it was agreed that 'routine emergency medicines' (vasopressors, anticholinergic drugs and Oxytocin (Syntocinon)) should be made available for anaesthetists to use when needed in obstetric theatres. It is acknowledged that preparation of these medicines at the time of an emergency arising may carry more risk of drug errors and cause unnecessary delay.

2. AIMS

2a. To provide clarity on medicines identified as ‘routine emergency medicines’, method of preparation and the roles and responsibilities of staff involved.
2b. To reduce risk of drug errors during preparation at the time of dealing with an emergency.
2c. To minimise delay in commencing anaesthesia during emergency obstetric procedures.
2d. To reduce risk associated with drugs being misplaced or wrongly prepared.
3. DEFINITION
‘Routine Emergency Medicines’ in this document include: two vasopressors (phenylephrine and ephedrine), two anticholinergics (atropine and glycopyrronium) and oxytocin (syntocinon).

The anaesthetic practitioner must have successfully completed the UHB Medicines Management Course prior to drawing up these drugs.

The preparation of routine general anaesthetic drugs are not included in this document.

4. PROCEDURE
4a. The following drugs should be drawn up/prepared by the anaesthetist or anaesthetic practitioner (ODP or Registered Nurse) whenever possible (preferably whilst re-setting the theatre for next case:
   1. Ephedrine bolus: 30mg in 1ml ampoule is diluted in 9ml of 0.9% sodium chloride (total volume 10ml).
   2. Phenylephrine bolus: Pre-filled 10ml syringe provided by pharmacy (500mcg/10ml). No dilution is required.
   3. Oxytocin (syntocinon) bolus: 10 International Units in 1ml ampoule is diluted in 9ml of 0.9% sodium chloride (total volume 10ml) then split into 2 x 5ml syringes.
   4. Oxytocin (syntocinon) infusion: 40 International Units diluted into a bag of 500ml compound sodium lactate (Hartmann’s solution).

4b. All drugs, at the time of preparation, must be checked/double confirmed by a second responsible healthcare professional (anaesthetist or anaesthetic practitioner).

4c. All drawn up drugs must also be clearly signed/initialled, timed and dated on the appropriate label (a second label may be used if required).

4d. Any drawn up drugs that are not used within 24 hours must be discarded.

4e. The following drugs may be prepared (set out but not drawn up) by the anaesthetist or the anaesthetic practitioner to facilitate drawing up when required:
   1. Atropine: 600mcg in 1ml ampoule.
   2. Glycopyrronium: 600mcg in 3ml ampoule.

4f. Phenylephrine, ephedrine, atropine and glycopyrronium may all be placed in one tray and should stored in a cupboard and only taken out when needed.

4g. Oxytocin (syntocinon) bolus and infusion should be stored in the theatre fridge.

4h. Any other drug not listed above should not be placed routinely unless specifically requested by the anaesthetist(s).

4i. In emergency situations, the anaesthetist may ask the anaesthetic practitioner to prepare/draw drugs that are not in the above list.

4j. In all situations when drugs are drawn up, ampoules and diluents must remain with the syringes for double confirmation.

5. ACCOUNTABILITIES AND RESPONSIBILITIES
Effective communication and checks of both parties are keys to the safe implementation and sustainability of this SOP.
Both anaesthetic practitioner and anaesthetist are individually responsible for applying standard medicines checks at the appropriate times. The anaesthetist administering the drug will be responsible and accountable for the final checks prior to administration.

6. TRAINING
6a. Any anaesthetic practitioner working under this SOP must have successfully completed the UHB Medicines Management Course
6b. Any anaesthetic practitioner working under this SOP must attend a training session on implementing this SOP.
6c. This training must be recorded in the anaesthetic practitioners training record. This is to be carried out by providing evidence to the theatres professional development team who will maintain a register of staff able to work under this SOP.

7. IMPLEMENTATION
The Anaesthetic Clinical Leader will ensure implementation in Obstetric Theatres (a role which can be delegated to a named member of the team who holds professional registration as a Nurse or ODP).

8. EQUALITY IMPACT AND ASSESSMENT
This procedure has had an equality impact assessment which has shown that there should be no adverse effect on or discrimination against any particular individual or group.

