Abstracts of free papers presented at the annual meeting of the Obstetric Anaesthetists' Association, Liverpool, 24 & 25 May 2012

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O1 Choice of anaesthetic agents for obstetric anaesthesia: are national trends changing?

H Murdoch, C Laxton
Dept. of Anaesthesia, Southmead Hospital, Bristol, UK

Introduction: Traditional teaching of general anaesthesia (GA) for caesarean section (CS) recommends rapid-sequence induction (RSI) with thiopental, suxamethonium, nitrous oxide/oxygen with opioids post delivery and volatile agent for maintenance. Evidence for this technique is in part historical and modification of RSI technique for non-obstetric cases is common practice according to a 2009 survey.1 As no ideal induction agent exists, and with limited comparative data from randomised controlled trials, agent choice remains a controversial subject.2 The 2011 CMACE report highlights the importance of emergence from anaesthesia and rapid recovery from drugs used for maintenance.3 Overseas use of propofol for obstetric anaesthesia is increasing and newer inhalational agents, with fast recovery profiles, are available for maintenance of anaesthesia. We invited opinion from UK consultant obstetric anaesthetists to obtain a snapshot of current practice and to determine preferences for use of different anaesthetic agents.

Methods: An Obstetric Anaesthetists’ Association (OAA) approved national survey was sent to all consultant members between September and December 2011, with questions on current practice and drug preferences for caesarean section under general anaesthesia.

Results: Response rate was 691/1228 (56%). Rationale for a particular induction agent was mostly historical (37%) and to reduce awareness (31%).

<table>
<thead>
<tr>
<th>Induction agent currently used</th>
<th>Thiopental</th>
<th>Propofol</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>GACS</td>
<td>93%</td>
<td>6%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Inhalational agent currently used</td>
<td>Isoflurane</td>
<td>Sevoflurane</td>
<td>Desflurane</td>
</tr>
<tr>
<td>for GA CS</td>
<td>47%</td>
<td>52%</td>
<td>1%</td>
</tr>
</tbody>
</table>

Respondents routinely use opioids during RSI in 15%, nitrous oxide during GA in 85% and 37% use TAP blocks. Trainees were not encouraged to use thiopental outside obstetrics in 31% of responses and only 13% of respondents used thiopental outside obstetrics more frequently than monthly. A change to propofol for induction would definitely and probably be considered in 15% and 43% respectively. The majority of anaesthetists (82%) would prefer to use sevoflurane or desflurane for maintenance.

Discussion: The overwhelming majority of UK consultant obstetric anaesthetists (93%) use thiopental for induction. The use of propofol would be considered by 58%, an increase of 32% from the OAA controversies meeting in 2003.2 Our survey demonstrates that current practice is consistent with traditional teaching although a significant body of opinion expressed a desire for newer induction and maintenance agents. Further research and a national consensus statement are urgently required to provide guidance regarding use of these anaesthetic agents in obstetrics.

References

O2 Comparison of ankle versus arm blood pressure measurement at elective caesarean section

MJP Drake, JS Hill
Department of Anaesthesia, National Women’s Health, Auckland City Hospital, Auckland, New Zealand

Introduction: Early detection of hypotension at caesarean section is important since reduced uteroplacental perfusion can be detrimental to the fetus and nausea and vomiting are unpleasant for the mother. Shivering and movement artefact can interfere with non-invasive blood pressure (NIBP) measured on the arm, and the cuff can cause discomfort; these problems can be avoided by measuring NIBP at the ankle during neuraxial anaesthesia. Since aortocaval compression reduces femoral arterial pressure more than brachial, ankle NIBP may also better reflect uteroplacental perfusion.1 We investigated reliability, accuracy and acceptability of arm and ankle NIBP measurements at caesarean section.

Methods: Following ethical approval 67 women with term singleton pregnancies for elective caesarean section were recruited. All received regional anaesthesia. NIBP cuffs were applied to the left arm and ankle. Regular concurrent blood pressure measurements were taken throughout the case. Failed or slow readings were noted. Patient satisfaction data of ankle versus arm NIBP measurement were collected.

Results: 2322 pairs of NIBPs were compared by Bland-Altman analysis. Mean difference (95% limits of agreement lower, upper) between arm and ankle NIBP for mean arterial pressure (MAP) was 0.80mmHg (-19.56, 21.16), systolic blood pressure was -11.55mmHg (-43.96, 20.85), and diastolic blood pressure (DBP) was 3.89mmHg (-17.63, 25.41). 19% stated that the arm cuff caused discomfort or pain (0% for ankle cuff) and 58% thought the arm cuff affected their ability to hold their baby (0% for ankle cuff). 6.9% of arm NIBP readings either failed completely or had a prolonged measurement time; this was just 2.4% for the ankle NIBP readings.

Figure: Bland-Altman plot comparing arm and ankle MAP. Mean difference, upper and lower limits of agreement shown.

Discussion: It is advantageous to measure NIBP at the ankle during caesarean delivery under regional anaesthesia as MAP and DBP readings are similar at arm and ankle. Use of an ankle NIBP cuff for caesarean section has fewer failed or slow readings and is more acceptable for patients in terms of comfort and ability to hold their baby, thus facilitating benefits of early skin-to-skin contact.2

References
**O3 Distractions during critical phases of anaesthesia in the obstetric theatre**

J V Wilkinson, A Jenkins, MA Broom,* MA Akeroyd,† S Young

Anaesthetics, Princess Royal Maternity, Glasgow, UK, *Anaesthetics, Western Infirmary, Glasgow, UK, †MRC Institute of Hearing Research, Glasgow Royal Infirmary, Glasgow, UK

**Introduction:** Accidents in aviation have been attributed to distractions in flight crews. This led to the sterile cockpit rule and pilots refraining from all non-essential conversations and activity during critical phases of flight. Take off and landing can be considered analogous to critical phases of anaesthesia and has been looked at in general theatres. We decided to look at distractions in the obstetric theatre environment.

**Methods:** Approval for our study was gained from the West of Scotland Research Ethics Service. Permission was sought from the duty anaesthetic consultant to obtain data during caesarean section. Data were collected at the time of establishing regional anaesthesia (phase 1), time of testing of the block (phase 2) and following delivery of the head (phase 3). We recorded the nature and frequency of potential distractions, including background noise levels, sudden loud noises, number of alarms, music playing, staff present, entrances / exits to and from theatre and conversations unrelated to the task in hand.

**Results:** We collected data for 30 patients during the 3 phases of anaesthesia.

**Table:** Auditory distractions during 3 phases of anaesthesia.

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<th>Phase 2</th>
<th>Phase 3</th>
<th>P value</th>
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<tr>
<td>Mean sound (dB)</td>
<td>62.5(3.9)</td>
<td>63.9(4.1)</td>
<td>66.8(5.0)</td>
<td>&lt;0.0011</td>
</tr>
<tr>
<td>Alarms/min</td>
<td>0(0-0)</td>
<td>0[0-0.1]</td>
<td>0[0-0]</td>
<td>0.033</td>
</tr>
<tr>
<td>Conversations/min</td>
<td>3.4[2.7-3.9]</td>
<td>4[3.6-4.5]</td>
<td>4.3[3.6-5.0]</td>
<td>0.0062</td>
</tr>
<tr>
<td>Entrance/exit/min</td>
<td>0.6[0.3-0.8]</td>
<td>0.5[0.4-0.7]</td>
<td>0.2[0-0.4]</td>
<td>&lt;0.0012</td>
</tr>
<tr>
<td>Music playing</td>
<td>16[53%]</td>
<td>14[46%]</td>
<td>15[50%]</td>
<td>0.93</td>
</tr>
<tr>
<td>No of staff present</td>
<td>6[6-8]</td>
<td>8[7-9]</td>
<td>10[9-11]</td>
<td>&lt;0.0012</td>
</tr>
<tr>
<td>Events &gt;70dB/min</td>
<td>0.05[0-0.2]</td>
<td>0.13[0-1.3]</td>
<td>0.6[0-3.8]</td>
<td>&lt;0.0012</td>
</tr>
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The reported values are either mean (SD), median [IQR], or proportion. P values are from (1) repeated measures ANOVA, (2) Friedman's non-parametric test,(3) Chi-square test.

**Discussion:** We observed clinically higher decibel levels compared with a previous study in general theatres (sound levels during induction, maintenance and emergence were 46, 52 and 58 dB respectively). There were also a significant number of events >70 dB and many other distracting events which could potentially affect patient safety. The sterile cockpit may have a role in the obstetric theatre.

**References**


**O4 Efficacy of leucocyte filters with unwashed blood salvaged at caesarean section**

JP Campbell, MJ Mackenzie, SM Yentis, SR Sooranna,* MR Johnson,*

Department of Anaesthesia, Chelsea and Westminster Hospital, London, UK, *Academic Department of Obstetrics, Chelsea and Westminster Hospital, London, UK

**Introduction:** Haemorrhage remains one of the most important global causes of maternal death. Cell salvage is too costly for use in many parts of the world; we have previously shown that a leucocyte filter alone removes cellular components of amniotic fluid (AF), suggesting its possible use as a cheaper option. Here, we studied its efficacy with blood salvaged at caesarean section.

**Methods:** With REC approval and written informed consent, 150-mL samples were taken from the suction bottles (with ACD-A added) at 10 elective caesarean sections. Half of each sample was passed under gravity through a LeukoGuard® RS filter (Pall Biomedical, UK). Samples were analysed for: fetal squames using an improved Neubauer hemocytometer (Hawksley, UK), lamellar bodies (LBs) by electronic resonance detection (Sysmex XE2100, Sysmex, UK), hair, meconium and vernix by microscopy and α-fetoprotein by immunoassay (Abbott Architect i2000SR, USA). Results were compared with paired t tests, P < 0.05 indicating statistical significance.

**Results:** Mean (SD) filtration efficiency for fetal squames and LBs was respectively 99 (1) % and 71 (14) %. Hair, meconium and vernix were completely removed but filtration had no effect on α-fetoprotein (Table).

**Table:** Amniotic fluid components pre-/post filtration.

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<th>Post</th>
<th>P value</th>
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<td>Fetal squames; cells/μL</td>
<td>163 (68)</td>
<td>2 (1)</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>LB count; x 10⁹/L</td>
<td>34 (13)</td>
<td>18 (9)</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Hair</td>
<td>7 (70%)</td>
<td>0 (0%)</td>
<td>0.04</td>
</tr>
<tr>
<td>Meconium</td>
<td>10 (100%)</td>
<td>0 (0%)</td>
<td>0.003</td>
</tr>
<tr>
<td>Vernix</td>
<td>10 (100%)</td>
<td>0 (0%)</td>
<td>0.0004</td>
</tr>
<tr>
<td>α-Fetoprotein; μg/L</td>
<td>572(515)</td>
<td>577(519)</td>
<td>0.68</td>
</tr>
</tbody>
</table>

Values are mean (SD) or number (proportion).

**Discussion:** The leucocyte filter was very efficient at removing fetal squames, LBs, hair, meconium and vernix from blood contaminated with AF, but had no effect on α-fetoprotein, as shown previously. Cell salvage using filtration alone may yet prove to be useful in dire situations of maternal haemorrhage in the developing world where no alternative exists.

**Acknowledgements:** Supported by an Obstetric Anaesthetists’ Association Small Project Grant. We are grateful to Pall Corporation for donating the filters.

**References**

O5 Management of patients who decline blood transfusion - an OAA-approved national survey

AP Jennings, C Brennan
Anaesthetics, Russells Hall Hospital, Dudley, UK

Introduction: Refusal of blood and blood products in major obstetric haemorrhage exposes Jehovah’s witnesses (JWs) or other women who refuse blood transfusion to an increased risk of maternal death. Specialist senior-led obstetric care is required to minimise bleeding risk and manage active haemorrhage. Currently these patients are managed in all UK obstetric units with local variation in policy, training, personnel and equipment. We sought to establish current UK practice.

Methods: After OAA approval (survey number 122) an e-mail questionnaire was sent to 213 lead obstetric anaesthetists in December 2011. Questions were posed on antenatal, perinatal and postnatal care including consent, anaesthetic technique and use of blood conservation techniques.

Results: The response rate was 52% (110 replies) with all units treating patients who refuse blood transfusion. 52% of units treat <10 patients per annum and 69% see patients antenatally to discuss management. 84% of units have guidelines for the management of JWs and 83% use a specific "no blood" consent form. Antenatal haemoglobin optimisation is used in some units (oral haematinics 31%; erythropoietin 21%).

