OBSTETRIC ANAESTHESIA FOR NON-OBSTETRIC ANAESTHETISTS - CPD MATRIX

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Consultant Anaesthetist
Acknowledgements:

- Martin Feast
- Mel Woolnough
- Claire Smith (Rotherham)
- Fleur Roberts
# The Royal College of Anaesthetists CPD Matrix

Matrix of topics for Continuing Professional Development for Anaesthetists (January 2013)

**Level 2**

Level 2 is based upon both the knowledge and skills that are relevant to an individual doctor’s ‘whole’ practice.

<table>
<thead>
<tr>
<th>General</th>
<th>Obstetrics</th>
<th>ICM</th>
<th>Paediatrics</th>
<th>Pain Medicine</th>
<th>Neuro</th>
<th>Regional Anaesthesia</th>
<th>Education and Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced airway management</td>
<td>Analgesia for labour</td>
<td>Assessment of the critically ill patient</td>
<td>Assessment and initial management of the critically ill child</td>
<td>Advanced management of perioperative pain</td>
<td>Initial management of brain injury (traumatic or spontaneous intracranial haemorrhage)</td>
<td>Indications, benefits and risks of RA</td>
<td>Work-place based assessment</td>
</tr>
<tr>
<td>Principles of assessment and management of major trauma (including burns)</td>
<td>General anaesthesia for elective and emergency LSCS</td>
<td>Initiation and management of ventilatory support</td>
<td>Perioperative care of children</td>
<td>Management of acute non-surgical pain</td>
<td>Initial management of spinal injured patients</td>
<td>Principles of performing local, regional and neuraxial techniques</td>
<td>Educational supervisor training</td>
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<tr>
<td>Preoperative assessment and preparation for surgery</td>
<td>Regional anaesthesia for elective and emergency LSCS</td>
<td>Diagnosis and management of shock, infection and sepsis</td>
<td>Vascular access techniques</td>
<td>Basic assessment and management of chronic pain</td>
<td>Management of patients with neuro trauma for imaging</td>
<td>Use of nerve/plexus location techniques</td>
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<tr>
<td>Advanced patient monitoring techniques</td>
<td>Regional anaesthesia complications in the pregnant patient</td>
<td>Support of threatened and failing organ systems</td>
<td>Fluid management for children</td>
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<td>Recognition and management of side effects and complications of regional anaesthesia</td>
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<tr>
<td>Fluid management and blood product usage</td>
<td>Management of obstetric emergencies</td>
<td>Sedation techniques for ICU patients</td>
<td>Anaesthesia for children</td>
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<tr>
<td>Perioperative emergencies</td>
<td>Assessment of the critically ill parturient</td>
<td>End of life issues and organ donation</td>
<td>Sedation techniques for children</td>
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<tr>
<td>Perioperative management for surgical specialties not listed elsewhere</td>
<td>Principles of newborn resuscitation</td>
<td>Management of the ICU</td>
<td>Team working between DGHs and PIC retrieval teams</td>
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<tr>
<td>Anaesthetic management for non-operative procedures</td>
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<td>Anaesthesia for non-obstetric procedures in the pregnant patient</td>
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<td>Sedation techniques for adults</td>
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<td>Patient transfer skills</td>
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<tr>
<td>Developments in allied clinical specialties (relevant to practice)</td>
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</tbody>
</table>
Order of talk:

- Anaesthesia for obstetric procedures
- Analgesia on labour ward
- The critically ill parturient
- Complications of regional techniques
- Obstetric emergencies
ANAESTHESIA FOR OBSTETRIC PROCEDURES

CPD Matrix:
2B02 and 2B03
Operations at the Jessop Wing Obstetric Unit in 2012

- **LSCS**: 1800 patients
- **Forceps Delivery**: 200 patients
- **Suturing**: 200 patients
- **Removal of Retained Placenta**: 100 patients
- **Other**: 50 patients
- **Cervical Suture**: 10 patients

Number of patients
“Delivery within 75 minutes does not appear to increase the risk of compromise, while delivery within 30 minutes may not always result in a good neonatal outcome. Once a decision to deliver has been made, therefore, delivery should be carried out with an urgency appropriate to the risk to the baby and the safety of the Mother.”
General anaesthesia for obstetric procedures.
Indications for General Anaesthesia

- Speed – category 1 caesarean sections
- Failure of a regional technique
- Patient preference
- Regional technique contraindicated
  - Coagulopathy
  - Massive haemorrhage
  - Localised infection in area that spinal would be sited
  - Systemic infection

GA rate approximately 13% of all caesareans at Jessop Wing

• Timings – Median (range [IQR])

• spinal block
  • To perform technique 2:56 (2:32 - 3:32 [1:22 - 3:50]),

• general anaesthesia
  • 1:56 (1:39 - 2:9 [1:13 - 3:12])
Failed tracheal intubation in obstetric anaesthesia: 2 yr national case–control study in the UK.

Failed tracheal intubation in obstetric anaesthesia: 2 yr national case–control study in the UK

Table 3
Rescue procedures for failed tracheal intubation

<table>
<thead>
<tr>
<th>Rescue</th>
<th>Number of cases (n=57)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classical LMA</td>
<td>39</td>
</tr>
<tr>
<td>Intubating LMA</td>
<td>4</td>
</tr>
<tr>
<td>PROSEAL</td>
<td>3</td>
</tr>
<tr>
<td>IGEL</td>
<td>3</td>
</tr>
<tr>
<td>Bag and mask</td>
<td>2</td>
</tr>
<tr>
<td>Smaller tracheal tube</td>
<td>1</td>
</tr>
<tr>
<td>Re-intubation attempt</td>
<td>3</td>
</tr>
<tr>
<td>Second-dose succinylcholine and TT</td>
<td>1</td>
</tr>
<tr>
<td>Tracheostomy</td>
<td>1</td>
</tr>
<tr>
<td>Patients woken up</td>
<td>4</td>
</tr>
<tr>
<td>Sedation+LA</td>
<td>1 (urgency grade1)</td>
</tr>
<tr>
<td>Intrathecal block</td>
<td>3 (urgency grade 1, 2, 4)</td>
</tr>
</tbody>
</table>

- Incidence 1:224
- Has not declined in 20 years
- Age, BMI and Malampati are significant predictors
Deaths directly due to anaesthesia

- Two women died from failure to ventilate the lungs,
- Four from postoperative complications
- One from leucoencephalitis.
- Two of the seven women were obese

“In the first woman, the anaesthetist failed to stop trying to intubate the trachea even though oxygenation was achieved through an intubating laryngeal mask airway (ILMA).”

“Failed intubation guidelines were followed, to an extent, in this very stressful situation, but oesophageal intubation through the ILMA was not recognised and further hypoxia occurred.”

“The woman was coughing but was not allowed to wake up, and a second dose of thiopental and a long-acting neuromuscular-blocking drug were given even though the end-expiratory CO₂ monitor indicated that the woman’s lungs were not being ventilated. Cricothyrotomy was not attempted.”
### Obstetric Failed Intubation Drill

**During Rapid Sequence Induction of General Anaesthesia**

**Plan A: “Initial Tracheal Intubation Plan”**

1. **Pre-oxygenate**: aim ET0>85%
2. **Cricoid force**: BURP
3. **Direct Laryngoscopy**: check
   - Neck flexion and Head extension
   - Laryngoscopic technique and vector
   - External laryngeal manipulation
   - Vocal cords open and immobile

   **If Poor laryngoscopy view - check:**
   - Patient position optimal, ramped enough?
   - Is the suxamethonium working yet?
   - Adjust, reduce or release cricoid force
   - Use Bougie (feel clicks / hold up at carina)
   - Use alternative laryngoscope

   **DECLARE FAILED INTUBATION**

   **GET HELP**
   - "Dial 2222 state Airway"
   - "Emergency and Location"

   **Plan C: "Maintenance of Oxygenation & Ventilation"**

   1. Oxygenate and ventilate
      - Use Face mask and OP airway
      - 1-2 person technique
      - Reduce or release cricoid temporarily if ventilation difficult

   **FAILED OXYGENATION** (SpO2<90% with FiO2 1.0)

   1. Oxygenate and ventilate
      - LMA / LMA Proseal (supreme) / I Gel / iLMA
      - Reduce or release cricoid force for insertion

   **FAILED OXYGENATION AND VENTILATION**

   **Plan D: "Rescue techniques for Can’t Intubate, can’t Ventilate” situation**

      1. Surgical or narrow bore cricothyroidotomy
      2. Consultation Assistance required

### Difficult airway society and OAA are currently devising a failed intubation drill

**Plan B: "Secondary Fibreoptic Intubation through LMA / SAD"**

**Consultant Assistance required**
Oxford HELP pillow
Buying more time – effective preoxygenation
PREOXYGENATION IN OBESITY

![Graph showing the relationship between Body Mass Index (BMI) and time to 90% saturation. The graph includes a dotted line indicating the lower limit of morbid obesity.]