9. AUDIT
It will be necessary to ensure that Obstetric Theatres are adhering to the requirements of this SOP. Audit of compliance against these guidelines will be undertaken periodically during routine observations of practice.

10. DISTRIBUTION
Once this SOP is approved by the Directorate Governance Forum, it will be available:
  • on the UHB intranet pages.
  • on the Obstetrics and Gynaecology home page under ‘Obstetric Guidelines’.
  • in the obstetric anaesthetic guidelines.

REFERENCES
Appendix 5

ANAESTHETIC DATABASE USER INSTRUCTION:

Open Clinical Workstation: Username: oateam Password: similar to username.

1. Find patient on DSW ward map.
2. Highlight patient yellow
3. Right click, drop menu to “Clinical” >>>>>> Obstetric Anaesthesia >>>>>Anaesthetic assessment.
4. Create assessment then save.
5. Click on “Clinical” tab on top.
6. Find patient (bottom of the list), highlight yellow.
7. Right click: “Add intervention”.
8. “Add Procedure(s).”
9. Save procedure.
10. Save intervention.
11. You are done.

- Yellow filed, please double click then select from the drop menu.
- If you can’t find patient on DSW ward, it is worth checking the 1st Floor map.
- If you can’t find patient on either wards, then it is most likely not yet admitted to the PMS. Please ask receptionist and/or Midwife in charge to assist in admission to the PMS.

Out of Hours Timely Admission of Women to PMS - Delivery Suite

In the absence of Receptionist

Midwife-in-Charge requests HCSW/MCA to admit

If unable to admit within 20 min, Call 24 hour Hotline 46455
Please have the following information ready:
- Hospital number
- Named consultant obstetrican
- Type of admission
- Admitting ward
Appendix 6

Use of PCA Opioids in Obstetric Practice

- Prescription chart
- Infusion Pump record sheet
- Complications

Starts on next page.
**OBSTETRIC ONLY**

**INTRAVENOUS PATIENT CONTROLLED ANALGESIA PRESCRIPTION**

<table>
<thead>
<tr>
<th>Patient details</th>
<th>Consultant</th>
<th>Type of pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affix addressograph</td>
<td>Ward</td>
<td>Bar code</td>
</tr>
</tbody>
</table>

### Drug and concentration – please tick appropriate box

**Morphine** 2mg/ml

- **Bolus dose: mg**
- **Lockout time: minutes**
- A standard setting to suit most patients would be 1 mg bolus/5 minute lockout

- Bolus dose range 500 micrograms - 3 mg*
- 4 hourly limit for 1mg bolus with 5 minute lockout = 50mg (Increase accordingly if bolus dose > 1mg)
- Pre-filled syringes of Morphine 2mg/ml are only available in the Main Theatre recovery room.

**Fentanyl** 25 micrograms/ml

- **Bolus dose: micrograms**
- **Lockout time: minutes**
- A standard setting to suit most patients would be 20 mcg bolus/5 minute lockout

- Bolus dose range 5 micrograms - 30 micrograms*
- 4 hourly limit for 10microgram bolus with 5 minute lockout = 480 micrograms (Increase accordingly if bolus dose > 10 micrograms)
- Pre-filled syringes of Fentanyl are not available. Fentanyl is available in 10ml ampoules of 50 micrograms/ml. To make a solution of 25 micrograms/ml draw up 20ml of Fentanyl 50 micrograms/ml in a 50ml syringe and add 20ml of 0.9% Sodium Chloride for injection. Mix well.

**Remifentanil** 40 micrograms/ml

- **Bolus dose: micrograms**
- **Lockout time: minutes**

- Bolus dose range 20 micrograms - 80 micrograms*
- Lockout range 2 – 5mins**
- Prefilled syringes of Remifentanil are not available. Remifentanil is available in 2mg ampoules (powder for reconstitution). To make a solution of Remifentanil 40micrograms/ml dilute 2mgs of Remifentanil in 50ml of Sodium chloride 0.9% in a 50ml syringe, mix well.
- Patients should NOT be left unattended with a Remifentanil PCA at any time
- Patients must not have received Pethidine or other opiates within 4 hours of commencing a Remifentanil PCA

*THE ANAESTHETIST WILL ADJUST THE PCA BOLUS DOSE OF MORPHINE, FENTANYL AND REMIFENTANIL WITHIN THE RANGE SPECIFIED ABOVE, ACCORDING TO THE NEEDS OF THE PATIENT

**THE REMIFENTANIL LOCKOUT TIME WILL BE ADJUSTED BY THE ANAESTHETIST**

Incremental loading doses for the immediate post operative period in recovery are prescribed and signed for on the anaesthetic chart.