Routine management of high risk JW parturient for elective caesarean section

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Number of units</th>
</tr>
</thead>
<tbody>
<tr>
<td>General anaesthesia</td>
<td>21 (19%)</td>
</tr>
<tr>
<td>Invasive monitoring</td>
<td>9 (8%)</td>
</tr>
<tr>
<td>Prolphylatic interventional radiology</td>
<td>32 (29%)</td>
</tr>
<tr>
<td>Empirical use of additional uterotonic agents e.g. ergometrine, carboprost</td>
<td>56 (51%)</td>
</tr>
<tr>
<td>Acute normovolema haemodilution</td>
<td>14 (12%)</td>
</tr>
<tr>
<td>Peri-operative cell salvage</td>
<td>86 (78%)</td>
</tr>
<tr>
<td>Transfer to tertiary unit</td>
<td>22 (20%)</td>
</tr>
</tbody>
</table>

The 'continuous connectivity' mode of cell salvage is discussed with patients in 50% of units although only 23% can provide a reliable out-of-hours service (25% have no cell salvage at all). 27% of units have access to a 24-hour interventional radiology service. Consultant anaesthetist-led theatre care is mandated in 30% of units; consultant obstetrician in 24%. Pre-emptive Syntocinon infusion is used in many units (all deliveries 21%; caesarean 51%).

Discussion: There is significant variation in practice and resource to manage mothers who decline blood transfusion amongst UK units despite all units regularly treating such patients. Many units are not equipped to meet the care plan of the Royal College of Obstetricians and Gynaecologists and morbidity from haemorrhage might be expected to be elevated in these units. 42% of obstetric leads feel JWs should be managed in specified regional centres where appropriate resources and expertise are guaranteed. This proposal may be worth discussion.

References

O6 OAA survey of the management of intrathecal catheters

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Introduction: Intrathecal (IT) placement of an epidural catheter after accidental dural puncture (ADP) has become increasingly common. It avoids the risk of further dural puncture and establishes immediate analgesia with fewer complications. However, there is limited evidence of best practice when using IT catheters in labour following ADP.

Methods: After OAA approval (survey number 119) 210 lead UK obstetric anaesthetists were invited to complete an online questionnaire. Questions were asked on management of labour analgesia and delivery by caesarean section in parturients with an IT epidural catheter following ADP.

Results: 158 replies were received (response rate 75%). 48% stated that it was unit practice to insert an IT catheter following ADP and 68% would use an IT catheter if detected after aspiration and dosing. IT labour analgesia was maintained by intermittent top-ups by 98%, administered by anaesthetists only in 100% of units. 0.1% bupivacaine (or L-bupivacaine) with fentanyl 2µg/mL in volumes of 1-5mL was used by 66%; 0.25% bupivacaine (0.5-3mL) was preferred by 21%. When topping up for caesarean section 91% of those using IT catheters would use hyperbaric bupivacaine 0.5% in volumes of 0.5-2.8 mL. 71% would add diamorphine (300-500µg) or 25% fentanyl (15-25µg). Only 7% stated that a consultant would always be present if caesarean section were required. 33% of responders would flush the catheter with saline after dosing with volumes ranging from 0.5-5 mL. Following delivery 76% would remove an IT catheter immediately with 15% leaving it in place for 24 h. 35% of units did not have guidelines for the management of IT catheters.

Discussion: 48% of units now use IT catheters, compared to 28% in 2003, and only 1% in 1993. This probably reinforces the fact that if managed correctly, IT catheters can offer a safe and reliable method of analgesia and anaesthesia. Over a third of units did not have guidelines for the management of IT catheters possibly reflecting the lack of evidence of best practice.

References
O7 Observational study of haemoglobin trend during an elective caesarean section

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Introduction: Many factors alter a parturient’s haemoglobin (Hb) during a caesarean section (CS) including haemorrhage, haemodilution, autotransfusion from the uterus, physiological changes at delivery and effects of regional anaesthesia. The Masimo rainbow SET Radical-7 co-oximeter provides a continuous non-invasive measurement of total Hb (SpHb). Using this equipment, we aim to measure the trend of SpHb during CS and identify relationships between this and a number of variables.

Methods: After ethical approval and written consent, 41 healthy women having elective CS under regional anaesthesia were recruited. SpHb measurements were taken every 5 minutes until end of surgery using the Masimo. Timings of specific events (e.g. spinal, knife to skin etc.) were recorded as well as amount of fluid and vasopressor used. Fixed effects were considered by comparing Akaike's Information Criterion.

Results: We considered models with fixed effects for time, fluid and vasopressor dose. Time and vasopressor dose were not significant at the 5% level. Patient-specific plots of SpHb changes suggested a random effects structure for fluid, in which haemoglobin change is proportional to the square root of the volume of fluid administered.

Figure: Change in SpHb since probe applied (dark points are mean change, with 95% confidence intervals).

Discussion: The trend of SpHb during CS is influenced by multiple complex variables. The trends suggest an initial fall in mean SpHb following start of measurement until delivery when there is a slight increase followed by a steady fall until end of surgery. We also observed a SpHb rise following delivery in a number of cases which may represent autotransfusion from the uterus. Statistical modelling identified a relationship between fluid given and SpHb change. In addition to haemodilution, the interplay between fluid requirement and a number of the factors outlined above may account for this relationship.

Reference
1. Hann GR. Volume kinetics for infusion of fluids. Anesthesiology 2010;113: 470-81

O8 Predicting sepsis in labour: A validation study of SIRS criteria in a tertiary UK hospital

PB Richardson, L Stephenson, RE Collis
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Introduction: Sepsis is the leading direct cause of maternal mortality; however, differentiation of incipient sepsis from symptoms of normal pregnancy remains challenging. Modified early obstetric warning systems (MEOWS) are limited by uncertainty over optimal triggering thresholds and a lack of sepsis-specific validation data. We performed a prospective audit to establish whether systemic inflammatory response syndrome (SIRS) criteria from which MEOWS charts are partly derived, can help predict peripartum sepsis.

Methods: Data on consecutive women delivering in a tertiary UK hospital over 12 days in July-August 2011 was collected using audit proforma, laboratory data and casenotes review. We recorded prevalence of SIRS (temperature ≥38°C or ≤36°C, tachypnoea >20/min, tachycardia >100/min, white blood cell count (WCC) ≥12x10⁹/L or ≤4x10⁹/L) as well as proven sepsis, defined as clinical suspicion of infection with positive microbiological culture. The relative risk (RR) of sepsis for individual SIRS criteria as well as other risk factors (induction of labour, oxytocin infusion, prolonged labour or rupture of membranes, epidural analgesia) was also calculated. Post-hoc modifications to standard SIRS criteria were evaluated.

Results: Of 253 women who delivered, analysis was performed on 146 who had all SIRS criteria recorded, as not all women had a WCC in labour. Demographic data and risk factor prevalence were typical for our institution. Two or more SIRS criteria were present in 48/146 (33%), with 10 cases of culture-positive sepsis (6.8%) and no deaths. Sensitivity [95% CI] of two or more SIRS criteria predicting sepsis was 70% [35-92%], specificity 70% [61-77%], positive predictive value (PPV) 15% [7-28%] and negative predictive value 97% [91-99%]. RR of sepsis was significantly increased in patients with temperature ≥38°C (RR 12.4, P=0.001), tachypnoea (RR 6.8, P=0.007) or tachycardia (RR 5.0, P=0.01), but not for WCC ≥12x10⁹/L or temperature ≤36°C. RR was also increased following induction of labour (RR 4.1, P=0.02), oxytocin infusion (RR 3.9, P=0.03) and epidural placement (RR 4.5, P=0.02), but not for prolonged labour or rupture of membranes. Mean WCC was 14.8 ± 4.9x10⁹/L, and in post-hoc analysis, adjustment of SIRS thresholds to WCC ≥20x10⁹/L (RR 5.4, P=0.004) as well as minimum temperature ≤35.5°C (RR 12.4, P=0.001) had an increased association with sepsis.

Discussion: Conventional SIRS criteria were poorly predictive of sepsis in labouring women and the utility of MEOWS charts derived from these criteria is likely to be similarly poor. Adjustment of SIRS thresholds to reflect maternal physiology may increase the PPV however a large number of false positive results remain likely. Larger studies are required to determine the predictive value of three and four SIRS criteria and WCC ≤4x10⁹/L, as well as the role of serum lactate in diagnosis of early sepsis in this population.

References
O9 Rapid epidural top-up for emergency caesarean section: an impact on the rate of general anaesthesia

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Introduction: Avoidance of airway related complications associated with general anaesthesia (GA) by increased use of regional techniques is one of the main reasons for the decline in anaesthesia related deaths in obstetrics in the UK. Extending labour epidural analgesia to provide surgical anaesthesia for emergency caesarean section (CS) is one such option. The use of a lidocaine-bicarbonate-adrenaline solution for epidural top-up halves the onset time to surgical block compared to levobupivacaine. Audit of our data shows that most GA for CS were for emergencies and inadequate time for epidural top-up with bupivacaine 0.5% was often cited as a reason for use of GA. We introduced a rapid top-up mixture with the aim of reducing the rate of GA for emergency CS.

Methods: A rapid top up mixture as described by Allam et al. using 20mL 2% lidocaine, 2mL 8.4% sodium bicarbonate (discarding 2mL) and 0.1mL 1:1000 epinephrine was introduced as the standard epidural top-up mixture for CS. The use of fentanyl was optional. We examined our data 1 year after the introduction of this mixture against the previous 4 years to compare the rate of GA for CS.

Results: The results are shown in the table. There were 695 emergency CS for 2010-2011. This time period achieved the lowest yearly rate of GA for emergency CS in our unit in the last 5 years.

<table>
<thead>
<tr>
<th></th>
<th>4 year average (2005-2009)</th>
<th>2010-2011 following introduction of rapid mixture</th>
<th>Relative change compared to previous 4 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>All CS under GA</td>
<td>8.5%</td>
<td>5.8%</td>
<td>32%</td>
</tr>
<tr>
<td>Emergency CS under GA</td>
<td>11.8%</td>
<td>9.2%</td>
<td>22%</td>
</tr>
<tr>
<td>Emergency CS under epidural top up</td>
<td>47%</td>
<td>62%</td>
<td>132%</td>
</tr>
</tbody>
</table>

Discussion: The most recent triennial report on UK maternal deaths recommended topping-up an epidural for emergency CS as this may have avoided general anaesthesia in a case of death due to failure of oxygenation. The use of a lidocaine-bicarbonate-adrenaline epidural top-up mixture reduces the onset time to achieve surgical anaesthesia for CS to 7 min. We introduced this mixture with the intention of reducing our GA rate for emergency CS and by extension, the risk of death from GA. Our preliminary data after 1 year of using this mixture suggests that we have achieved our aim. We will continue to audit our activity to ensure that this achievement is sustained. If this proves to be the case, we recommend that other obstetric units consider adopting this practice.

References

O10 Sensory thresholds and mothers’ self-identification of the midline in late pregnancy

J Ip, J Campbell, SM Yentis

Magill Department of Anaesthesia, Chelsea and Westminster Hospital, London, UK

Introduction: Identification of the midline by palpation during central neuraxial blockade may be challenging. Ultrasound (u/s) scanning may be useful in obstetric patients but is not universally available. We have observed that anaesthetists often ask the mother to point to the centre of her back, or confirm whether a palpating finger or needle inserted in the back ’feels like’ it is in the midline. The reliability of these methods is unknown, and recent data suggest that in pregnancy, sensitivity to tactile stimulation and two-point discrimination is reduced. Our aim was to assess women’s ability in late pregnancy to identify their own midline using proprioception and pinprick sensation.

Methods: After REC approval and written consent, we studied 15 healthy women of normal body mass index and >36 weeks’ gestation. With the woman sitting, the midline and L3-4 interspace were identified using u/s by counting up from the sacrum, and marked. She was then asked to touch the middle of her back with the index finger of her dominant hand, at a point level with the iliac crests. The distance between this point and the midline identified by u/s (the ’finger-midline distance’) was measured. Next, a Neuronet device (Owen Mumford Ltd, Oxford) equipped with a standard neurological examination pin was used to apply standardised sharp stimuli at 0.5-cm intervals along a horizontal line drawn at the level of L3-4, starting 5 cm from the midline and moving to the contralateral side. At each interval the participant was asked to identify the pin as being: in the middle; to the left; or to the right. We then measured the distance that the mother identified as the ’middle’ from the true midline. This procedure was performed twice (from left to right, then right to left); the average of the two distances (the ’pinprick discrimination range’) was calculated.

Results: The median (IQR [range]) finger-midline distance was 0 (0-5 [0-12]) mm. The mean (SD [range]) pinprick discrimination range was 17.3 (7.7 [7.5-30.0]) mm. If a participant stated the stimulus was to the left or the right, she was correct 99% of the time.

Discussion: This preliminary study suggests that non-obese parturients in late pregnancy are accurate at identifying their own midline, with 75% accurate to within 5 mm. Women could be asked to do this quickly before cleaning and draping. Pinprick discrimination is accurate for identifying left/right but much less so for identifying the midline.