Fig. 1. Times to 90% saturation compared with BMI.
Pre-oxygenation of women – 38 weeks pregnant.

Entrainment of air occurred in 22% of cases
Entrainment of air during preoxygenation for caesarean section under GA.

Intubation

Preoxygenation

Entrainment of air during preoxygenation for caesarean section under GA.
Fall in SaO2 following prolonged intubation attempt for GA caesarean section.

Preoxygenation

Intubation (90 seconds)
Survey of UK lead obstetric anaesthetists 2012:

**Results**

A total of 153 forms (64%) were returned.

**Question 1. How long would you preoxygenate for?**

- <3 minutes: 0%
- 3 minutes or more: 64%
- Fixed no' of VC breaths: 16%
- Until target EtO2 reached: 0%
- Until surgeon ready: 0%

**Question 2. What oxygen flow rate would you normally use?**

Range 4 to 20 litres/minute (median 10 litres/minute).
Spinal anaesthesia for obstetric procedures.
Spinal – the superior anaesthetic?

• Works quickly – usually ready within 10 minutes
• Excellent anaesthesia – over 90% pain free even with externalisation of uterus
• Reliable/ predictable
• Lower incidence of PDPH than epidural (1:500 cf 1:100)
• With spinal diamorphine - better postoperative pain relief than GA
Incidence of breakthrough pain for caesarean section under regional anaesthesia:

Percentage of cases with breakthrough pain.

- **Mild**:
  - Spinal: 6%
  - Epidural: 18%

- **Moderate**:
  - Spinal: 2%
  - Epidural: 4%
Adding diamorphine to the local anaesthetic for a spinal anaesthetic improves pain following caesarean section.
Spinals – last longer than you think:

<table>
<thead>
<tr>
<th></th>
<th>Median Time (Range)</th>
<th>median</th>
<th>range</th>
<th>median</th>
<th>range</th>
<th>median</th>
<th>range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time for complete recovery on examination (hrs)</td>
<td>Time patients felt normal sensation (hrs)</td>
<td>Time catheter out (hrs)</td>
<td>Time first out of bed (hrs)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Spinal 4-9</td>
<td>7.5 (3-12)</td>
<td>17 (7-23)</td>
<td>17 (7-24)</td>
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<tr>
<td>Epidural 4-8</td>
<td>6 (2.5-13)</td>
<td>12 (4-22)</td>
<td>13 (6-22)</td>
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</tbody>
</table>
Post-caesarean pain on movement - TAP block with Bupivacaine (B) vs Normal Saline (N)
Effect of height and weight on dose of heavy bup’ needed for CS
2 groups - RCT

- Fixed dose group
  - N = 39
  - 2.4ml Bup’
  - ↓BP – 72%
  - No block failures
  - Faster onset of block

- Variable dose group
  - N = 45
  - 1.9 (1.6 to 2.2) ml Bup’
  - ↓BP – 50%
  - No block failures
Volume of 0.5% bupivacaine (ml) with diamorphine 0.4mg in 0.9% NaCl 0.4 ml

<table>
<thead>
<tr>
<th></th>
<th>140 cms</th>
<th>145</th>
<th>150</th>
<th>155</th>
<th>160</th>
<th>165</th>
<th>170</th>
<th>175</th>
<th>180</th>
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</thead>
<tbody>
<tr>
<td>55kg</td>
<td>1.5</td>
<td>1.6</td>
<td>1.8</td>
<td>1.9</td>
<td>2.0</td>
<td></td>
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<tr>
<td>60</td>
<td>1.4</td>
<td>1.6</td>
<td>1.7</td>
<td>1.8</td>
<td>2.0</td>
<td>2.1</td>
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<tr>
<td>65</td>
<td>1.4</td>
<td>1.5</td>
<td>1.7</td>
<td>1.8</td>
<td>1.9</td>
<td>2.0</td>
<td>2.2</td>
<td>2.3</td>
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<tr>
<td>70</td>
<td>1.3</td>
<td>1.5</td>
<td>1.6</td>
<td>1.8</td>
<td>1.9</td>
<td>2.0</td>
<td>2.1</td>
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<tr>
<td>75</td>
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<td>1.9</td>
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<td>2.4</td>
<td>2.4</td>
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<tr>
<td>80</td>
<td>1.4</td>
<td>1.5</td>
<td>1.7</td>
<td>1.8</td>
<td>2.0</td>
<td>2.1</td>
<td>2.4</td>
<td>2.4</td>
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<tr>
<td>85</td>
<td>1.5</td>
<td>1.6</td>
<td>1.8</td>
<td>1.9</td>
<td>2.1</td>
<td>2.2</td>
<td>2.3</td>
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<tr>
<td>90</td>
<td>1.4</td>
<td>1.6</td>
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<td>95</td>
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<td>100</td>
<td>1.5</td>
<td>1.7</td>
<td>1.8</td>
<td>1.9</td>
<td>2.1</td>
<td>2.2</td>
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<tr>
<td>105</td>
<td></td>
<td>1.6</td>
<td>1.7</td>
<td>1.9</td>
<td>2.1</td>
<td>2.2</td>
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Epidural anaesthesia for obstetric procedures.
Epidural

- Rarely started from scratch in theatre
- Usually topped up from labour ward
  - Top up in room
  - Top up in theatre
  - Or mixture of both
- Local anaesthetic mixture to use
  - Bupivacaine
  - Lignocaine
  - Mixtures – Bupivacaine/ lignocaine/ adrenaline/ bicarbonate
- Addition of opioids
  - Fentanyl – probably not beneficial if used in labour epidural
  - Diamorphine/ Morphine = prolonged analgesia
Which epidural top-up for caesarean section?

- RCT
  - lignocaine-bicarbonate-adrenaline mixture (final concentrations 1.8%, 0.76% and 1:200,000, respectively)
  - Levobupivacaine 0.5%

- Time ready for surgery (median (interquartile range (range))
  - Mixture = 7 minutes (6-9 (5-17))
  - Levobupivacaine = 14 minutes (10-17 (9-31))

<table>
<thead>
<tr>
<th>UNITS</th>
<th>NGH</th>
<th>JHW</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location that top-up was given:</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Labour ward</td>
<td>10</td>
<td>24</td>
<td>13</td>
</tr>
<tr>
<td>Theatre</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Both</td>
<td>4</td>
<td>5</td>
<td>14</td>
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</table>

**Service Evaluation at 3 obstetric units:**

- Topping up epidurals for emergency caesarean section.

**Timings:**

- Time from starting top-up to ready for surgery (mins).
  - NGH: 17.9 (8.9)
  - JHW: 18.2 (7)
  - City: 20.4 (7.1)

- Time from epidural ready to surgery starting (mins).
  - NGH: 9.5 (7.6)
  - JHW: 8.4 (4.5)
  - City: 8.0 (6.5)

- Total time from being told to surgery starting (mins)
  - NGH: 31.3 (12.2)
  - JHW: 37.4 (14)
  - City: 39.3 (18.3)
ANALGESIA ON LABOUR WARD

CPD Matrix: 2B01
Current standard for epidural analgesia in labour at the Jessop Wing

- Patient controlled epidural analgesia
- Test dose = 3ml of 0.5% bupivacaine
- Starting dose = 50 mcg of Fentanyl in 10ml of saline
- PCEA
  - Solution – 0.1% levobupivacaine plus 2mcg/ml fentanyl
  - Background – 7ml/ hour
  - Boluses – 5ml
  - Lockout – 20 minutes
- Breakthrough – 10 ml of 0.25% bupivacaine
Automated boluses for epidural analgesia:

“...when compared to a continuous epidural infusion or a PCEA plus background infusion regimen, regular epidural automated mandatory boluses and PCEA plus automated mandatory boluses seem to reduce the consumption of local anaesthetic, while reducing the incidence of breakthrough pain requiring physician intervention.”
Trials comparing continuous background infusion to automated boluses:


Conclusion
PCEA+AMB, when compared to PCEA+BI, confers greater patient satisfaction and a longer duration of effective analgesia after CSE despite reduced analgesic consumption.
Non-Luer connections – what next?