- Please affix PCA prescription sticker to as required section of medication chart. Naloxone and Cyclizine are included on the prescription sticker.
- Paracetamol and an NSAID (if not contraindicated) should be prescribed regularly for all patients receiving PCA.
- Incremental bolus doses to a maximum of …………………….micrograms or mg

<table>
<thead>
<tr>
<th>Date &amp; time</th>
<th>Amount</th>
<th>Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prescribers name &amp; signature</th>
<th>Print name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Set up by</th>
<th>Checked &amp; connected</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Time</td>
<td>Balance in syringe</td>
</tr>
<tr>
<td>------</td>
<td>------</td>
<td>---------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Time</td>
<td>Balance in syringe</td>
</tr>
<tr>
<td>------</td>
<td>------</td>
<td>--------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potential problems surrounding the safe administration of PCA</td>
<td>Early detection and treatment</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>-------------------------------</td>
<td></td>
</tr>
<tr>
<td>Incorrect: Drug, Concentration, Bolus, Lockout time.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCA device/giving set</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCA is safely administered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCA device delivers prescribed bolus with correct lockout time.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mothers must not be lying flat on their back – either lateral or semi-recumbent position is acceptable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ensure that controlled drugs are checked in accordance with the Cardiff and Vale University Health Board policy. Ensure that the syringe is correctly labelled and contents correlate with the prescription chart. The PCA syringe should be checked hourly by the qualified staff caring for the patient and the PCA record of administration chart should be completed. Any discrepancies should be reported to the On-call Anaesthetist immediately, remove PCA button from the patient until the problem is resolved. When changing syringes and at shift handover, 2 qualified staff (including the qualified staff caring for the patient) should check the PCA settings, i.e. the bolus dose, lockout time and continuous infusion, against the prescription chart.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A dedicated IV cannula must be used (pink 20g or blue 22g). No other drugs should be administered through this cannula. Ensure that a PCA giving set with anti-syphon and anti-reflux valve is in use.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potential side effects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unrelieved pain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient will have no more than mild pain at rest and mild to moderate pain on movement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ensure that the patient is educated in the use of PCA. Provide patient information leaflets plus verbal instruction prior to initiating PCA. Provide on-going reminders to patient whilst PCA is in use if not contraindicated: check that regular paracetamol and an NSAID have been administered in addition to PCA. This may reduce morphine requirement. Check that the intravenous cannula is patent. Check that PCA administration set is unclamped and connected properly. Help position patient comfortably. Advise patient to support wound when coughing/moving. Pain assessment: Pain should be assessed and recorded on movement alongside other observation or more frequently if required.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unrelieved pain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory depression</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory Rate &gt; 12/min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory rate should be counted for a full minute. If the respiratory rate is &gt; 25/min the anaesthetist should be called.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Sedation score 0 or 1
- Oxygen saturation >94%
- Early detection and prevention of vomiting

Sedation score 2 or 3
- Oxygen saturation <94%
- Early detection and treatment of respiratory rate falls to 9 or 10/min, remove the PCA button from the patient, give oxygen 15L via a well-fitting non-rebreather reservoir mask (ensure reservoir bag inflated) reassess every 5 minutes until respiratory rate >12/min. If respiratory rate falls to <8/min, call anaesthetist and follow actions above. Give IV naloxone (*Dilute a 1ml ampoule of naloxone 400mcg with 3mls of normal saline for injection to make a total of 4mls). Give in 50 mcg (0.5ml) increments until respiratory rate >12/min.
- Monitor O2 saturation continuously, ensure alarms are set and audible.

Sedation score 3 or more = call anaesthetist
- Any queries or concerns please contact the Obstetric Anaesthetist

Useful phone numbers
Acute Pain Service – Bleep 5414 (UHW) Bleep 4560 (UHL)
Out of hours Bleep 5101 (UHW) Bleep 4800 (UHL)