References
O11 Validation of ultrasound to identify the lumbar intervertebral space in morbidly obese using MRI imaging as the gold standard- A pilot study

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Introduction: Evidence suggests that ultrasound assisted epidural placement can improve success rates in obese parturients. However, there is limited data regarding its validity in morbidly obese patients. The aims of our study were: (1) to assess the accuracy of ultrasound to identify the lumbar intervertebral space using MRI and validate it; (2) to compare findings of the clinical palpation method to identify the lumbar intervertebral space with the ultrasound; and (3) to assess the depth to epidural space at the L3-4 level using ultrasound and validating it with MRI.

Methods: After local ethics committee approval and informed written consent, 20 female patients with BMI >35 kg/m² scheduled for MRI scan of lower back were recruited prospectively. Investigator No1 identified L3-4 level by palpating standard anatomical land marked the space using an invisible ultraviolet marker. Next, investigator No2 identified the distance from the spinal to the epidural space using ultrasound. Scanning was performed using a Sonosite 5.2Mhz curved transducer probe in both transverse and longitudinal planes. Cod liver oil capsules secured to the patient’s skin denoted the markings; one for first investigator and two for second investigator. The patient then proceeded to MRI and the level and depth were identified.

Results: Ultrasound was accurate in identifying the L3-4 interspace 55% of the time as compared to 35% by clinical palpation. The average depth measured using ultrasound was 70.1 mm (SD 13.1) which was comparable to that measured using MRI was 72.4 mm(SD 12.8, P=0.29).

Discussion: Our study demonstrated that ultrasound has a place in the epidural placement for the morbidly obese patient. Ultrasound was able to identify correct interspace in 55% of patients. Clinical palpation identified correct interspace only in 1 in 3 patients and was at least two interspaces spaces higher. Depth was identified with a high degree of accuracy with ultrasound and this may help avoid dural punctures and act as guide for successful placement. Imaging proved difficult with BMI >45 kg/m², this suggests that further technological advancements in real time sonography may be required to obtain reliable images in the morbidly obese patients. Further studies with large numbers may be needed to explore this issue further.

Reference

O12 The effect of passive leg raising on haemodynamics in healthy term pregnant women

S Griffiths, A Dennis
Dept of Anaesthesia, The Royal Women's Hospital, The University of Melbourne, Parkville, Australia

Introduction: The use of transthoracic echocardiography (TTE) has provided insights into the intravascular volume status of non-pregnant adults during passive leg raising. Increases in stroke volume (SV) in spontaneously breathing critically ill non-pregnant adults after passive leg raising have predicted fluid responsiveness. The effect of passive leg raising in healthy pregnant women is uncertain. As pregnancy is associated with changes in intravascular volume and cardiovascular variables, the aim of this study was to use TTE to measure the haemodynamic responses to passive leg raising in pregnant women to provide baseline data.

Method: After institutional ethics approval and written informed consent, 20 healthy term pregnant women (body mass index (BMI) <30 kg/m²) were recruited. After resting for at least 10 min, heart rate (HR) and blood pressure (BP) were obtained, continuous electrocardiography attached and a standardised TTE examination was performed in the left lateral level position (P1). The legs were then elevated 15° (P2) and SV was assessed with TTE minutely for 5 min and BP was measured again. The legs were repositioned to the level position (P3) and SV was assessed minutely for 5 min after which a final BP was recorded. Statistical analysis used analysis of variance with Dunnett’s post hoc analysis comparing baseline (P1) with positions P2 and P3.

Results: Haemodynamic data were obtained in all 20 women in each position. Baseline demographics (mean ± SE) were age 30 ± 0.9 years, gestation 39 ± 0.2 weeks and BMI 26 ± 0.5 kg/m². Baseline haemodynamics (mean±SE) were fractional shortening 38 ± 1.1%, mitral valve E/A 1.4 ± 0.07, septal a’ velocity 10.9 ± 0.52 cm·s⁻¹, septal a’ velocity 7.4 ± 0.44 cm·s⁻¹, mitral valve E/e’ 6.5 ± 0.45, systemic vascular resistance 1961 ± 101.3 dynes.cm⁻⁵. All women had fractional shortening >28%.

Table. Changes in haemodynamics after passive leg raising

<table>
<thead>
<tr>
<th>Variable</th>
<th>P1</th>
<th>P2</th>
<th>P3</th>
<th>P4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 min</td>
<td>5 min</td>
<td>1 min</td>
<td>5 min</td>
</tr>
<tr>
<td>MAP (mmHg)</td>
<td>84 ± 2.5</td>
<td>82 ± 2.3</td>
<td>82 ± 2.6</td>
<td>82 ± 2.6</td>
</tr>
<tr>
<td>CO (ml/min)</td>
<td>3553 ± 7394 ± 3499 ± 3814 ± 3296 ±</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SV (ml)</td>
<td>173.6</td>
<td>211.5</td>
<td>208.4</td>
<td>189.3</td>
</tr>
<tr>
<td>HR (BPM)</td>
<td>49 ± 2.2</td>
<td>52 ± 2.9</td>
<td>47 ± 2.7</td>
<td>52 ± 2.3</td>
</tr>
</tbody>
</table>

Data are mean ± SE *P < 0.05 for comparison against P1 values. MAP = mean arterial pressure, CO = cardiac output

Discussion: 15° passive leg raising does not alter SV, HR or CO in healthy term pregnant women under resting conditions. SV decreased with a compensatory increase in HR, with no change in CO, when the legs were lowered to level. This method enables further examination of leg elevation and its haemodynamic effects under different conditions such as neuraxial anaesthesia, and in different groups of pregnant women including those with hypertension or suspected hypovolaemia.

Reference
O13 Comparison of ultra-low and higher-concentration epidural local anaesthetic solutions in labour: a meta-analysis

P Sultan, C Murphy, S Halpern, B Carvalho

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Introduction: While epidural anaesthesia does not increase the caesarean delivery rate compared to non-epidural techniques, the effect of epidural analgesia on incidence of operative vaginal delivery is controversial. Lower concentrations of local anaesthetics (<0.125% bupivacaine) are preferable. The purpose of this meta-analysis was to determine whether ultra-low concentration (ULC) infusions of local anaesthetics are associated with decreased assisted vaginal delivery (AVD) than higher concentrations (HC).

Methods: We searched electronic databases (PubMed, Embase, Ovid, Medline, CinaHL) and Cochrane using MeSH terms and text words ropivacaine, bupivacaine, obstetric labour complications, instrumental and caesarean delivery. We included randomised controlled trials of labouring patients that compared ULC (defined as ≤0.1% epidural bupivacaine or ≤0.17% ropivacaine) with higher local anaesthetic concentrations for maintenance of analgesia. Study quality was graded using the Jadad scale and allocation blinding. The primary outcome was AVD. The odds ratio (OR) and 95% confidence interval (CI) were calculated using random effects modeling (Review Manager 5.0). An OR <1 favored ULC and P value <0.05 was statistically significant.

Results: 18 studies met our criteria. 5 publications from the COMET study group were presented as one study. 1344 patients in the ULC group and 940 patients in the HC group reported the primary outcome. The median quality score was 2 [range 1 to 5]. 2 studies had blinded allocation; 16 studies were not blinded or not clearly blinded. There was a significant reduction in the incidence of assisted vaginal delivery in the ULC group (OR=0.77, 95% CI=0.64-0.93, P=0.006) (Figure). There was no difference in the incidence of caesarean delivery (OR=0.95, 95% CI=0.77-1.18, P=0.6).

Discussion: The use of ULC of local anaesthetic for labour epidural analgesia maintenance reduced the incidence of AVD compared to HC solutions. We recommend the use of ULC epidural analgesia to optimise obstetric outcome.

Reference

O14 Left uterine displacement methods in maternal resuscitation - a national OAA approved survey of equipment and current practice

B Macafee, D Bushby, J Ip, SM Yentis

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Introduction: The European Resuscitation Council (ERC) and its American equivalent have recently updated their guidelines for resuscitation. In maternal cardiac arrest, the arrest should be identified, cardiopulmonary resuscitation commenced and the fetus delivered by caesarean section if there is no return of cardiac output within 5 minutes. Aorticaval compression is known to hinder successful resuscitation following cardiac arrest. Various methods have been described for relieving aorticaval compression via left uterine displacement (LUD), but it is unknown which are used in clinical practice.

Methods: After OAA approval (Survey number 121), 213 lead obstetric anaesthetists were invited to complete an online questionnaire in November 2011. Questions were posed on: i) use of LUD methods; ii) choice/storage of LUD devices within, and in locations remote to, labour ward; and iii) maternal resuscitation drills.

Results: The response rate was 61.5% (131 replies). In the theatre environment, 100% of respondents would use the operating table lateral tilt in maternal cardiac arrest, either as the sole LUD method or in conjunction with other methods.

Table: LUD method in labour ward

<table>
<thead>
<tr>
<th>Left uterine displacement</th>
<th>Theatre</th>
<th>Delivery room bed</th>
<th>Delivery room floor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pelvic tilt with non-preformed device - pillows/blankets</td>
<td>0%</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Pelvic tilt with preformed soft device - foam wedge</td>
<td>42%</td>
<td>50%</td>
<td>8%</td>
</tr>
<tr>
<td>Pelvic tilt with preformed rigid device - Carduff wedge</td>
<td>40%</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>Human wedge</td>
<td>0%</td>
<td>4%</td>
<td>96%</td>
</tr>
<tr>
<td>Manual uterine displacement</td>
<td>18%</td>
<td>64%</td>
<td>18%</td>
</tr>
</tbody>
</table>

The LUD devices are stored in theatres (39%), in labour ward storage cupboards (27%), beside/attached to the emergency trolley (15%) or in the anaesthetic room (12%). In maternal cardiac arrest outside labour ward, the favoured LUD methods in non-clinical areas are firstly human wedges, then manual uterine displacement and pillows/blankets. In A&E, pillows/blankets or foam wedges are first choice devices, with manual uterine displacement used when these are unavailable. Maternal resuscitation drills are undertaken every 6 months in 22% of units, quarterly in 22%, annually in 18%, monthly in 15% and never in 13% of units.

Discussion: It is clear that, in the event of maternal cardiac arrest, the majority of UK obstetric units have a wide range of LUD devices available to staff, with clearly defined storage areas. We suggest that, during maternal resuscitation drills, all LUD devices are made available to aid familiarisation and training, and scenarios external to labour ward are routinely practised.

References
O15 Pain after caesarean section
CE Warnaby, NJ Beale, O Kciuk, N Brooks, R Russell, J Quinlan
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Introduction: Persistent post-surgical pain (PSP) lasting >3 months is well recognised; the incidence after caesarean section (CS) being 10–18% in retrospective questionnaire studies.1,2 Recall of severe acute pain is a predictor of chronicity but may be confounded by recall bias. We present data detailing the trajectory of acute pain in the first month after CS, as part of a prospective study to identify predictive factors for transition to persistent PSP after one year.

Methods: Following ethics approval 50 women undergoing planned CS after 34 weeks were recruited. Verbal and numerical pain scores at rest and on movement were recorded prospectively at 6 h and at 2, 7 and 30 days post CS, as were detailed data on site of pain and analgesia requirements.

Results: Pain and analgesic requirements reduced over time after day 2 (Fig.), after which there were only 2 verbal reports of severe pain on day 7. At 30 days, 6 of 50 women (12%) reported pain on movement of ≥3/10, with 2 women also having pain at rest. Of these 6 women, pain was located in either the wound (n=3), wound and back (n=2) or the abdomen (n=1) for which 3 were taking simple analgesia.

Figure: Numerical pain scores after CS

Discussion: The median pain score at 6 h was lower than that at day 2, which could be attributed to the residual effects of anaesthesia. The reduction in pain from day 2 was expected and not influenced by recall bias. Severe pain at 7 days has been associated with the development of persistent PSP.3 We have identified the presence of outliers with elevated pain levels in the acute postoperative period with an incidence consistent with that of persistent PSP. Based on previous studies these women may go on to develop chronic pain at one year. If we can identify at-risk women early, we may be able to develop interventions that prevent conversion to persistent PSP.

References

O16 Early fibrinogen as a predictor of red cell requirements during postpartum haemorrhage
L De Lloyd, PW Collins, A Kaye, RE Collis
Dept of Anaesthetics, University Hospital of Wales, Cardiff, UK

Introduction: A fall in fibrinogen from the normal pregnancy range of 4-6g/L has been shown to occur early during postpartum haemorrhage.1-3 In addition, fibrinogen has been shown to be predictive for blood product requirements during PPH.2 whereas other coagulation tests were not. We analysed data from a retrospective audit to evaluate whether the first fibrinogen taken during a PPH could predict the eventual need for 4 or more units of red blood cells (RBC) or ≥2500mL total blood loss.

Methods: PPHs >1000mL were identified from the maternity database. The first fibrinogen measured during the bleed, taken either at the time of first clinical concern or PPH>1500mL but before blood products were used, according to our PPH guidelines, was recorded and blood product usage identified through blood bank records. Blood loss was systematically estimated for all deliveries by weighing swabs and bedding as part of our standard PPH protocol. Statistical analyses were performed on SPSS 16.