- The CAD will not be the same as any of the products on the market; therefore any users of current non-Luer equipment will have to change again.
Remifentanil patient controlled analgesia in labour is a more effective than other parenteral and inhalational alternatives.

Schnabel et al European Journal of Anaesthesiology 2012; 29: 177-85

“This is now the fourth case report of respiratory and/or cardiac arrest related to remifentanil in obstetrics published in the last year [5–8].”


Several examples in the world literature of chlorhexidine being injected into the epidural space:

- Hydrocephalus
- Ascending neuropathy
- Paraplegia
- Upper limb involvement

RECOMMENDATIONS:

- .....chlorhexidine 0.5% in alcohol should be used in preference to the stronger solution.
- Equipment and sterile surfaces should be kept covered ...... while the anti-septic is applied.
- Antiseptic containers and sponges should be removed ...... before uncovering equipment.
- ...... the fluid must be allowed to dry before the skin is palpated or punctured.
- ..operator ... should check ... gloves for contamination and, if there is any doubt, change them before continuing the procedure.
Regional anaesthesia and patients with abnormalities of coagulation
The Association of Anaesthetists of Great Britain & Ireland The Obstetric Anaesthetists' Association Regional Anaesthesia UK.

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Normal risk</th>
<th>Increased risk</th>
<th>High risk</th>
<th>Very high risk</th>
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</thead>
<tbody>
<tr>
<td>LMWH – prophylactic dose</td>
<td>&gt; 12 h</td>
<td>6–12 h</td>
<td>&lt; 6 h</td>
<td>&lt; 5 h</td>
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<tr>
<td>LMWH – therapeutic dose</td>
<td>&gt; 24 h</td>
<td>12–24 h</td>
<td>6–12 h</td>
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<tr>
<td>UFH – infusion</td>
<td>Stopped &gt; 4 h and APTT ≤ 1.4</td>
<td>Last given &lt; 4 h</td>
<td>APTT &gt; normal range</td>
<td></td>
</tr>
<tr>
<td>UFH – prophylactic bolus dose</td>
<td>Last given &gt; 4 h</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSAID + aspirin</td>
<td>Without LMWH</td>
<td>With LMWH dose 12–24 h</td>
<td>With LMWH dose &lt; 12 h</td>
<td></td>
</tr>
<tr>
<td>Warfarin</td>
<td>INR ≤ 1.4</td>
<td>INR 1.4–1.7</td>
<td>INR 1.7–2.0</td>
<td>INR &gt; 2.0</td>
</tr>
<tr>
<td>General anaesthesia</td>
<td>Starved, not in labour, antacids given</td>
<td>Full stomach or in labour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-eclampsia</td>
<td>Platelets &gt; 100 x 10^9 L^-1 within 6 h of block</td>
<td>Platelets 75–100 x 10^9 L^-1 (stable) and normal coagulation tests</td>
<td>Platelets 75–100 x 10^9 L^-1 (decreasing) and normal coagulation tests</td>
<td>Platelets &lt; 75 x 10^9 L^-1 or abnormal coagulation tests with indices ≥ 1.5 or HELLP syndrome</td>
</tr>
<tr>
<td>Idiopathic thrombocytopenia</td>
<td>Platelets &gt; 75 x 10^9 L^-1 within 24 h of block</td>
<td>Platelets 50–75 x 10^9 L^-1</td>
<td>Platelets 20–50 x 10^9 L^-1</td>
<td>Platelets &lt; 20 x 10^9 L^-1</td>
</tr>
<tr>
<td>Intra-uterine fetal death</td>
<td>FEC and coagulation tests normal within 6 h of block</td>
<td>No clinical problems but no investigation results available</td>
<td></td>
<td>With abruption or overt sepsis</td>
</tr>
<tr>
<td>Cholestasis</td>
<td>INR ≤ 1.4 within 24 h</td>
<td>No other clinical problems but no investigation results available</td>
<td></td>
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</tbody>
</table>
ASSESSMENT OF THE CRITICALLY ILL PARTURIENT:

Thanks to Claire Smith – Consultant Anaesthetist
Rotherham

CPD Matrix: 2B06
Assessment of the critically ill parturient overview:

- The recognition of life threatening illness may be challenging in the obstetric population
- Physiological reserves increase in pregnancy and may further conceal the development of serious pathology
- Maternal Early Warning Score recommended to help identify emerging disease
- Multidisciplinary scenario training and on-going education
Despite a decline in the overall UK maternal mortality rate, there has been an increase in deaths related to genital tract sepsis, particularly from community acquired Group A streptococcal disease. The mortality rate related to sepsis increased from 0.85 deaths per 100,000 maternities in 2003–2005 to 1.13 deaths in 2006–2008, and sepsis is now the most common cause of Direct maternal death.
ICNARC – October 2009

- Report for RCoA, RCOG, OAA

- ‘Female admissions (aged 16-50 years) to adult, general intensive care units in England, Wales and Northern Ireland, reported as “currently pregnant” or “recently pregnant”

- Incidence approximately 260 per 100,000 maternities

- Overall 61% were admitted for obstetric reasons
  - haemorrhage
  - hypertensive
CEMACH Saving Mother’s Live 2003-2005

• Critical care recommendations

• Early detection of severe illness in mothers remains a challenge to all involved in their care. The relative rarity of such an event combined with the physiology associated with pregnancy and childbirth compounds the problem.

• Introduction of modified early warning scoring systems for all acute obstetric admissions including early pregnancy

• Training
  • Simulation training
  • Scenario based training and protocols for the management of obstetric emergencies
  • Staff involved in the care of seriously sick women should have undertaken appropriate competency-based training and have a record of success
CMACE Saving Mother’s Lives 2006-2008

• 10 Top recommendations

• 4. Women with potentially serious medical conditions require immediate and appropriate _multidisciplinary_ specialist care

• 6. Specialist clinical care: _identifying and managing very sick women_

• 8. _Genital tract sepsis_
• “Anaesthetists responsible for obstetric services should liaise with midwives, obstetricians and physicians to agree management for successful delivery. The anaesthetist must become involved in the management of the ‘at risk’ patient at an early stage and can provide the liaison with high dependency and intensive care on behalf of the management team” (2005)

• “Timely recognition of the sick parturient is key to ensuring a good outcome and reducing maternal morbidity and mortality” (2013)

• “A graded response strategy for patients identified as being at risk of clinical deterioration should be agreed and locally delivered” (2103)
How to identify sick patients in pregnancy:

Maternal early warning scores
Early warning scores in pregnancy

• Despite recommendations no validated system currently exists

• Postal survey published May 2009

• 89% of units thought it would be possible to implement a system

• 96% of hospitals used a non obstetric EWSS

• But only 23% thought this to be relevant to obstetric physiology and disease
Early Warning Scoring Systems

- Not a replacement for clinical judgement
- Compliments existing practice
- Helps midwives to have clear directives as to what to do for patients whose observations are abnormal
- Need to be modified for the obstetric population due to altered physiology of pregnancy
- Need to be designed jointly with obstetricians and midwives
- Need to be simple and clear to use
- Ongoing education, training and audit
## Physiological parameters