Results: From June-Nov 2010 ≥1000mL PPH occurred in 239/3350 births (7%) and progressed to PPH ≥2500mL in 25 (0.75%). Fibrinogen was measured in 164 cases. Median fibrinogen in the 44 women who received blood products was 3.2 (IQR 2.3-3.9) and 4.4 (IQR 3.6-4.9) in the 120 who did not, P<0.001. The median fibrinogen (IQR [range]) for those with a PPH ≥2500mL vs <2500mL was 3 (2.1-3.7[0.7-4.1]) vs 4.2 (3.5-4.9 [4.7-7.2]) P<0.001. A receiver operator characteristics (ROC) analysis was performed on the first fibrinogen and progression to PPH ≥2500mL or the need for ≥4 units RBC.

<table>
<thead>
<tr>
<th>Area under ROC curve (95% CI)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPH ≥ 2500mL</td>
<td>0.85 (0.78-0.93)</td>
</tr>
<tr>
<td>≥ 4 units RBC</td>
<td>0.8 (0.73-0.86)</td>
</tr>
</tbody>
</table>

A fibrinogen of ≤2g/L had a positive predictive value (PPV) of 71% and a fibrinogen >4g/L a negative predictive value (NPV) of 99% of progressing to PPH ≥2500mL. A fibrinogen ≥2g/L had a PPV of 57% and a fibrinogen >4g/L had a NPV of 100% for the need for ≥4 units RBC.

Discussion: These data demonstrate that fibrinogen measured early during a PPH is predictive of progression to ≥2500mL blood loss and the need for ≥4 RBC. Conversely fibrinogen within the physiological range (≥4g/L) has a very strong NPV for progression. These data are retrospective and blood loss at the time of the first coagulation study is not known, however, they are very similar to previous findings2 and suggest that fibrinogen plays a critical role at the time of PPH. It is not known whether correction of fibrinogen would reduce progression of PPH and prospective research is required.

References
O17 Haemodynamics in pregnant women with morbid obesity
S Griffiths, A Dennis
Dept of Anaesthesia, Royal Women's Hospital, The University of Melbourne, Parkville, Australia

Introduction: Class II obesity (body mass index (BMI) >35 kg/m²) and class III obesity (BMI >40 kg/m²) in pregnant women represent a significant health issue. Complications occur more frequently in these women and it is recommended that women with BMI >40 are reviewed by an anaesthetist antenatally. Close monitoring of haemodynamics is important when these women become unwell. Transthoracic echocardiography (TTE) for haemodynamic assessment offers advantages, however, morbid obesity may make TTE scanning difficult. The aim of this study was to determine haemodynamics in morbidey obese pregnant women and to assess the applicability of TTE in this group.

Methods: After institutional ethics approval and informed written consent, 15 pregnant women with a minimum BMI of 35 kg/m² but otherwise healthy, were recruited and compared with 40 healthy pregnant non-obese controls. After resting for at least 10 min, blood pressure (BP), using correct cuff size, was obtained. A standardised TTE exam, according to the American Society of Echocardiography guidelines, was performed. Statistical analysis used the General Linear Model and unpaired t test comparisons with Welch's correction.

Results: Study completion with haemodynamic data was achieved in 100%. Obese weight range was 92–143 kg.

Table: Demographic, haemodynamic and structural data

<table>
<thead>
<tr>
<th></th>
<th>Non-obese n=40</th>
<th>Morbidly obese n=15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>32 ± 3.9</td>
<td>31 ± 5.0</td>
</tr>
<tr>
<td>Gestation (weeks)</td>
<td>36 ± 4.4</td>
<td>34 ± 5.1</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>28 ± 4.1</td>
<td>43 ± 5.3*</td>
</tr>
<tr>
<td>MAP (mmHg)</td>
<td>81 ± 8.3</td>
<td>83 ± 10.8</td>
</tr>
<tr>
<td>CO (mL/min)</td>
<td>4109 ± 594.5</td>
<td>4664 ± 523.2*</td>
</tr>
<tr>
<td>HR (beats/min)</td>
<td>78 ± 9.6</td>
<td>85 ± 9.7*</td>
</tr>
<tr>
<td>SV (mL)</td>
<td>53 ± 7.9</td>
<td>55 ± 7.2</td>
</tr>
<tr>
<td>SVR (dynes/s/cm⁵)</td>
<td>1613 ± 315.4</td>
<td>1437 ± 246.2*</td>
</tr>
<tr>
<td>FAC (%)</td>
<td>57 ± 9.2</td>
<td>58 ± 10.7</td>
</tr>
<tr>
<td>LVEDA (cm²)</td>
<td>17 ± 2.7</td>
<td>17 ± 4.0</td>
</tr>
<tr>
<td>Septal e’ (cm/s)</td>
<td>11.5 ± 2.3</td>
<td>10.5 ± 2.0</td>
</tr>
<tr>
<td>MV E/A</td>
<td>1.5 ± 0.2</td>
<td>1.3 ± 0.2</td>
</tr>
<tr>
<td>MV E/septal e’</td>
<td>6.7 ± 1.3</td>
<td>7.2 ± 1.6</td>
</tr>
<tr>
<td>LV mass (g)</td>
<td>130.8 ± 21.0</td>
<td>179 ± 36.8*</td>
</tr>
</tbody>
</table>

Data are mean ± standard deviation. HR = heart rate, SV = stroke volume, FAC = fractional area change, LVEDA = left ventricular end diastolic area, MV = mitral valve *P <0.05

Discussion: Increased cardiac output in class III obesity is due to increased HR without changes in SV or LVEDA. An implication of this finding is that drugs that reduce HR in these women may also reduce CO which may be deleterious. Diastolic function is preserved. TTE determined key haemodynamic variables in all morbidly obese women and therefore can be used to assess haemodynamics in this high risk group antenatally.

Reference

O18 Impact of equipment problems on failure of spinal anaesthesia for caesarean section—baseline Luer data from the OAA NOAD/NPSA adverse outcomes monitoring

SM Kinsella
Anaesthesia, St Michael's Hospital, Bristol, UK

Introduction: The National Patient Safety Agency (NPSA) issued a Patient Safety Alert in 2011 that obliges non-Luer connectors for spinal needles in the UK in 2012. The OAA organised a multi-centre service evaluation of current practice of spinal anaesthesia at caesarean section (CS) as an adjunct to data collection for the National Obstetric Anaesthesia Database (NOAD). The aim was to establish a baseline rate of adverse outcomes during spinal anaesthesia in order to gauge any impact of the introduction of non-Luer equipment.

Method: Data collection was performed in six consultant obstetric units in England between 3- to 10-month periods during 2010 and 2011. Adverse outcomes were defined as spinal failure (need for another anaesthetic technique after the spinal or pain during surgery) and general anaesthesia (GA) conversion of spinal (N.B. GA cases are a subset of spinal failure). Use of data for this purpose was approved as service evaluation by the LREC at the base hospital.

Results: Data were collected on 1718 CS. The table shows the relationship of spinal failure and GA conversion [in brackets] to technical problems with the spinal equipment. Reported technical problems were difficult CSF aspiration (4), needle bent (2), difficult reintersion of trocar (1). The mean (SD) satisfaction score with the spinal equipment was 9.7 (0.7) on a 0-10 scale, with 23 uses scoring <7.

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>Category 4 (elective)</th>
<th>Category 1-3 (emergency)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cases</td>
<td>1718</td>
<td>919</td>
<td>799</td>
</tr>
<tr>
<td>Technical problem, no spinal failure</td>
<td>11</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Technical problem, related spinal failure [GA conversion]</td>
<td>1 [0]</td>
<td>0 [0]</td>
<td>1 [0]</td>
</tr>
</tbody>
</table>

Discussion: Results from almost 6900 other spinal cases reported to the NOAD/NPSA database found none of 104 GA conversions were caused by technical problems with the spinal equipment. The data presented here show that, even when using the more sensitive endpoint of spinal failure, there was only one case out of 81 that was attributed to equipment problems. This data establishes the status quo against which to compare spinal failure rate when non-Luer equipment is introduced into clinical practice in 2012.

Acknowledgements: Many thanks to those who provided data: Adegoke Adejumo, Anna Bewlay, Bill Harvey, Jonny Hudsmith, Ted Rees.

References
1. NPSA 2011/PSA001, http://www.nrls.npsa.nhs.uk/resources/?EntryId45=94529
2. OAA Monitoring of adverse outcomes at CS/NOAD, http://www.oaa-anaes.ac.uk/content.asp?ContentID=448
O19 The IDvIP Trial: A two-centre double-blind randomised controlled trial comparing i.m. diamorphine and i.m. pethidine for labour analgesia

MYK Wee, JP Tuckey,† P Thomas,‡ S Burnard,‡ D Jackson
Anaesthesia, Poole Hospital NHS Foundation Trust, Poole, UK, †Anaesthesia, Royal United Hospital, Bath, UK, ‡Research Design Service, Bournemouth University, Bournemouth, UK

Introduction: Intramuscular pethidine, the commonest parenteral opioid analgesic used in obstetrics and more recently diamorphine usage has increased particularly in Scotland and north of England. The maternal, fetal and neonatal side effects are well known for pethidine but there are no sufficiently powered large RCTs comparing pethidine with diamorphine in terms of analgesic efficacy and maternal, fetal and neonatal side effects. The aim of this trial is to address this.

Methods: After ethical approval, informed consent was obtained from 484 women randomised to receive either intramuscular (i.m.) diamorphine 7.5 mg. or i.m. pethidine 150 mg for labour analgesia. The sample size calculation derived from a small RCT, giving 90% power at the 5% significance level was based on the maternal primary outcome measure of pain relief at 60 min and the neonatal primary outcome measures of Apgar Score of <7 at 1 min and neonatal resuscitation. Secondary outcome measures include verbal pain intensity at 60 min and over 3 h post-analgesia, pain relief over first 3 h, maternal oxygen saturation, sedation, nausea and vomiting and maternal satisfaction with analgesia. Fetal and neonatal secondary outcomes included CTG trace, meconium staining, UA pH, UVpH, time of delivery to first breath, Apgar Score at 5 min, naloxone use, neonatal oxygen saturations, sedation and feeding behaviour for the first 2 h after delivery.

Results: Reported using CONSORT guidelines. At 60 min post-administration and over a 3 h period, diamorphine was better at reducing pain scores than pethidine (P<0.001). There were no statistical differences between the two groups regarding Apgar Scores of <7 at 1 min and the need for neonatal resuscitation. The time between first dose administered and delivery was on average 82 min longer with diamorphine compared to pethidine (P<0.001). The vast majority of women experienced moderate to severe pain at all times. Women receiving diamorphine were more likely to be satisfied with their analgesia. There were no statistically significant differences in maternal sedation, nausea and vomiting or oxygen saturations over the 3 h period. Neonates at 2 h were more likely to be moderately or severely sedated in the pethidine group. Otherwise, there were no statistically significant differences in the fetal and neonatal outcomes including feeding behaviour between the two groups within 2 h of birth.

References

O20 The management and outcomes of placenta accreta/increta/percreta in the United Kingdom

K Fitzpatrick, S Sellers,† JJ Kurinczuk, P Spark, P Brocklehurst, M Knight
National Perinatal Epidemiology Unit, University of Oxford, Oxford, UK, †Department of Obstetrics and Gynaecology, University Hospitals Bristol NHS Trust, Bristol, UK

Introduction: Placenta accreta/increta/percreta is associated with major pregnancy complications. Antenatal diagnosis of the condition allows for early delivery planning, including the availability of a multi-professional team. The aims of this study were to estimate the incidence of placenta accreta/increta/percreta in the UK and compare the management and outcomes according to whether the condition was diagnosed antenatally.

Methods: A population-based descriptive study was undertaken using the UK Obstetric Surveillance System, carried out in all 221 hospitals with consultant-led maternity units in the UK. The participants comprised 134 women in the UK diagnosed with placenta accreta/increta/percreta between 1st May 2010 and 30th April 2011.

Results: The estimated incidence of placenta accreta/increta/percreta was 1.7 per 10 000 pregnancies (95%CI 1.4-2.0). 65% of cases (87/133) were associated with placenta previa. Placenta accreta/increta/percreta was suspected prior to delivery in half of the women (67/133, 50%). Women who had placenta accreta/increta/percreta suspected prior to delivery were more likely than those who did not to have placenta previa (97% vs 33%, P<0.001) and to have had a previous caesarean (99% vs 71%, P=0.002). 44% of women with placenta accreta/increta/percreta suspected prior to delivery had a final diagnosis of increta or percreta compared with 29% of those without antenatal suspicion (P=0.07). Women who had placenta accreta/increta/percreta suspected prior to delivery were more likely to have their complete placenta left in situ (33% vs 8%, P<0.001) and have therapies to prevent haemorrhage (76% vs 53%, P=0.008) but less likely to have therapies to treat active haemorrhage (48% vs 73%, P=0.004); there was a suggestion that they were less likely to have a massive obstetric haemorrhage (blood loss >2500 mL) (54% vs 70%, P=0.06). However, there was no significant difference in the proportion of women who received a blood transfusion (74% of women diagnosed antenatally vs 85%, P=0.1) or who subsequently had a hysterectomy (66% of women diagnosed antenatally vs 52%, P=0.1). A higher proportion of the suspected cases were admitted to ITU/HDU (81% vs 59%, P=0.007); no women died.

Discussion: Placenta accreta/increta/percreta is still rare in the UK. Antenatal diagnosis is associated with a greater use of preventative therapies for haemorrhage although there is no clear evidence that women who are diagnosed antenatally have lower levels of haemorrhage, possibly because the women diagnosed antenatally have a greater severity of placental invasion. Nonetheless, more than half of women with placenta accreta/increta/percreta have a hysterectomy and early diagnosis will allow for the appropriate planning of anaesthetic and surgical resources.

Reference
P1 A national survey on the management of major obstetric haemorrhage: availability of cell salvage.

DH Evans, E Lewis
Anaesthetic Department, Singleton Hospital, Swansea, UK

Introduction: The use of cell salvage in obstetrics has been recommended by NICE since 2005.1 A survey in that year found that 38% of units had access to cell salvage.2 We undertook an OAA-approved survey to ascertain the availability of cell salvage in UK obstetric units.

Methods: An OAA approved survey (no.114) was emailed to 205 lead obstetric anaesthetists in April 2011. Questions were posed on the 24-h availability of intra-operative cell salvage for unexpected major obstetric haemorrhage.

Results: Of the 205 invited participants, 148 responded (72.2%). 72 units (49% of responders) had cell salvage available 24-h per day. 29 units that had cell salvage available relied on calling non-resident staff to provide this service. The general trend showed that larger units were more likely to have 24-h availability. However, 16 units with >5000 deliveries/year did not have 24-h access to cell salvage. 28 units with 3000-5000 deliveries/year did not have 24-h cell salvage, whilst 32 units with <3000 deliveries/year did not have 24-h access to cell salvage.

Table: 24-h availability of cell salvage for major obstetric haemorrhage

<table>
<thead>
<tr>
<th>Availability</th>
<th>Responses (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes with trained resident staff</td>
<td>43 (29)</td>
</tr>
<tr>
<td>Yes with trained non-resident on-call staff</td>
<td>29 (19.6)</td>
</tr>
<tr>
<td>No</td>
<td>76 (51.4)</td>
</tr>
</tbody>
</table>

Discussion: There has been a substantial increase in the availability of cell salvage over the last 6 years. However, despite strong evidence for its benefit in major obstetric haemorrhage,3 the majority of UK units do not have 24-h access to cell salvage. Larger units are more likely to have cell salvage available 24-h a day but a significant proportion (42% of hospitals with >5000 deliveries/year) are unable to provide this service. This is surprising when our survey showed that the majority of units of this size experience >20 major haemorrhages/year. Almost 1 in 5 UK obstetric units are reliant on non-resident staff to provide cell salvage, resulting in inevitable delays and potentially reduced effectiveness of the procedure.

References

P2 Audit of obstetric intraoperative cell salvage uptake, benefits and complications: three years experience

CL Baxendale, N Osborn
Department of Anaesthesia, Heart of England NHS Foundation Trust, Birmingham, UK

Introduction: Massive obstetric haemorrhage remains a common cause of morbidity and in the 2006-8 CMACE report it was the sixth largest direct cause of maternal death.1 Intraoperative cell salvage (ICS) is increasingly used in the UK and can be effective in reducing the need for allogeneic blood transfusion at caesarean section (CS).2 ICS was introduced to our delivery suite over three years ago and its use has been continuously audited. This audit covers 2 years of data following a previous audit presented by our department. The key objectives of this audit were to identify the strongest indications for ICS, compare transfusion trends with previous data and quantify clinical and technical problems associated with ICS.

Methods: Data were collected prospectively from all obstetric cases where ICS was used between Sept 2009-Nov 2011. Indication for ICS, volume of autologous transfusion given, requirement for allogeneic blood transfusion and presence of complications were analysed for each case.

Results: ICS was used in 145 patients over the study period, an increase in usage since the previous audit from 3.5 to 5.3 cases per month. 43% of cases were emergencies, up from 31% previously. Transfusion of ICS blood was achieved in 26% of elective cases (mean volume 395 mL) and 41% of emergency cases (mean volume 286 mL). Retransfusion rates were higher in the previous audit; 36% and 70% respectively.

<table>
<thead>
<tr>
<th>Indication for intraoperative cell salvage</th>
<th>Number of cases</th>
<th>% of cases retransfused</th>
</tr>
</thead>
<tbody>
<tr>
<td>placenta praevia</td>
<td>33</td>
<td>33</td>
</tr>
<tr>
<td>placenta praevia and previous CS</td>
<td>8</td>
<td>75</td>
</tr>
<tr>
<td>placenta accreta or percreta</td>
<td>3</td>
<td>67</td>
</tr>
<tr>
<td>ante/postpartum haemorrhage</td>
<td>8</td>
<td>38</td>
</tr>
<tr>
<td>multiple previous CS</td>
<td>35</td>
<td>20</td>
</tr>
<tr>
<td>fibroid uterus</td>
<td>9</td>
<td>33</td>
</tr>
<tr>
<td>Jehovah’s Witness</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>staff training</td>
<td>19</td>
<td>0</td>
</tr>
<tr>
<td>other</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>not recorded</td>
<td>15</td>
<td>47</td>
</tr>
</tbody>
</table>

Five patients developed profound hypotension during retransfusion of ICS blood. Inadequate volumes of blood were collected in 4 cases despite significant intraoperative bleeding. Processed ICS blood was discarded in 3 cases due to technical problems. Allogeneic blood transfusion may have been reduced or avoided in 9 patients receiving ICS blood.

Discussion: ICS usage has increased in our unit over the past 2 years but disappointingly this has not been accompanied by an increase in the number of patients receiving retransfusion. Modifiable obstacles to retransfusion include equipment problems relating to the ICS machine, lack of availability of disposable pocket drapes and use of dual suction.

References
P3 Cell salvage during caesarean section reduces perioperative allogeneic red cell transfusion in suitable patients.
S Aluri, † J Wrench, † M Wilson
Anaesth., Royal Hallamshire Hospital, Sheffield, UK
Introduction: It is uncertain whether intra-operative cell salvage prevents donor red blood cell transfusion in caesarean section.1 We compared allogeneic red cell transfusion rates during the entire perioperative period in elective and emergency caesarean section patients eligible for cell salvage.
Methods: Information was pooled and cross referenced from the theatre (ORMIS), blood bank and labour ward (PROTOS) IT databases. Cases suitable for cell salvage were manually identified. Data for 12 months prior to, and 24 months after the introduction of cell salvage were analysed.
Results: In the 12 months before introduction, 1580 (72%) cases were suitable for cell salvage, of which 88 (5.6%) received donor blood. In the 24 months after introduction, 3489 (75%) cases were eligible, of which 154 (4.4%) received donor blood and 125 (3.6%) received cell salvaged blood. This reduction in prevalence of donor blood transfusion is statistically significant (P = 0.042).

Figure: Red cell transfusion rates before and after introduction of cell salvage

Discussion: Our data suggest that the introduction of cell salvage to an obstetric unit reduces allogeneic red cell transfusion rates in those patients where its use is indicated. The reduction reported was not previously detected since previous analysis included vaginal deliveries ineligible for cell salvage (unpublished data). A national multi-centre randomised controlled trial examining the effectiveness and cost effectiveness of cell salvage in caesarean sections has been funded by the NIHR Health Technology Assessment Programme.

Reference

P4 Do leucocyte depletion filters shed their material?
EJ Robson, † JP Campbell, MJ Mackenzie, * S Sooranna, † SM Yentis
Department of Anaesthesia, Chelsea and Westminster Hospital, London, UK, *Department of Anaesthesia, East Surrey Hospital, Redhill, UK, † Imperial College, London, UK
Introduction: During a previous study, we found that small strands were present in samples of amniotic fluid after passing through a LeukoGuard® RS leucocyte depletion filter (Pall, UK).1 We therefore investigated whether these might be pieces of filter material.
Methods: A 500-mL bag of 0.9% saline, hung at 100 cm, was run through either a LeukoGuard filter (which incorporates a giving set) or an intravenous giving set (Intrafix® SafeSet (B.Braun, Germany)). Four 45-mL samples of filtrate were collected (V1-4), discarding 80 mL between each sample. Five filters and five giving sets were studied in random order. Each sample was centrifuged at 3000 rpm for 15 min, the supernatant removed and the remains resuspended in 1 mL supernatant. Five 100-µL aliquots from each sample were examined at 100 x magnification by an investigator blinded to the randomisation, and the number of strands counted. The study was repeated with pressurisation of the fluid bag to 300 mmHg.
Results: The number of strands is shown in the figure.

Figure: Median number of strands (total in 5 x 100-µL aliquots) present in filtrate (IQR/range not shown for clarity) (*P < 0.05).

Discussion: There were more strands in the first collection when a filter was used, especially with pressurisation. However, the overall number of strands was very small, and strands were also present when the filter was not used. Furthermore, the strands did not resemble filter material obtained from a dismantled filter (data not shown), suggesting that they might arise from the other components and/or their assembly, or another source, rather than from the filters per se.

Acknowledgments: We would like to thank B.Braun Medical Ltd for donating the giving sets and Pall Corporation for donating the filters.

Reference
P5 National survey of obstetric cell salvage availability
C Harber, JS Dawson, P Wake
Anaesthetics Department, Nottingham University Hospitals
NHS Trust, Nottingham, UK

Introduction: Haemorrhage remains one of the commonest direct causes of maternal death in the UK; the most recent CMACE report recommends that women known to be at risk of major haemorrhage should be delivered in maternity units with access to red blood cell salvage (RBCS).1

Methods: An electronic survey was sent to the 214 lead obstetric anaesthetists in the UK, identified through the Obstetric Anaesthetists’ Association. Questions regarding the availability of RBCS and other haemorrhage-related CMACE recommendations were asked.

Results: The response rate was 74% (159 replies). Access to RBCS was possible in 117 units (74%) and this was positively correlated with number of annual obstetric deliveries. Of these, 85 units had access to RBCS for both elective and emergency use. Reliable 24-hour access to RBCS however, was confirmed in just 57 out of the 159 centres (36%) and the RBCS machine itself was stored in remote sites (or even separate buildings) in two thirds of hospitals surveyed. Of the 42 units without access to cell salvage, 23 units (55%) reported no perceived clinical need for cell salvage and 13 units (31%) reported a lack of funding for cell salvage. The overwhelming majority of units (88%) using RBCS infused cells routinely using a leucocyte depletion filter. Of these, 25% noticed problems including profound hypotension and very slow infusion rates.

Table: Number of maternity units ranked by number of deliveries per annum with potential access to cell salvage.

<table>
<thead>
<tr>
<th>Deliveries per year</th>
<th>Number of maternity units with potential access to cell salvage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2000</td>
<td>11/21 (52%)</td>
</tr>
<tr>
<td>2000-2999</td>
<td>22/35 (63%)</td>
</tr>
<tr>
<td>3000-3999</td>
<td>27/37 (73%)</td>
</tr>
<tr>
<td>4000-4999</td>
<td>21/25 (84%)</td>
</tr>
<tr>
<td>&gt;5000</td>
<td>37/42 (88%)</td>
</tr>
</tbody>
</table>

Discussion: RBCS is not universally available in UK maternity units. Funding, training and maintenance of skills have been highlighted as potential reasons for this, particularly in smaller units and in centres not undertaking surgery that utilise this technology. Despite CMACE recommendations, there is no national guidance on the recommended availability of cell salvage to maternity units and NICE have yet to formalise any recommendations on its use in obstetrics. 2,3 Despite this, it is concerning that 24-h access to RBCS seems poor. The widespread utilisation of leucocyte depletion filters (and their drawbacks) may warrant review.

References

P6 Continuous infusion dose of phenylephrine to prevent hypotension during regional anesthesia for cesarean delivery
Jungmin Lee, Eunso Choi, Wonsik Ahn
Anesthesiology and Pain Medicine, Seoul National University Hospital, Seoul, Korea

Introduction: Regional anesthesia for cesarean delivery is frequently complicated by hypotension. This complication has been associated with a greater risk of fetal acidosis and maternal nausea and vomiting during cesarean delivery compared with general anesthesia. It can be prevented with coloading intravenous fluid in combination with the use of vasopressors. But the most effective continuous infusion dose of phenylephrine has not been estimated.