<table>
<thead>
<tr>
<th></th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Systolic BP</strong></td>
<td>&lt;80</td>
<td>80-89</td>
<td>90-99</td>
<td>100-149</td>
<td>150-159</td>
<td>160-179</td>
<td>&gt;180</td>
</tr>
<tr>
<td><strong>Diastolic BP</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>90-99</td>
<td>100-120</td>
<td>&gt;120</td>
</tr>
<tr>
<td><strong>Heart rate</strong></td>
<td>&lt;40</td>
<td>41-49</td>
<td>50-99</td>
<td>100-119</td>
<td>120-139</td>
<td></td>
<td>&gt;140</td>
</tr>
<tr>
<td><strong>Temperature</strong></td>
<td></td>
<td>&lt;35</td>
<td>36-38</td>
<td></td>
<td></td>
<td></td>
<td>&gt;38</td>
</tr>
<tr>
<td><strong>Respiratory rate</strong></td>
<td>≤8</td>
<td></td>
<td>9-18</td>
<td>19-25</td>
<td>26-29</td>
<td></td>
<td>≥30</td>
</tr>
<tr>
<td><strong>Conscious level</strong></td>
<td></td>
<td></td>
<td></td>
<td>Alert</td>
<td>Voice</td>
<td>Pain</td>
<td>Unresponsive</td>
</tr>
<tr>
<td><strong>Urine output</strong></td>
<td>&lt;20</td>
<td>&lt;30</td>
<td>30-200</td>
<td>&gt;200</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Oxygen saturations (%)</strong></td>
<td>&lt;85</td>
<td>86-89</td>
<td>90-94</td>
<td>&gt;95</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>% oxygen</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&gt;60%, HF, CPAP, BiPAP</td>
<td></td>
</tr>
</tbody>
</table>
Inform midwife in charge

Graded response

• Eclampsia
• Pre-eclampsia / severe pre-eclampsia
• Any blood loss > 1000ml
• Sudden collapse
• Post HDU / ITU patients
• Any patient causing concern
• Postoperative LSCS patients
• Any patient having regional or general anaesthesia

A documented decision to be made at senior level to decrease frequency of obs or stop PAR scoring
If you are uncertain at any time seek medical assistance (Patient At Risk Score)
How to identify sick patients in pregnancy:

Back to Basics
“Back to Basics”
CMACE Saving Mother’s Lives 2006-2008

• Aide memoire
• Highlights good practice points

• Improving basic medical and midwifery practice such as history taking, undertaking basic observations and understanding normality

• Attributing signs and symptoms of emerging serious illness to commonplace symptoms in pregnancy

• Improving communication and referrals
‘Back to Basics’

Red flags:

**Sepsis**

- Pyrexia >38
- Sustained tachycardia >100 bpm
- Breathlessness (RR > 20)
- Abdominal / chest pain
- Diarrhoea and/or vomiting
- Reduced or absent FM or absent FH
- SROM or significant PV discharge
- Uterine or renal angle pain and tenderness
- Woman is generally unwell or seems unduly anxious, distressed or panicky

**Breathlessness**

- Physiological breathlessness in 75% - any trimester, gradual
- Asthma – unusual to present for first time in pregnancy
- Wheeze
- Sudden onset breathlessness
- Associated with chest pain
- Orthopnoea / PND

Consider

- PE
- Pneumonia
- Pulmonary oedema (fluid overload – pre-eclampsia, mitral stenosis, LVF)
- Pulmonary hypertension
‘Back to Basics’
Red flags:

**Abdominal pain or diarrhoea and vomiting**

Early pregnancy:
- Exclude ectopic pregnancy
- Pregnancy test / USS

Later in pregnancy, after delivery, end of pregnancy consider:
- Pre-eclampsia, eclampsia
- HELLP
- Placental abruption
- Sepsis

Basic observations, urinalysis, CRP, basic blood tests

**Headache**

- Common – tension, migraine, drug related
- Sudden onset
- Associated neck stiffness
- ‘Worst headache ever’
- Associated abnormal neurological examination

Consider
- SAH
- Cerebral venous thrombosis
- Pre eclampsia / Impending eclampsia
Simulator based training: Martin Feast - Mexborough

Should be multidisciplinary but difficult to get other specialties involved
Assessment of the critically ill parturient overview:

- The recognition of life threatening illness may be challenging in the obstetric population

- Physiological reserves increase in pregnancy and may further conceal the development of serious pathology

- Maternal Early Warning Score recommended to help identify emerging disease

- Multidisciplinary scenario training and on-going education
COMPLICATIONS OF REGIONAL TECHNIQUES.

CPD Matrix:
2B04
Epidural Information Card

The Epidural Information Card is an updated version of the original produced by Mike Wise at the Poole Maternity Unit (see White et al. Int J Obstet Anesth 2003; 12:43).

It is a two-sided card which can be laminated and kept in labour rooms so that women who lack knowledge about epidurals can read it during the early stages of labour when they are more able to understand the information.

The first side briefly explains the epidural procedure, and the reverse includes a table with risks of regional anaesthesia. This table is also included in the revised version (3rd edition) of the "Pain Relief in Labour" booklet.

See English and Foreign Language translations to download

First side of the card:

We are grateful to the following doctors and patients who have kindly contributed to the translations of these leaflets:

- Bulgarian - Drs Zhana & Dancha Ignatov
- Estonian - Dr Ilhetic Randi
- Greek - Dr Sofia Dellara
- Farsi - Dr Mehdi Tavakoli
- Georgian - Drs Alex Gokhelashvili, Lasha Phirtkhaleva, Khatabre Sanikide, Alex Kakhidze and Tinothin Chkhvadze
# EPIDURAL INFORMATION CARD

Risks of having an epidural or spinal to reduce labour pain

<table>
<thead>
<tr>
<th>Type of risk</th>
<th>How often does this happen?</th>
<th>How common is it?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significant drop in blood pressure</td>
<td>One in every 50 women</td>
<td>Occasional</td>
</tr>
<tr>
<td>Not working well enough to reduce labour pain so you need to use other ways of lessening the pain</td>
<td>One in every 8 women</td>
<td>Common</td>
</tr>
<tr>
<td>Not working well enough for a caesarean section so you need to have a general anaesthetic</td>
<td>One in every 20 women</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Severe headache</td>
<td>One in every 100 women (epidural)</td>
<td>Uncommon</td>
</tr>
<tr>
<td></td>
<td>One in every 500 women (spinal)</td>
<td></td>
</tr>
<tr>
<td>Nerve damage (numb patch on a leg or foot, or having a weak leg)</td>
<td>Temporary - one in every 1,000 women</td>
<td>Rare</td>
</tr>
<tr>
<td>Effects lasting for more than 6 months</td>
<td>Permanent - one in every 13,000 women</td>
<td>Rare</td>
</tr>
<tr>
<td>Epidural abscess (infection)</td>
<td>One in every 50,000 women</td>
<td>Very rare</td>
</tr>
<tr>
<td>Meningitis</td>
<td>One in every 100,000 women</td>
<td>Very rare</td>
</tr>
<tr>
<td>Epidural haematoma (blood clot)</td>
<td>One in every 170,000 women</td>
<td>Very rare</td>
</tr>
<tr>
<td>Accidental unconsciousness</td>
<td>One in every 100,000 women</td>
<td>Very rare</td>
</tr>
<tr>
<td>Severe injury, including being paralysed</td>
<td>One in every 250,000 women</td>
<td>Extremely rare</td>
</tr>
</tbody>
</table>
What do I warn patients about before a spinal anaesthetic for an obstetric procedure?

- Low blood pressure
- Failure of technique with prompt management
- GA of about 1:100
- Permanent nerve damage is < 1:100,000
- PR medication
- Patient will feel pulling/ pushing/ pressing
- PDPH 1:500
COMPLICATIONS OF REGIONAL TECHNIQUES.

Post dural puncture headache (PDPH)
Incidence of post dural puncture headache for atraumatic (Whitacre) and Quinke needles - average of published studies.

Percentage of patients with post dural puncture headache.

Gauge of needle.

Post dural puncture headache (PDPH)

What is the effect of inserting a catheter through the puncture site?
Effect of leaving catheter in for duration of labour only:

Prevention of postdural puncture headache after accidental dural puncture: a quantitative systematic review.

C. C. Apfel et al


<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Intervention</th>
<th>Control</th>
<th>Risk ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Events Total</td>
<td>Events Total</td>
<td>M-H, Random, 95% CI</td>
</tr>
<tr>
<td>1.1.3 Short-term intrathecal catheter vs no catheter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cohen and colleagues\textsuperscript{28}</td>
<td>8</td>
<td>17</td>
<td>0.41 (0.59, 3.39)</td>
</tr>
<tr>
<td>Norris and Leighton\textsuperscript{29}</td>
<td>19</td>
<td>35</td>
<td>1.04 (0.62, 1.72)</td>
</tr>
<tr>
<td>Ayad and colleagues\textsuperscript{27}</td>
<td>18</td>
<td>35</td>
<td>0.56 (0.40, 0.78)</td>
</tr>
<tr>
<td>Rutter and colleagues\textsuperscript{31}</td>
<td>24</td>
<td>34</td>
<td>0.87 (0.67, 1.14)</td>
</tr>
<tr>
<td>Paech and colleagues\textsuperscript{30}</td>
<td>21</td>
<td>24</td>
<td>1.01 (0.84, 1.22)</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>145</td>
<td>161</td>
<td>0.88 (0.68, 1.14)</td>
</tr>
</tbody>
</table>

Total events: 145

Heterogeneity: $\chi^2=11.02$, df=4 ($P=0.03$); $I^2=64\%$

Test for overall effect: $Z=0.99$ ($P=0.32$)
Effect of leaving catheter in for at least 24 hours following delivery.


<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>ITC Events</th>
<th>Total</th>
<th>Control Events</th>
<th>Total</th>
<th>Weight</th>
<th>Risk Ratio M-H, Random, 95% CI</th>
<th>Risk Ratio M-H, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ayad**</td>
<td>20</td>
<td>66</td>
<td>34</td>
<td>37</td>
<td>10.6%</td>
<td>0.33 [0.23, 0.48]</td>
<td></td>
</tr>
<tr>
<td>Cohen</td>
<td>8</td>
<td>30</td>
<td>5</td>
<td>15</td>
<td>3.8%</td>
<td>0.80 [0.32, 2.03]</td>
<td></td>
</tr>
<tr>
<td>Kaul**</td>
<td>30</td>
<td>60</td>
<td>84</td>
<td>162</td>
<td>12.3%</td>
<td>0.96 [0.72, 1.29]</td>
<td></td>
</tr>
<tr>
<td>Norris</td>
<td>19</td>
<td>35</td>
<td>11</td>
<td>21</td>
<td>8.3%</td>
<td>1.04 [0.62, 1.72]</td>
<td></td>
</tr>
<tr>
<td>Paech</td>
<td>21</td>
<td>24</td>
<td>44</td>
<td>51</td>
<td>14.4%</td>
<td>1.01 [0.84, 1.22]</td>
<td></td>
</tr>
<tr>
<td>Russell**</td>
<td>38</td>
<td>57</td>
<td>36</td>
<td>58</td>
<td>12.7%</td>
<td>1.07 [0.82, 1.41]</td>
<td></td>
</tr>
<tr>
<td>Rutter**</td>
<td>24</td>
<td>34</td>
<td>30</td>
<td>37</td>
<td>12.8%</td>
<td>0.87 [0.67, 1.14]</td>
<td></td>
</tr>
<tr>
<td>Spiegel**</td>
<td>71</td>
<td>102</td>
<td>42</td>
<td>52</td>
<td>14.4%</td>
<td>0.86 [0.72, 1.04]</td>
<td></td>
</tr>
<tr>
<td>Walters**</td>
<td>27</td>
<td>61</td>
<td>24</td>
<td>37</td>
<td>10.8%</td>
<td>0.68 [0.47, 0.99]</td>
<td></td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>469</td>
<td></td>
<td>470</td>
<td></td>
<td>100.0%</td>
<td>0.82 [0.67, 1.01]</td>
<td></td>
</tr>
<tr>
<td>Total events</td>
<td>258</td>
<td></td>
<td>310</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: Tau² = 0.07; Chi² = 33.98, df = 8 (P &lt; 0.0001); I² = 76%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 1.95 (P = 0.06)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig. 2 Intrathecal catheterization and the incidence of postdural puncture headache.

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>ITC Events</th>
<th>Total</th>
<th>Control Events</th>
<th>Total</th>
<th>Weight</th>
<th>Risk Ratio M-H, Random, 95% CI</th>
<th>Risk Ratio M-H, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ayad**</td>
<td>12</td>
<td>66</td>
<td>30</td>
<td>37</td>
<td>11.0%</td>
<td>0.22 [0.13, 0.38]</td>
<td></td>
</tr>
<tr>
<td>Cohen</td>
<td>5</td>
<td>30</td>
<td>3</td>
<td>15</td>
<td>3.6%</td>
<td>0.83 [0.23, 3.03]</td>
<td></td>
</tr>
<tr>
<td>Kaul**</td>
<td>16</td>
<td>60</td>
<td>52</td>
<td>162</td>
<td>12.0%</td>
<td>0.83 [0.52, 1.34]</td>
<td></td>
</tr>
<tr>
<td>Norris</td>
<td>4</td>
<td>35</td>
<td>4</td>
<td>21</td>
<td>3.6%</td>
<td>0.60 [0.17, 2.15]</td>
<td></td>
</tr>
<tr>
<td>Paech</td>
<td>10</td>
<td>24</td>
<td>41</td>
<td>51</td>
<td>11.7%</td>
<td>0.52 [0.32, 0.85]</td>
<td></td>
</tr>
<tr>
<td>Russell**</td>
<td>27</td>
<td>57</td>
<td>32</td>
<td>58</td>
<td>14.4%</td>
<td>0.86 [0.80, 1.23]</td>
<td></td>
</tr>
<tr>
<td>Rutter**</td>
<td>17</td>
<td>34</td>
<td>27</td>
<td>37</td>
<td>13.7%</td>
<td>0.69 [0.46, 1.01]</td>
<td></td>
</tr>
<tr>
<td>Spiegel**</td>
<td>54</td>
<td>102</td>
<td>32</td>
<td>52</td>
<td>15.9%</td>
<td>0.86 [0.85, 1.14]</td>
<td></td>
</tr>
<tr>
<td>Walters**</td>
<td>25</td>
<td>63</td>
<td>34</td>
<td>59</td>
<td>14.0%</td>
<td>0.69 [0.47, 1.00]</td>
<td></td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>471</td>
<td></td>
<td>492</td>
<td></td>
<td>100.0%</td>
<td>0.64 [0.49, 0.84]</td>
<td></td>
</tr>
<tr>
<td>Total events</td>
<td>170</td>
<td></td>
<td>255</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: Tau² = 0.10; Chi² = 23.04, df = 8 (P = 0.003); I² = 65%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 3.18 (P = 0.001)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig. 3 Intrathecal catheterization and the need for epidural blood patch.
Multicentre study – dural punctures randomised to either repeat epidural or spinal catheter left in for at least 24 hours.

• Repeat epidural (47)
  • PDPH - 62%
  • Blood patch – 55%
  • Need for repeat epidural 41%

• Spinal catheter (50)
  • PDPH - 72%
  • Blood patch – 47%
  • Need for repeat epidural 12% (p<0.0004)

• Dural puncture more likely with inexperienced anaesthetists
• Headache more likely post dural puncture if vaginal rather than caesarean delivery
• 16G vs 18G - increased risk of PDPH (RR=2.21, 95% CI 1.4–2.6, P=0.005) and
• 16G vs 18G - increased risk of blood patch (RR=2.92, 95% CI 1.37–3.87, P=0.01)
What is the effect of inserting a catheter through the puncture site?

- May not reduce incidence of headache
- Reduces requirement for blood patch by about 30%
- Ties anaesthetist to patient for top-ups
Blood patches:

**What do I tell the patients before the procedure?**

- Risk of dural puncture 1:100
- Back pain for several hours
- Success 70 to 80% with first patch
- Epidural abcess very rare but signs non-specific
- Give RCofA/ AAGBI leaflet
What problems are associated with a blood patch?

There is a chance that another accidental dural puncture could occur.

A blood patch may not cure your headache. In about 60 – 70% of patients, a blood patch will take away the headache very quickly. In the others, although a blood patch may help initially, the headache soon returns.

‘...when it finally worked, the blood patch was wonderful...’

A blood patch may cause local bruising and backache which lasts for a few days. Epidurals do not cause chronic long-term backache.

‘...I was back to normal very quickly, but my back was stiff for quite a while...’

Difficulty in passing urine, severe pain or loss of sensation in your back or legs are not normal and you should contact your anaesthetist or another doctor immediately.

Infection or bleeding into your back are very rare complications of epidurals, spinals and blood patches.

There are alternative treatments, but none has been shown to be as effective as an epidural blood patch. You can discuss this with your anaesthetist.

This leaflet describes a special type of headache that can occur after having an epidural or spinal anaesthetic.