Methods: Healthy non-laboring women undergoing a cesarean delivery were recruited. All women received spinal or combined spinal-epidural anesthesia using hyperbaric bupivacaine 10 mg with fentanyl 10 µg. They were received prophylactic phenylephrine continuous infusion dose at 0.25, 0.30 or 0.35 µg/kg/min immediately after regional anesthesia in combination with intravenous fluid coload. Maternal baseline systolic blood pressure (SBP) was determined by the mean of ward SBP and operation room SBP. We compared whether the continuous infusion dose maintain the target range without intervention during 40 min after spinal injection.

Results: Fifty-six patients were included in the analysis. Two patients were excluded due to preoperative bradycardia and intraoperative massive bleeding. There was no significant difference in the effectiveness among the groups (P = 0.16). But in 0.25 µg/kg/min of phenylephrine, there was higher the incidence of spinal-related hypotension and in 0.35 µg/kg/min, there was higher the incidence of hypertensin.

Discussion: We recommend that the most effective continuous infusion dose of phenylephrine for prevention hypotension are 0.30 µg/kg/min.

Reference
P7 Novel method for targeting fluid and vasopressor management in caesarean section under spinal anaesthesia using continuous non-invasive monitoring

MC Faulds, I Wrench
Department of Anaesthesia, Sheffield Teaching Hospitals NHSFT, Sheffield, UK

Introduction: All patients undergoing caesarean section require varying volumes of fluid and possibly blood products. Minimum monitoring intraoperatively should include pulse oximetry. Technological advancements now allow continuous non-invasive monitoring of additional variables such as haemoglobin concentration (SpHb) and pleth variability index (PVI). PVI is a measure of the pulse pressure variation with respiration which may help to tailor fluid management. To date, no published studies have investigated its use in obstetric patients under regional anaesthesia.

Method: A Masimo Rainbow SET co-oximetry probe was provided by the Masimo company. We gained informed consent from a healthy patient undergoing elective caesarean section under spinal anaesthetic. Anaesthesia was conducted using our department’s standard regimen. Haemodynamic variables were recorded at 1-min intervals and included pulse rate, non-invasive blood pressure (BP), SpHb and PVI.

Results:

![Graph showing variation in systolic BP, PVI and haemoglobin concentration over time during spinal anaesthesia for elective caesarean section](image)

Discussion: We have shown that PVI increased with the onset of spinal blockade with a matched fall in BP. The PVI then returned to baseline with fluid and vasopressor administration whilst improvement in the BP was slightly later. The PVI trend suggested that there were no further significant fluid requirements, matching the clinical picture. Measured haemoglobin level was stable throughout the procedure with a value close to the pre-op laboratory sample of 10.6g/dL. The Masimo co-oximetry probe may be useful in tailoring fluid administration and may give early warning of falling haemoglobin. There could also be a role for widespread use of the Masimo probe to allow non-invasive spot checks of haemoglobin levels in post-delivery women and continuous monitoring of those at high risk of bleeding.

Reference

P8 Prevention of oxytocin induced hypotension in caesarean delivery by co-administration of phenylephrine

ABM Kamrul Hasan, Anand H Kulkarni, S Durairajan, Kim H Lim, Zulaidi Latif, HL Kaul
Department of Anaesthetics, RIPAS Hospital, Bandar Seri Begawan, Brunei

Introduction: The value of oxytocin in caesarean delivery is well established. However, oxytocin may cause dose related adverse, even fatal, cardiovascular effects including hypotension, tachycardia and myocardial ischemia. In this prospective, randomised double-blind control study, we investigated the effects of co-administration of intravenous (i.v.) bolus of oxytocin with phenylephrine on haodynamic changes caused by oxytocin. We hypothesize that this co-administration would reduce the incidence of oxytocin induced-hypotension after caesarean delivery. Our objectives were to compare changes in blood pressure (BP), heart rate and emetic effects after bolus dose of oxytocin with or without co-administration of different doses of phenylephrine after delivery of baby in elective caesarean section.

Methods: With ethical approval 90 healthy parturients undergoing elective caesarean section received 10 IU oxytocin i.v. bolus after delivery of the baby over 5-10 s. They were randomised to receive either placebo (Group A) or 100 µg (Group B) or 200 µg (Group C) of phenylephrine with the oxytocin bolus. Non-invasive BP and heart rate were recorded at 1-min intervals from the time of oxytocin administration for 5 min, and at 5-min intervals thereafter until the end of surgery. BP and heart rate before oxytocin administration were considered as the baseline for subsequent changes. Hypotension was defined as a BP <20% of the baseline. Tachycardia was defined as a maternal heart rate >20% of baseline. Hypotension was treated with an i.v. bolus of phenylephrine or ephedrine.

Results: The incidence of hypotension 1 min after the oxytocin bolus was 46.7% in Group A, 20% in Group B and 0% in Group C which was statistically significant (P <0.001). At 2 min, it was 13.3% in Group A, 6.7% in Group B and 0% in Group C which was not significant (P=0.117). Incidence of reduction in mean BP at 1 min was 63.3% in Group A, 30% in Group B and 6.7% in Group C which was significant (P <0.001). The incidence of tachycardia at 1 min was 46.7% in Group A, 30% in Group B and 16.7% in Group C which was significant (P=0.042). No patients in Group B and C had nausea and vomiting, whereas in Group A, 4 patients had nausea and 1 patient vomited.

Discussion: Co-administration of phenylephrine with oxytocin has been found to be effective and 200 µg is more effective than 100 µg of phenylephrine in prevention of oxytocin induced hypotension in caesarean delivery without any increase in untoward effects.

References
P9 A survey of patient and partner views, on the presence of the partner in the operating theatre during caesarean section performed under regional and general anaesthesia.

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Anaesthetics, Glasgow Royal Infirmary, Glasgow, UK

Introduction: We previously reported that an unexpected high percentage of labour ward staff favoured partners being present at caesarean section performed under general anaesthesia. Many staff who opposed partners being present presumed there was no interest from either the woman or her partner. Recently in our unit there have been cases where partners were permitted into the theatre during general anaesthetic. The patients and partners were very grateful for this opportunity, and it was a very positive experience. We sought to ascertain the views of patients and partners, with a view to improving the birthing experience for parents.

Methods: We gained ethical approval for this study. 109 questionnaires were distributed. Patients and partners were surveyed after caesarean section. They were each asked to rate the importance of the partner’s presence in theatre during caesarean section performed under regional blockade, and their opinion of the partner being present if the patients required a general anaesthetic.

Results: 109 questionnaires were completed: 56 from patients and 53 from their partners (33 elective and 23 emergency cases). 53 (95%) of women strongly agreed, and 2 (4%) agreed that it was important for their partner to be present during a regional caesarean section. 1 (1%) neither agreed, nor disagreed. 47 (89%) of partners strongly agreed, and 5 (9%) agreed that it was important to be with the woman for a regional caesarean section. 1 (2%) disagreed. 36 (64%) of mothers strongly agreed, and 10 (18%) agreed that it was important for their partner to be present for a general anaesthetic caesarean section. 5 (9%) neither agreed, nor disagreed. 3 (5%) disagreed and 2 (4%) strongly disagreed. 38 (72%) of partners strongly agreed, and 10 (19%) agreed that it was important to be present for a general anaesthetic caesarean section. 2 (4%) disagreed and 3 (5%) strongly disagreed.

Discussion: A cornerstone of modern maternity care is the increasing emphasis on patient satisfaction and autonomy. Our results demonstrate that an overwhelming majority of women (82%) and partners (91%), want to be present during general anaesthetic caesarean sections. This abolishes the belief that women and partners do not want partners to be present in theatre. There is potential to increase maternal satisfaction by considering the routine practice of partner inclusion when a general anaesthetic has been administered. This is in context of other priorities, and safety must remain paramount. For emergency caesareans this can not always be offered, but for many lower grade sections, such as patients with thrombocytopenia or Harrington rods this could be easily offered in a controlled setting.

Reference

P10 Should women be able to choose caesarean delivery? A UK survey of obstetric anaesthetists

NP Patel, FP Plaat
Department of Anaesthesia, Queen Charlotte's Hospital, London, UK

Introduction: Whether to allow elective caesarean section (ELCS), in the absence of an obstetric or medical indication, divides clinicians and the public and is addressed in a recently revised national guideline. Whilst the views of obstetricians and midwives have been published, to date those of obstetric anaesthetists have not. We wanted to identify the proportion of OAA members that think that women should have the choice of ELCS, the reasons behind their views and the proportion that would choose this option for themselves or their partner.

Methods: In 2011 an OAA approved survey was sent to all 1800 OAA members.

Results: We received 993 responses (55% response rate), 50% were male, 70% were consultants and 62% worked in a DGH. Half of all respondents believed that women should have the choice of ELCS. The most commonly cited advantages were avoidance of stress incontinence and perineal trauma. The most frequent free text comment was that this was an issue of 'patient choice', as long as women were fully informed. Of those who did not believe that this choice should be available, the most common reasons were complications of surgery, unnecessary anaesthetic risk and longer recovery period. 27% stated that they would choose or recommend to their partner, a patient choice ELCS, and 30% would opt for this if they or their partner had previously suffered inadequate analgesia in labour.

Discussion: Because of the subject, we felt it appropriate to survey all OAA members, not just lead clinicians, and the low response rate was therefore not unexpected (although better than average for a membership wide survey). The absolute number of responses was high but we cannot exclude the possibility that they represent a biased sample. Nevertheless the proportion of respondents who believe that women should be able to choose an ELCS (50%) is in startling contrast to that of British obstetricians (17%). Both anaesthetists and obstetricians cited the same advantages of caesarean section. Whilst ethical issues concerning patient autonomy and choice were prominent in the pro-choice group, unnecessary risk and cost to the NHS were commonly cited by those opposed. Of note in a US National Institute of Health (NIH) consensus in 2006, 46% of US obstetricians concluded that information available about the risks and benefits of ELCS did not provide the basis for a recommendation in either direction. Whether the views of anaesthetists have any effect on the incidence of patient choice ELCS, and the wider implications for future reproductive health and on the health service are matters for debate.

References
P11 Mobilisation after neuraxial obstetric anaesthesia
M W Lambert, L Emanuel-Kole, A P McG Glennan
Department of Anaesthesia, Royal Free Hospital, London, UK

Introduction: Early mobilisation improves recovery after surgery and is increasingly incorporated into multimodal strategies which aim to improve patient outcome.1 It is also recommended as part of prophylaxis against venous thromboembolism for mothers who have undergone caesarean section.2 Despite a full Pubmed search, we found no published data or guidelines on maternal mobilisation after neuraxial block for obstetric procedures. We aimed to establish the relationship between type of neuraxial block, duration of motor block and time to mobilisation after obstetric surgical procedures.

Methods: Over a two-month period, parturients who underwent spinal or epidural anaesthesia for an obstetric procedure (caesarean section, instrumental delivery, perineal repair) were surveyed between 24 and 48 h after delivery. This was incorporated into our routine obstetric anaesthesia postnatal follow up. Data collected included onset and method of analgesia, time of subjective return of motor function whilst still in bed and time of ambulation. Data were also collected regarding reasons for non-ambulation if lower-limb motor function had returned.

Results: 71 patients were questioned. The median interval from onset of anaesthesia to reported return of motor function was 7 h. Median recovery of motor function was fastest in patients who had undergone spinal anaesthesia (5.5 h) as compared to CSE and epidural top-up (9 h and 7 h respectively). The median duration between onset of neuraxial anaesthesia and ambulation was 18.5 h with the median interval between reported return of motor function and ambulation being 11 h. Parturients who had a neuraxial block established out-of-hours (between 1800 and 0600h) had a shorter median interval between return of motor function and ambulation compared to parturients who underwent neuraxial anaesthesia during daylight hours (0600-1800) – 4 h and 12.25 h respectively. The most common reason for delayed ambulation despite return of lower limb motor function was ‘awaiting catheter removal’ (43%) followed by ‘awaiting instruction to mobilise’ (30%).

Discussion: Spinal anaesthesia produced the shortest duration of motor block for obstetric procedures. Despite return of motor function, parturients often delay mobilisation which may be related to catheter removal. Patients who have a block performed out of hours mobilise earlier than those who have blocks performed during daylight hours. We postulate that this may be related to return of motor function during daylight hours when more encouragement from staff is available. Following this work we have educated staff on the labour ward and adapted our protocol regarding mobilisation. We encourage catheter removal and ambulation as soon as possible after return of motor function.

References

P12 National survey of mobilisation guidelines after epidurals
N Akerman, J Jones,* L Walton,*
Obstetric Anaesthetic, Pinderfields Hospital, Wakefield, UK,*Anaesthesia, Leeds Teaching Hospitals, Leeds, UK

Introduction: Epidural analgesia is one of the most common and most effective methods of providing pain relief to labouring mothers. In our unit 30% of mothers receive epidural analgesia. We frequently discuss the benefits, side effects and common and serious complications, but mention little about when to mobilise. Following a recent critical incident in our hospital; where a patient suffered an orthopaedic injury after mobilising too soon, we have introduced guidelines about assessing patients prior to mobilisation after epidurals on labour ward. We wondered what other trusts in the UK do.