Many people have epidurals or spinals for surgery. Occasionally, a headache may develop following the procedure.

This leaflet explains the causes, symptoms and treatment of the headache.

Your anaesthetist will be happy to discuss this in greater detail and to answer any questions that you have.

For more information and help, please contact the anaesthetic department in your local hospital.

Booklets produced in the same series by the Royal College of Anaesthetists and Association of Anaesthetists are available at www.youranaesthetic.info. They include:

- Epidurals for pain relief after surgery
- Your spinal anaesthetic

The Royal College of Anaesthetists
The Association of Anaesthetists of Great Britain and Ireland

Second edition December 2003

© The Royal College of Anaesthetists (RCA) and The Association of Anaesthetists of Great Britain and Ireland (AAGBI)

This leaflet will be reviewed within five years of the date of publication
Procedure for blood patch:

- Full aseptic technique – two anaesthetists
- Patient sitting or lying as tolerated/ preference
- Epidural space identified – loss of resistance
- Blood drawn from patient aseptically
- Blood injected slowly – may be painful
- Flush Tuohy needle with saline and withdraw
Effect of volume and timing of blood patch:

Table 4. Incidence of Headache Relief After Epidural Blood Patch

<table>
<thead>
<tr>
<th></th>
<th>&lt;48 hours</th>
<th>≥48 hours</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>永久或部分缓解</td>
<td>永久性缓解</td>
<td></td>
</tr>
<tr>
<td>15 mL</td>
<td>33.3 (9.0–65.1)</td>
<td>72.4 (52.8–87.3)</td>
<td>61.0 (44.5–75.8)</td>
</tr>
<tr>
<td>20 mL</td>
<td>61.5 (31.6–86.1)</td>
<td>78.6 (59.1–91.7)</td>
<td>73.2 (57.1–85.8)</td>
</tr>
<tr>
<td>30 mL</td>
<td>56.3 (29.9–80.3)</td>
<td>73.9 (51.6–89.9)</td>
<td>66.7 (49.8–80.9)</td>
</tr>
<tr>
<td>永久性缓解a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 mL</td>
<td>0.0 (0–26.5)</td>
<td>13.8 (3.9–31.7)</td>
<td>9.8 (2.7–23.1)</td>
</tr>
<tr>
<td>20 mL</td>
<td>15.4 (1.9–45.5)</td>
<td>39.3 (21.5–59.4)</td>
<td>32.3 (18.1–48.1)</td>
</tr>
<tr>
<td>30 mL</td>
<td>25.0 (7.3–52.4)</td>
<td>26.1 (10.2–48.4)</td>
<td>25.6 (13.0–42.1)</td>
</tr>
</tbody>
</table>

Values are percentages (Clopper-Pearson binomial 95% confidence intervals). Summaries are shown for both strata and overall.

*Statistically significant differences in the rates of permanent relief were found between the groups on chi-square test (P = 0.048), with the less-than-expected number of permanent responses seen in the 15-mL group. Further comparisons using logistic regression analysis showed that the response achieved in the 20-mL group was significantly higher than that achieved in the 15-mL group (odds ratio [OR] = 4.49, confidence interval [CI] = 1.31–15.42; P = 0.017), while the higher response in the 30-mL group was not significantly different from that in the 15-mL group (OR = 3.56, CI = 0.99–12.73; P = 0.051).
Which interspace to site the blood patch?

Figure. T2–turbo spin-echo MRI of the cervicothoracic spine. Sagittal (A) and transversal (B) sections show a hyperintense epidural fluid collection (arrows) indicating high protein containing remnants of the epidural blood clot extending from vertebra C7 to the thoracic spine. Giess R et al. Neurology 2003;61:1449-1449
Management of post dural puncture headaches: Post-procedure

- No good evidence
- My practice
  - Lie completely flat for 2 hours
  - Sit up in bed for 2 hours
  - Mobilise and if symptom free can go home
The headache is the result of sagging of the intracranial contents, which causes tension on pain sensitive structures in the meninges.

In some cases, this may lead to cranial nerve palsies. Subdural haematoma and hygroma have also been reported and are thought to result from rupture of bridging veins when the brain pulls away from the dura as the CSF volume decreases.

Sagittal MRI of patient with low pressure headache – the brain has “sagged”. The “*” should be on the line.
COMPLICATIONS OF REGIONAL TECHNIQUES.

Hypotension
Low blood pressure for patient undergoing spinal anaesthesia for caesarean section.
Frequency of BP measurement and hypotension.

Percentage fall in BP in first 10 minutes - Mean (SD).

Number of BP measurements in first 10 minutes.
Hypotension and spinals

• Difficult to predict precisely
• Many units use prophylactic vasopressor infusions
Oxytocin administered as an i.v. bolus of 10 IU induces chest pain, transient profound tachycardia, hypotension, and concomitant signs of myocardial ischaemia according to marked ECG and STC-VM changes.

Phenylephrine or ephedrine?

Figure 1. Meta-analysis of trials. The effect of phenylephrine versus ephedrine on umbilical cord arterial blood pH. Data are mean difference with 95% confidence intervals.


Anesth Analg 2002;94:920–6
COMPLICATIONS OF REGIONAL TECHNIQUES.

Nerve damage

• We are poor at identifying the correct spinal interspace

• Even so serious side effects of regional anaesthesia/ analgesia are rare

• Most post delivery neurological deficit is non-anaesthetic
Mechanisms of nerve damage

- Bleeding
- Infection
- Trauma
- Neurotoxicity - rare
Mechanisms of nerve damage

• Bleeding
• Infection
• **Trauma**
• Neurotoxicity - rare
How may direct damage to spinal by spinal needle

• Anaesthetists are poor at correctly identifying the interspace
• The spinal cord may be lower down in some patients
Assessment of interspace level by experienced anesthetists accurate in only 29%.

The true level was

- one segment higher in 51%,
- two in 15.5%,
- three in 1% and
- four in 0.5%.

Foot drop after spinal anesthesia in a patient with a low-lying cord F.U. Ahmad, P. Pandey, B.S. Sharma, and A. Garg

- Broadbent et al. found that the conus medullaris was below the first lumbar vertebra in 19% of patients.
- In 690 patients, Tuffier’s line was always below the end of the conus.
- The distance between the conus and Tuffier’s line is less in cases of females than males, and this distance decreases with age.

Tuffier's line = L4,5 a horizontal line on the highest points of iliac crest.
Anatomy of lumbar spine showing sites for dural puncture

Puncture site (L4-5 interspace)

Level of posterior superior iliac crests
To avoid hitting the cord with a spinal needle:

• Never site a spinal above L3
• Identify Tuffier’s line
• Insert spinal as close to this line as possible
• Preferably no more than 2 interspaces above
Table 7 Incidence of permanent harm (including death) after CNB with ‘pessimistic’ (see text for explanation) interpretation of data: events per 100,000 cases (95% CI). N/A, zero denominator (i.e. no cases reported in this group in the ‘snapshot’ phase of the project)

<table>
<thead>
<tr>
<th></th>
<th>Perioperative</th>
<th>Obstetric</th>
<th>Chronic pain</th>
<th>Paediatric</th>
<th>Non-anaesthetists</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epidural</td>
<td>17.4 (7.2–27.8)</td>
<td>0.6 (0–3.4)</td>
<td>0 (0–10.7)</td>
<td>0 (0–95.9)</td>
<td>0 (0–121.1)</td>
<td>6.1 (3.6–9.7)</td>
</tr>
<tr>
<td>Spinal</td>
<td>2.6 (1.0–6.2)</td>
<td>1.5 (1.0–5.4)</td>
<td>0 (0–226.1)</td>
<td>0 (0–921.8)</td>
<td>0 (0–386.6)</td>
<td>2.2 (1.0–4.4)</td>
</tr>
<tr>
<td>CSE</td>
<td>18.2 (3.7–53.0)</td>
<td>3.9 (1.0–22.0)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>9.6 (2.6–24.5)</td>
</tr>
<tr>
<td>Caudal</td>
<td>0 (0–33.3)</td>
<td>N/A</td>
<td>8.8 (1.0–49.0)</td>
<td>0 (0–16.6)</td>
<td>0 (0–32.8)</td>
<td>2.1 (1.0–11.7)</td>
</tr>
<tr>
<td>Total</td>
<td>8.0 (5.2–11.8)</td>
<td>1.2 (1.0–3.2)</td>
<td>2.5 (1.0–13.7)</td>
<td>0 (0–13.9)</td>
<td>0 (0–24.2)</td>
<td>4.2 (2.9–6.1)</td>
</tr>
</tbody>
</table>

Table 8 Incidence of permanent harm (including death) after CNB with ‘optimistic’ (see text for explanation) interpretation of data: events per 100,000 cases (95% CI). N/A, zero denominator (i.e. no cases reported in this group in the ‘snapshot’ phase of the project)

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<tr>
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<td>0 (0–2.2)</td>
<td>0 (0–226.1)</td>
<td>0 (0–921.8)</td>
<td>0 (0–386.6)</td>
<td>0.9 (0–2.7)</td>
</tr>
<tr>
<td>CSE</td>
<td>12.1 (1.5–43.7)</td>
<td>0 (0–11.8)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>4.8 (1.0–17.3)</td>
</tr>
<tr>
<td>Caudal</td>
<td>0 (0–33.3)</td>
<td>N/A</td>
<td>0 (0–26.3)</td>
<td>0 (0–16.6)</td>
<td>0 (0–32.8)</td>
<td>0 (0–6.3)</td>
</tr>
<tr>
<td>Total</td>
<td>4.2 (2.2–7.1)</td>
<td>0.3 (0–1.7)</td>
<td>0 (0–7.4)</td>
<td>0 (0–13.9)</td>
<td>0 (0–24.2)</td>
<td>2.0 (1.1–3.3)</td>
</tr>
</tbody>
</table>
Number of women with different postpartum nerve palsies.
Total incidence = 0.92% of 6057 assessed.

COMPLICATIONS OF REGIONAL TECHNIQUES

Nerve damage - summary

• We are poor at identifying the correct spinal interspace

• Even so serious side effects of regional anaesthesia/ analgesia are rare

• Most post delivery neurological deficit is non-anaesthetic
MANAGEMENT OF OBSTETRIC EMERGENCIES

Dr Martin Feast
Consultant Anaesthetist
CPD Matrix: 2B05
Management of Obstetric Emergencies

- Overview of common and uncommon emergencies
- Tips for non-obstetric anaesthetists
- Questions
Obstetric Emergencies

- Major obstetric haemorrhage
  - Uterine inversion
- Severe PET
  - Use of magnesium
- Maternal collapse
  - Amniotic fluid embolism
- Perimortem caesarean section
Major obstetric haemorrhage

• Unexpected
  • Retained placenta
  • Uterine inversion
  • Vaginal tears
  • Uterine rupture
  • Surgical damage
  • Uterine atony
  • Acquired coagulopathy

• Anticipated
  • Placenta praevia
  • **Placenta accreta / percreta**
  • Maternal coagulopathy
  • Multiple pregnancy
  • Multiple previous LSCS
  • Previous PPH
Placenta praevia

- Emergency LSCS
  - In labour
  - Bleeding
- Where is the placenta?
  - Anterior or posterior
  - Risk of undiagnosed accreta?

- Choice of anaesthetic
  - Regional vs GA
  - Invasive monitoring?
  - Cross matched blood vs electronic issue
  - Cell salvage
Uterine Inversion

- Mismanagement 3rd stage
- Sudden rise in intra abdominal pressure-coughing, vomiting
- Morbidly adherent placenta
- Manual removal of placenta- esp at LSCS
- Abnormally short umbilical cord
- Connective tissue disorders e.g. Marfan’s
Presentation

- Severe sustained hypogastric pain in 3\textsuperscript{rd} stage
- Shock out of proportion to blood loss
- Obvious- boggy mass with placenta attached (least common)
Management

• DO NOT REMOVE PLACENTA
  Immediate manual replacement
if fails:
• SUMMON HELP - wide bore cannulae x2,
  X-match, catheter
• Theatre – preferably GA to help relax uterus
• May need tocolysis
• After replacement will need syntocinon infusion
Tocolysis

- Terbutaline iv 250mcg in 5 ml saline over 5 mins
- Magnesium sulphate 2-4g iv over 5mins
- Nitroglycerine 100mcg iv – given by adding 5mg to 1000ml saline and drawing up 20ml which is slowly titrated. Acts within 90 secs
Massive Obstetric Haemorrhage

- Declare the emergency
- Easy to underestimate blood loss
- Don’t forget the O-neg
- Know your local major haemorrhage protocol
- Invasive monitoring
Blood loss is underestimated at caesarean section – Bland and Altman plot.
MAJOR OBSTETRIC HAEMORRHAGE - HAEMATOLOGICAL SUPPORT

Estimated blood loss 1500mls or greater and continuing to bleed OR clinical shock

Phone Blood bank at RHH 12333/68602 (out of hours bleep via switch board)
Give patient details and state MAJOR OBSTETRIC HAEMORRHAGE
Ask blood bank if Electronic issue is available

Send samples for URGENT cross matching, FBC, clotting screen, U+E, LFTS
Support worker to take FBC and Crossmatch samples to blood bank, wait there until
matched blood is available and bring 6 units back to Jessop theatre
Then return to blood bank to collect FFP x3 and Cryoprecipitate x2

Give tranexamic acid 1gram IV

If cannot wait for cross matched blood give O NEGATIVE (2 units in Jessop wing Obstetric theatre blood fridge)

If able to wait for cross matched blood:
Give 4 units blood (available 5-10 minutes after receipt of blood sample)
If on going blood loss give
3x FFP and 2x cryoprecipitate without waiting for clotting results
If blood loss ceases after blood transfusion send repeat urgent FBC and clotting. Await results before giving
FFP and Cryoprecipitate

MAINTAIN
Hb >8g/dl
Hct >0.30
PT and APTT <1.5 x mean of normal range
Platelets >75 x 10^9/l
Fibrinogen >2g/l

If still bleeding after 4 units blood, 3x FFP and 2x cryoprecipitate, Contact on call haematology registrar and send urgent FBC and coagulation and give another 4 units blood, 3x FFP and 2x cryoprecipitate.

Give 1 unit platelets if platelet count is less than 100,000.

If still bleeding discuss further management with on call haematology registrar who will liaise with on call consultant for coagulation.

NB cryoprecipitate and platelets should NOT be stored in fridge
Communication

• Midwives
• Obstetricians
• Anaesthetists
• Blood Bank / laboratories
• Haematologist
• Theatre Staff
• Critical Care
• Porters
• Interventional radiologist
Communication

• Midwives
• Obstetricians
• Anaesthetists
• Blood Bank / laboratories
• Haematologist
• Theatre Staff
• Critical Care
• Porters
• Interventional radiologist
Causes 4Ts

- TONE
  - Abnormalities of uterine contraction
- TISSUE
  - Retained products of conception
- TRAUMA
  - Of the genital tract
- THROMBIN
  - Abnormalities of coagulation
Uterine atony

- Pharmacological
  - Syntocinon iv (Carbetocin is longer acting newer agent)
  - Ergometrine iv/im
  - Carboprost im
  - Misoprostol pr

- No evidence to recommend any one uterotonic over another
Surgical

- Uterine massage
- B lynch suture
- Rusch balloon
- Internal iliac artery ligation
- Hysterectomy
Haematological

- Correct coagulopathy
  - Cryoprecipitate
  - FFP
  - Platelets
  - Tranexamic acid
- Maintain Hb $> 10$
- (Consider rFactor VIIa)
- Fibrinogen???
The importance of fibrinogen?

• “a fibrinogen level of <2g/dL was a strong predictor for the development of severe PPH”

• “the maternal fibrinogen level was independently associated with severe PPH: adjusted OR 1.9, 95% CI 1.16–3.09 for fibrinogen levels between 2-3g/dL, and 11.99, 95% CI 2.56–56.06 for fibrinogen levels <2g/dL.”

• “A retrospective study also reported a significant negative association between the total estimated blood loss and nadir fibrinogen levels in a cohort of 456 women experiencing severe PPH (r −0.48, P<0.01).” de Lloyd L, Bovington R, Kaye A, et al.
What next?

- Interventional radiology
- Availability
- Patient transfer
Interventional radiology

• Proximal vessels
  • Balloons

• Distal vessels
  • Embolization (microparticles, glues)
Perioperative Endovascular Internal Iliac Artery Occlusion Balloon Placement in Management of Placenta Accreta.