Methods: We conducted a national postal survey of all UK consultant-led obstetric units, asking what assessment they performed on their patients before they mobilise, after they have had an epidural.

Results: We had a response rate of 64% (122/190). 25 (20%) units said they did have specific guidelines for mobilisation, of which the motor response was assessed in 22 units and a sensory assessment in 16 units. Midwives performed this assessment in 19/25 units. 92 (75%) units had no formal guideline, relying on a ‘common sense approach’.

Discussion: Given the AAGBI recommendation that ‘the patient is under the anaesthetists care until the return of normal function, including sensation’1 it is perhaps surprising that only 20% of units have a motor assessment, 13% have a sensory assessment and only one unit had an assessment for proprioception. This latter unit had only developed their guidance after a ‘patient slipped in the shower and successfully made a small claim’. In an era where patient safety is paramount and very much at the forefront of clinical practice, we were surprised by the survey results. We now have a guideline which encompasses motor function (modified Bromage Score) and a sensory assessment (including proprioception and Romberg’s Test) which the patients have to pass before a patient can mobilise independently after an epidural has worn off.

Reference
P13 Thromboelastography and obesity in pregnancy
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*Academic department of anaesthesia, critical care, Heart of
England NHS Foundation Trust, Birmingham, UK.
†Thrombosis and Haemostasis, Kings College, London, UK.
Introduction: Obesity has been identified by CMACE and
UKOSS as an important risk factor for maternal venous
thromboembolism.1,2 Thromboelastography (TEG) has been
used to demonstrate a hypercoagulable state in both morbidly
obese and pregnant subjects.3,4 The objective of this study was
to quantify degrees of obesity with degrees of
hypercoagulable state in pregnancy.
Methods: After gaining ethical approval and informed consent,
parturients were recruited into 4 groups depending on booking
BMI. Inclusion criteria were women in 3rd trimester, not in
labour, ≥16 yrs old. Exclusion criteria were thromboprophylaxis,
trocarisation or aspirin. Primary outcome was the difference
in maximum amplitude between groups. Thirty subjects were
needed in each group, P=0.05, power 90%. TEG methods:
citrated blood, activated with kaolin.
Results:

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Group 4</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>29.3 ± 4.3</td>
<td>29.3 ± 4.3</td>
<td>29.3 ± 4.3</td>
<td>27.7 ± 3.9</td>
<td>0.53</td>
</tr>
<tr>
<td>Gestation</td>
<td>38 ± 0.9</td>
<td>38 ± 1.2</td>
<td>38 ± 0.9</td>
<td>34.5 ± 4.6</td>
<td>0.00</td>
</tr>
<tr>
<td>Hbg (g/dl)</td>
<td>11.1 ± 1.5</td>
<td>11.5 ± 1.2</td>
<td>11.1 ± 0.8</td>
<td>11.7 ± 1.2</td>
<td>0.27</td>
</tr>
<tr>
<td>Plt (10^9/l)</td>
<td>255 ± 80</td>
<td>285 ± 109</td>
<td>265 ± 57</td>
<td>308 ± 77</td>
<td>0.14</td>
</tr>
<tr>
<td>PT (s)</td>
<td>15.6 ± 2.4</td>
<td>14.6 ± 1.7</td>
<td>14.2 ± 2.3</td>
<td>15.4 ± 2.8</td>
<td>0.06</td>
</tr>
<tr>
<td>APTT (s)</td>
<td>41.8 ± 14.9</td>
<td>41 ± 6.3</td>
<td>39.7 ± 6.6</td>
<td>43.4 ± 19.5</td>
<td>0.78</td>
</tr>
<tr>
<td>Fbg (g/l)</td>
<td>5.4 ± 1.4</td>
<td>5.5 ± 1.4</td>
<td>5.4 ± 1.3</td>
<td>5.6 ± 1.8</td>
<td>0.93</td>
</tr>
<tr>
<td>(mm)</td>
<td>7.1 ± 1.7</td>
<td>7.1 ± 1.5</td>
<td>6.5 ± 1.2</td>
<td>7.5 ± 2.1</td>
<td>0.17</td>
</tr>
<tr>
<td>k (mm)</td>
<td>1.7 ± 0.5</td>
<td>1.6 ± 0.4</td>
<td>1.5 ± 0.3</td>
<td>1.6 ± 0.4</td>
<td>0.53</td>
</tr>
<tr>
<td>α angle °</td>
<td>63.5 ± 8.3</td>
<td>63.3 ± 7.7</td>
<td>63.5 ± 7.5</td>
<td>64.2 ± 8</td>
<td>0.95</td>
</tr>
<tr>
<td>MA (mm)</td>
<td>75.7 ± 5.3</td>
<td>75.8 ± 4.9</td>
<td>77.5 ± 3.7</td>
<td>77.5 ± 5.7</td>
<td>0.35</td>
</tr>
</tbody>
</table>

Data are Mean and standard deviation.

Discussion: The failure to identify differences in TEG
variables according to BMI may have been due to low
numbers, or the significant difference in gestation, in the
morbidly obese group. However due to sufficient numbers in
the other 3 groups it is likely we would have demonstrated a
correlation between MA and BMI if there were one.

References
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(CEMACH). Saving Mothers’ Lives: reviewing maternal deaths to
2. Knight M. Antenatal pulmonary embolism: risk factors,
management and outcomes. BJOG 2008; 115: 453–61
3. Sharma S K, Philip J, Wiley J. Thromboelastographic changes in
thromboelastography and sonoclot analysis in morbidly obese

P14 The impact of preeclampsia on the childbirth experience
S Lau, C Carr, S Wood, A Dennis.
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University of Melbourne, Parkville, Australia, Department of
Anaesthesia, Mercy Hospital for Women, Heidelberg,
Victoria, Australia. ‡Department of Anaesthesia, Stepping
Hill Hospital, Stockport, UK.

Introduction: Preeclampsia is an unexpected complication of
pregnancy and it is important to explore experiences and views
of the childbirth event in women with preeclampsia.1 The aim
of this study was to evaluate the impact of preeclampsia on
the childbirth experience for women and their partners, by
comparing questionnaire responses from those who experienced
preeclampsia with those who did not.

Methods: After institutional approval and written consent, 40
women with preeclampsia and 40 healthy pregnant women
were recruited. After postnatal discharge, women and partners
were sent a questionnaire (yes/no responses & five-point
Likert scale) about their experiences of pregnancy and
childbirth. Fisher’s exact test compared data from the groups.
Results: 60 questionnaires were returned (75%) with similar
percentage responses from each group.

<table>
<thead>
<tr>
<th>Characteristics and responses</th>
<th>Healthy n=32</th>
<th>Hypertensive n=28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nulliparous women</td>
<td>26</td>
<td>17 (61)*</td>
</tr>
<tr>
<td>Number of babies born at &lt; 37 weeks gestation</td>
<td>13</td>
<td>13 (46)*</td>
</tr>
<tr>
<td>Women who experienced separation from partner during birth</td>
<td>7</td>
<td>12 (43)*</td>
</tr>
<tr>
<td>Negative impact of separation from partner on woman</td>
<td>4 (67)</td>
<td>7 (88)</td>
</tr>
<tr>
<td>Negative impact of separation from partner on partner</td>
<td>4 (67)</td>
<td>8 (100)</td>
</tr>
<tr>
<td>Women who experienced separation from baby after birth</td>
<td>7 (22)</td>
<td>23 (82)*</td>
</tr>
<tr>
<td>Negative impact of separation from baby on bonding</td>
<td>12 (38)</td>
<td>14 (41)</td>
</tr>
<tr>
<td>Negative impact of separation from baby on breastfeeding</td>
<td>11 (34)</td>
<td>17 (53)</td>
</tr>
<tr>
<td>Women satisfied with care</td>
<td>31 (97)</td>
<td>26 (93)</td>
</tr>
<tr>
<td>Childbirth expectations met</td>
<td>29 (91)</td>
<td>22 (79)</td>
</tr>
<tr>
<td>Severe or very severe maternal anxiety at time of diagnosis of preeclampsia N/A</td>
<td>20 (71)</td>
<td></td>
</tr>
<tr>
<td>Severe or very severe partner anxiety at the time of diagnosis of preeclampsia N/A</td>
<td>18 (64)</td>
<td></td>
</tr>
</tbody>
</table>

Results: 60 questionnaires were returned (75%) with similar
percentage responses from each group.

Data are number (percentage). *P < 0.01

Discussion: There is significant maternal and partner anxiety
at the time of diagnosis of preeclampsia. For women, and their
partners, separation during birth is a negative experience
especially if the woman has preeclampsia. For women with
preeclampsia, separation from her baby occurs more frequently
and has a negative impact on bonding and breastfeeding.
Most women are satisfied with their care and have their
childbirth expectations met, however, there is opportunity for
anaesthetists caring for these women to improve the
childbirth experience for women by minimising separation from
their partner and baby, and allaying anxiety.

References
1. Meher S, Duley L. Interventions for preventing pre-eclampsia and
its consequences: generic protocol. Cochrane Database of
Systematic Reviews 2005. DOI:10.1002/14651858.CD005301
P15 "Allergic to everything" - sulphite sensitivity
S Davies, M O'Meara, A Banks
Department of Anaesthesia, Nottingham University Hospitals, Nottingham, UK
Introduction: We present two cases that highlight the need to check the constituents of drugs when patients present with allergy syndromes.
Cases: A 27-year old nulliparous woman presented to the obstetric department for induction of labour. Anaesthetic review was requested in light of multiple previous severe allergic reactions. The patient suffered from chronic idiopathic urticarial angioedema along with multiple allergies to foods and medicines. A sulphite allergy was discovered by immunological investigation of life-threatening laryngeal oedema and an adrenaline auto-injector (EpiPen™) was prescribed. The constituents of commonly used epidural regimens and drugs in our establishment were examined and a “safe/unsafe” list created. Epidural analgesia, when requested, was established and maintained with bupivacaine 0.1% + fentanyl 4 µg/mL. When the decision was made to proceed to category 1 caesarean section, 20 mL ropivacaine 0.75% was used as an emergency epidural top-up as this did not contain the metabisulphite ingredient found in bupivacaine 0.5% with 1:200 000 adrenaline solution (a constituent of our “rapid epidural top-up mix”). The second patient, also a primigravida, presented in labour having previously been reviewed in the anaesthetic clinic. She gave a very similar history of multiple severe allergies which included paracetamol, antibiotics, several foods and alcoholic beverages, all of which may contain sulphites. She was sensitive to metabisulphite and had made significant diet and lifestyle modifications in order to avoid precipitants. She went on to deliver normally without anaesthetic intervention.
Discussion: Sulphite sensitivity is a recognised immunological condition that can cause a variety of symptoms from urticaria to angioedema, often following ingestion. They can cause severe respiratory symptoms in between 5 and 13% of asthmatics, particularly in those with atopic disease. Sulphite compounds are used as preservatives in a variety of foods and drugs. Sodium metabisulphite is the preservative used to stabilise adrenaline-containing preparations including local anaesthetics with adrenaline, to which toxicity has been reported. They can also be found in many of the commonly used inotropic and vasopressor agents, as well as some over-the-counter preparations such as paracetamol, unfortunately, in a brand-specific manner. Interestingly, the EpiPen™ also contains metabisulphite. The compound is added as an antioxidant, as well as to prevent browning which decreases its effectiveness. Indeed, to our knowledge, there are no sulphite-free alternatives. The advice given by the manufacturers is to use the auto-injectors in cases where concerns over anaphylaxis supervene.

References
2. Baker M. Chloroprocaine or sulfite toxicity. Anaesthesiology 2004;101:1247

P16 A follow-up study of lung function trends in cystic fibrosis parturients
J Kerr, S Quasim,* E Walker
Anaesthetics, Heart of England NHS Foundation Trust, Birmingham, UK, *Anaesthetics, UHCW, Coventry, UK
Introduction: Cystic fibrosis is the commonest inherited life-threatening disease (with a median survival of 29 years). As medical management has improved, more women with cystic fibrosis are surviving to childbearing age and becoming pregnant. In 2009 we presented a case series of pregnancy outcomes in a cohort of parturients with cystic fibrosis. We were interested to see if pregnancy has a long-term impact on lung function at one year, as matched cohort studies have shown no significant difference in deterioration between pregnant and non-pregnant groups.
Method: We retrospectively reviewed the notes of all parturients with cystic fibrosis since January 2000 and recorded lung function pre-pregnancy, during pregnancy, immediately postpartum, and at 3, 6 and 12 months postpartum.
Results: During the study period, 25 women with 30 pregnancies were identified. Complete data were available for 21 women with 23 pregnancies. FEV1 appears to decline during pregnancy, being lowest immediately after delivery, but does not reach statistical significance, and then improves, but not to pre-pregnancy values. The only statistically significant change from baseline is at 3 months (P<0.03).