Cher Et Al AJR:189 November 2007
Left internal iliac angiography shows contrast extraversion from a cervical branch of the left uterine artery (arrows). The bleeding is directly into the uterine cavity.

The left uterine artery was embolized with a microcoil and glue after superselection of the bleeding artery. The bleeding stopped immediately after embolization.
Don’t forget

- Warming
- Rapid infusor
- Antibiotics
- Cell salvage
Pre-eclampsia

- Management of hypertension
- Emergency LSCS
  - Cat 1
  - Cat 2 or 3
- Eclampsia
Management of hypertension

- Protocol
- Obstetrician
NICE Guideline
Aug 2010

• Severe hypertension
  • BP 160/110 or higher

• Moderate hypertension
  • BP 150/100 or higher
NICE Guideline

- Oral labetalol
  - Aim for systolic BP < 150, diastolic BP 80-100

- Only offer women with pre-eclampsia antihypertensive treatment other than labetalol after considering side-effect profiles for the woman, fetus and newborn baby
  - Methyldopa, nifedipine
Emergency LSCS

- Blood pressure control pre-op
- Choice of anaesthetic
  - GA vs regional
Eclampsia

- Usually self-limiting seizure
- Treatment aimed at
  - Controlling blood pressure
  - Preventing recurrent seizures
- Foetal monitoring?
- Immediate delivery NOT required
Magnesium

- Drug of choice for preventing recurrent eclamptic seizures
- 4g loading dose over 5 minutes, 1g per hour infusion? (Collaborative Eclampsia Trial regimen, NICE guidance)
- Recurrent seizures give further 2-4g iv over 5 minutes (NICE guidance)
- If continue to fit, consider differential diagnosis
- Follow the protocol
Magnesium

- Severe pre-eclampsia?
- Consider giving intravenous magnesium sulphate to women with severe pre-eclampsia who are in a critical care setting if birth is planned within 24 hours. (NICE guidance)
Control of hypertension

- iv labetalol
- iv hydralazine
- Oral nifedipine
Maternal collapse
Eclampsia
Intracranial haemorrhage

Pulmonary embolism
Amniotic fluid embolism

Drugs: magnesium sulphate
local anaesthetic
illicit drugs

Haemorrhage: splenic artery rupture
hepatic rupture
uterine (antepartum
haemorrhage/postpartum
haemorrhage)

Anaphylaxis
Aortic dissection
Cardiac causes: arrhythmias
myocardial infarction
cardiomyopathy

Hypoglycaemia

Sepsis
Maternal Collapse

• Amniotic fluid embolus
• Local anaesthetic toxicity
Amniotic fluid embolus

- 2 in 100,000 maternities
- Survival rates:
  - 1979 14%
  - 2005 30%
  - 2010 80%
- Neurological morbidity in survivors
Presentation

- Acute hypotension
- Respiratory distress
- Acute hypoxia
- Seizures
- Cardiac arrest
Different phases

• Pulmonary hypertension may develop (vascular occlusion by debris or by vasoconstriction)

• Left ventricular dysfunction or failure

• Coagulopathy causing PPH

• Profound foetal distress if ante-partum

• Underlying pathology compared to anaphylaxis or severe sepsis
Treatment

- Supportive
- No antenatal diagnostic test
Local anaesthetic toxicity

- Signs & Symptoms
  - Circumoral tingling
  - Deafness
  - Lightheadedness
  - Twitching
  - Convulsions

- Arrhythmias
  - Sinus bradycardia
  - Conduction blocks
  - Asystole
  - Ventricular tachyarrhythmias
AAGBI Safety Guideline
Management of Severe Local Anaesthetic Toxicity

1 Recognition

Signs of severe toxicity:
- Sudden alteration in mental status, severe agitation or loss of consciousness, with or without tonic clonic convulsions
- Cardiovascular collapse, including hypotension, bradycardia, conduction blocks, asystole and ventricular tachycardia or fibrillation may all occur
- Local anaesthetic (LA) toxicity may occur some time after an initial injection

2 Immediate management

- Stop injecting the LA
- Call for help
- Maintain the airway and, if necessary, secure it with a tracheal tube
- Give 100% oxygen and ensure adequate lung ventilation (hypoventilation may help by increasing plasma pH in the presence of metabolic acidosis)
- Confirm or establish intravenous access
- Control incidents: give a benzodiazepine, thiopental or propofol in small incremental doses
- Assess cardiovascular status throughout
- Consider drawing blood for analysis, but do not delay definitive treatment to do this

3 Treatment

IN CIRCULATORY ARREST
- Start cardiopulmonary resuscitation (CPR) using standard protocols
- Manage arrhythmias using the same protocols, recognising that arrhythmias may be very refractory to treatment
- Consider the use of cardiopulmonary bypass if available
- GIVE INTRAVENOUS LIPID EMULSION (following the regimen overleaf)

WITHOUT CIRCULATORY ARREST
- Use conventional therapies to treat:
  - Hypotension
  - Bradycardia
  - Tachycardia

CONSIDER INTRAVENOUS LIPID EMULSION (following the regimen overleaf)
- Propofol is not a suitable substitute for lipid emulsion
- Lidocaine should not be used as an anti-arrhythmic therapy

4 Follow-up

- Arrange safe transfer to a clinical area with appropriate equipment and suitable staff until sustained recovery is achieved
- Exclude pancreatitis by regular clinical review, including daily amylase or lipase assays for two days
- Report cases as follows:
  - in the United Kingdom to the National Patient Safety Agency (via www.npsa.nhs.uk)
  - in the Republic of Ireland to the Irish Medicines Board (via www.imb.ie)
- If Lipid has been given, please also report its use to the international registry at www.lipidregistry.org. Details may also be posted at www.lipidescue.org

Your nearest bag of Lipid Emulsion is kept...

An approximate dose regimen for a 70-kg patient would be as follows:

IMMEDIATELY
- Give an initial intravenous bolus injection of 20% lipid emulsion 100 ml over 1 min
- Start an intravenous infusion of 20% lipid emulsion at 200 mlkg\(^{-1}\)h\(^{-1}\)

AFTER 5 MIN
- Give a maximum of two repeat boluses of 100 ml
- Continue infusion until stable and adequate circulation restored or maximum dose of lipid emulsion given

Do not exceed a maximum cumulative dose of 12 mlkg\(^{-1}\)

This AAGBI Safety Guideline was produced by a Working Party that comprised:
- Grant Keen, William Harry-Ellis (Chair), Martin Hafley, Tim Bruce, John Picard, Tom Short and Guy Winsberg
- The Association of Anaesthetists of Great Britain & Ireland 2010

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Maternal resuscitation

• Supportive treatment
  • Follow BLS/ALS algorithms
• In case of maternal cardiac arrest perform peri-mortem caesarean section if resuscitation not successful
Maternal Cardiac Arrest

- Wedged?
- Compressions from left or right side?
- Study reported in IJOA using mannekin
Perimortem Caesarean Delivery

- Arrest to delivery time
- Where to deliver?
- Who is going to do it?
- Incision
  - midline vs pfannenstiel
If no response to CPR after 4 minutes, proceed to delivery/perimortem caesarean section.

During CPR:
- Ensure high-quality CPR: rate, depth, recoil
- Plan actions before interrupting CPR
- Give oxygen
- Consider advanced airway and cannography
- Continuous chest compressions when advanced airway in place
- Vascular access (intravenous, intrarosophus)
- Give adrenaline every 3-5 minutes
- Correct reversible causes

Reversible causes:
- Hypoxia
- Hypovolaemia
- Hypo/hyperkalaemia/metabolic
- Hypothermia
- Thrombosis – coronary or pulmonary
- Tamponade – cardiac
- Infections
- Tension pneumothorax
Perimortem Caesarean Delivery


- Identified 94 cases of PMCD
- 54% of mothers survived to hospital discharge
- PMCD felt to be helpful in 32% and not harmful in any
- Best outcomes were with in hospital arrest and PMCD within 10 minutes
Neonatal outcome

- Survivors
  - mean arrest to delivery time was 14 +/- 11 minutes

- Non-survivors
  - mean arrest to delivery time 22 +/- 13 minutes
Fire drills

- Recommended in CEMACH reports
- Multiprofessional training for CNST requirements