Discussion: FEV1 is expected to decline with time, and previous studies have demonstrated no significant impact of pregnancy on lung function. Our results demonstrate an improvement in lung function post partum which other studies have not, suggesting a potentially reversible pregnancy related decrease in lung function in the 3 months postpartum.

References
P17 Anaesthetic management of parturients with neuromuscular disorders requiring non invasive ventilation - a case series
K Bhatia, P Kochhar, A Bentley,
Department of Anaesthesia, St Mary’s Hospital, Manchester, UK, *Long Term Ventilation Service and Intensive Care, University Hospital of South Manchester, Manchester, UK

Introduction: Pregnancy and its physiological effects in patients with neuromuscular disorders (NMD) can stretch the cardio-respiratory reserves, necessitating non invasive ventilation (NIV) and early obstetric intervention.1 We present the clinical management and outcomes of eight parturients with varied NMD on NIV who presented for caesarean section (CS) over a six year period (2005 – 2011).

Methods: Case notes including patient demographics, investigations, NIV details, anaesthetic technique for CS, the problems encountered and post operative care of eight patients with NMD who presented for CS (7 elective; 1 urgent) at St Mary’s Hospital, Manchester and University Hospital of South Manchester were retrospectively reviewed using a pre-defined proforma.

Results: The spectrum of NMD, anaesthetic details, NIV settings used intra-operatively [Inspiratory Positive Airway Pressure (IPAP cmH2O) / Expiratory Positive Airway Pressure (EPAP cmH2O)], along with details of duration of stay in High Dependency Unit (HDU) and Intensive Care Unit (ICU) are summarised in the table given below.

Table: Peri-operative management of patients with NMD’s

<table>
<thead>
<tr>
<th>NMD</th>
<th>Anaesthetic technique</th>
<th>Intraoperative IPAP/EPAP</th>
<th>Postoperative care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hereditary Sensorimotor Neuropathy</td>
<td>CSE</td>
<td>10/4</td>
<td>HDU, 1 day</td>
</tr>
<tr>
<td>Muscular Dystrophy</td>
<td>Continuous Spinal</td>
<td>25/5</td>
<td>ICU, 1 day</td>
</tr>
<tr>
<td>Muscular Dystrophy</td>
<td>CSE</td>
<td>30/2</td>
<td>ICU, 34 days</td>
</tr>
<tr>
<td>Mitochondrial Myopathy</td>
<td>Epidural</td>
<td>14/3</td>
<td>Obstetric</td>
</tr>
<tr>
<td>Limb Girdle Dystrophy (LGD)</td>
<td>CSE</td>
<td>10/2</td>
<td>HDU, 2 days</td>
</tr>
<tr>
<td>Congenital</td>
<td>Not (N/A)</td>
<td>Applicable</td>
<td>ICU, 1 day</td>
</tr>
<tr>
<td>Kyphoscoliosis</td>
<td>GA</td>
<td>Applicable</td>
<td>ICU, 1 day</td>
</tr>
<tr>
<td>LGD</td>
<td>GA</td>
<td>N/A</td>
<td>ICU, 1 day</td>
</tr>
<tr>
<td>LGD</td>
<td>CSE</td>
<td>10/3</td>
<td>HDU, 1 day</td>
</tr>
</tbody>
</table>

Three patients were established on NIV pre-pregnancy and five required NIV initiation after 20 weeks gestation. Four patients had a FEV1 (Forced Expiratory Volume in 1 second) of less than a litre. Two patients died within a year of delivery from their co-morbidities.

Discussion: All patients were seen antenatally by the obstetricians, the respiratory failure team and the obstetric anaesthetists and a plan formulated. NIV is an essential peri-operative tool in parturients with NMD during neuraxial anaesthesia to counter the cardio-respiratory embarrassment during pregnancy and recumbent positioning. A multidisciplinary approach allows the safe peri-operative management of this complex group of patients.

Reference

P18 Anaesthesia in parturients with cardiac disease: a one-year review
K O'Connor, P Tripathi, J Brennand, B McCreath
Anaesthetics, Southern General Maternity Unit, Glasgow, UK

Introduction: Cardiac disease is the commonest cause of maternal death.1 Retrospective studies provide valuable data on management of cardiac disease in obstetrics.2-4 We reviewed our anaesthetic management of parturients with cardiac disease delivering in our obstetric unit.

Methods: We retrospectively reviewed case notes of parturients with moderate-risk cardiac disease delivering at the Southern General Maternity Unit in 2010 (5791 deliveries), when this unit became the regional centre for the management of such patients.

Results: 34 women with cardiac disease delivered 36 babies (6 per 1000 deliveries) including two sets of twins. Median maternal age was 32 [range 17-43]. 21 patients had congenital and 13 acquired cardiac disease. Septal defects were the commonest congenital defect (7), followed by transposition of the great arteries (5) and aortic valve disease (5). Arrhythmia was the most common acquired disease (11). 18 patients had undergone cardiac surgery. Recorded symptoms at booking included palpitations (15), exertional dyspnoea (7) and fatigue (7). NYHA classification deteriorated in five patients between booking and delivery but only three were NYHA classifications III or IV. 20 patients of 33 weeks median gestation [range 21-38] were reviewed at the high-risk anaesthetic clinic. Six patients were referred for echocardiography and five for ECG. The anaesthetist attended 27 patients at least once during labour. 12 patients required invasive blood pressure monitoring but none required central venous cannulation. Four patients had labour epidural analgesia. Mode of delivery was elective (19) and emergency (7) caesarean section (CS), SVD (7) and instrumental (1). For CS eight patients received spinal anaesthesia, four had an epidural top-up and eleven had a combined spinal-epidural. Three patients had a general anaesthetic. Phenylephrine and ephedrine were the only vasoactive drugs used. Four patients had estimated blood loss >1000 mL but only one required transfusion. 10 patients required obstetric HDU. Complications included eight cardiac and three obstetric. No major neonatal complications were recorded.

Discussion: Documenting data is a recommended step in planning anaesthesia services.5 Heart disease patients require increased resources.6 Recognition and timely referral of significant morbidity to anaesthetics permit early assessment and possibly the avoidance of complications including unplanned critical care admissions.2 This study on local experience provides a gross overview of management and outcome in this challenging group of patients. Over half required anaesthetic care. An appropriate management pathway for these patients is reflected by no unplanned critical care admissions and generally favourable outcomes.

References
P19 Anaesthetic management during childbirth in women with cardiac disease - history matters.

SD Williams, R Wendler, F Schroeder
Department of Anaesthesia, St George's Hospital, London, UK

Introduction: Women with heart disease are at increased risk for maternal and neonatal complications during pregnancy and delivery. We report a review of pregnant women with cardiac disease in view of peripartum management and outcomes.


Results: 103 women with 109 pregnancies were reviewed and cardiac lesions were divided into: congenital corrected 21 (19%), congenital uncorrected 18 (17%), arrhythmia 26 (24%), valvular 30 (28%), cardiomyopathy 3 (3%) and other acquired 11 (10%). 42 (41%) women underwent cardiac interventions prior to pregnancy and 36 (35%) suffered a cardiac event in the past. Of all 109 pregnancies 19 were risk-stratified to be of high or intermediate risk for maternal complications in the peripartum period. Across all groups 74/109 (68%) women were allowed to go into labour but only 60 (55%) delivered vaginally. 49 (45%) women underwent a caesarean section, 14 of these due to the maternal cardiac condition.

Delivery mode Analgesia/Anaesthesia Number of women
Vaginal None 3 (3%)
Vaginal, no epidural 20 (18%)
Vaginal, epidural 37 (34%)
Caesarean Spinal 13 (12%)
Epidual 11 (10%)
CSE 20 (18%)
GA 5 (5%)

There were no maternal deaths. 11 (10%) maternal cardiac events occurred during pregnancy but not delivery. 8 complications occurred in women who suffered a previous cardiac event and 3 in parturients from the high/intermediate risk group. The complication rate amongst all live births was 23% with premature births (11%), intrauterine growth restriction (10%) and low Apgar scores (2%). The neonatal complication rate for the high/intermediate risk subgroup only was higher (42%).

Discussion: Unsurprisingly, neonatal complications were nearly doubled in the high/intermediate risk group. Women with cardiac conditions were more likely to deliver by caesarean section (45% versus institutional average 25%). Maternal cardiac events were more likely in parturients with previous cardiac events but interestingly not in the high/intermediate risk groups. Therefore thorough assessment of medical history in parturients with cardiac disease is vital, even in lower risk patients.

References

P20 Cardiac function in women with severe preeclampsia

A Dennis
Dept of Anaesthesia, Royal Women's Hospital, Mercy Hospital for Women, Parkville/Heidelberg, Australia

Introduction: Preeclampsia (PE) is a life-threatening hypertensive disease of pregnancy. Morbidity and mortality from PE has not decreased in the last decade. Regardless of gestation, PE is often stratified into mild and severe disease based on symptoms, signs and haematological/biochemical criteria. Anaesthetists frequently manage women with severe PE and an understanding of haemodynamics in this group of women is important. The aim of this study was to examine the haemodynamics in women with severe PE using transthoracic echocardiography (TTE).

Methods: After institutional ethics approval and informed written consent, haemodynamics were assessed using TTE in 34 women with severe PE. A standardised TTE examination was performed according to American Society of Echocardiography guidelines. If stable, women were scanned prior to treatment interventions; if unstable women were scanned immediately after treatment interventions. Groups were compared using unpaired t-tests with Welch’s correction. Proportions were compared using Fisher’s exact test.

Results: Table. Untreated versus treated severe PE

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Untreated PE n=19</th>
<th>Treated PE n=15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>30 ± 6.1</td>
<td>31 ± 4.1</td>
</tr>
<tr>
<td>Gestation (weeks)</td>
<td>35 ± 4.9</td>
<td>31 ± 5.2</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>32 ± 7.4</td>
<td>33 ± 8.6</td>
</tr>
<tr>
<td>MAP (mmHg)</td>
<td>113 ± 4.9</td>
<td>110 ± 14.6</td>
</tr>
<tr>
<td>CO (ml/min)</td>
<td>4847 ± 1413.1</td>
<td>5690 ± 1650</td>
</tr>
<tr>
<td>HR (beats/min)</td>
<td>81 ± 14.1</td>
<td>82 ± 15.2</td>
</tr>
<tr>
<td>SV (ml)</td>
<td>60 ± 14.0</td>
<td>69 ± 14.0</td>
</tr>
<tr>
<td>SVR (dyne/s/cm⁵)</td>
<td>2060 ± 741.5</td>
<td>1716 ± 631.1</td>
</tr>
<tr>
<td>FAC (%)</td>
<td>63 ± 11.3</td>
<td>63 ± 12.0</td>
</tr>
<tr>
<td>Seplat e (cm/s¹)</td>
<td>8.2 ± 2.2†</td>
<td>7.8 ± 1.8‡</td>
</tr>
<tr>
<td>Seplat a (cm/s¹)</td>
<td>8.0 ± 1.9</td>
<td>8.8 ± 2.3</td>
</tr>
<tr>
<td>MV E/A</td>
<td>1.3 ± 0.3</td>
<td>1.2 ± 0.3</td>
</tr>
<tr>
<td>MV E/septal e'</td>
<td>11.0 ± 2.2†</td>
<td>12.6 ± 4.0‡</td>
</tr>
<tr>
<td>LV mass (g)</td>
<td>192 ± 42.7†</td>
<td>189 ± 57.6‡</td>
</tr>
</tbody>
</table>

Data are mean ± SD, or number (%). BMI = body mass index, MAP = mean arterial pressure, CO = cardiac output, HR = heart rate, SV = stroke volume, SVR = systemic vascular resistance, FAC = fractional area change, MV = mitral valve. *abnormal values compared to healthy pregnant and non-pregnant adults. *P <0.05

Discussion: Women with severe PE have increased LV mass, and significant diastolic abnormalities with evidence of increased left ventricular end diastolic pressure (MV E/e' >14). These abnormalities are greater in women with treated severe PE. Ejection fraction (FAC) is preserved. There are large haemodynamic differences between women however TTE can be used to measure individual haemodynamics in women prior to and after responses to interventions which can enable haemodynamically tailored drug therapy.

Reference
P21 One-year review of obstetric patients with cardiac disease referred to the anaesthetic high-risk clinic

K E Bramley, K Litchfield
Anaesthetic Department, Princess Royal Maternity Unit, Gloucester Royal Infirmary, Gloucester, UK

Introduction: The Eighth Report on Confidential Enquiries into Maternal Deaths in the United Kingdom highlighted cardiac disease as the leading cause of maternal death. Our tertiary maternity unit has approximately 6000 deliveries/year including patients with cardiac disease. We reviewed: 1) baseline details of obstetric patients with cardiac disease; 2) documentation of an anaesthetic plan; 3) identification of known risk factors for predicting cardiac events; 4) current anaesthetic practice in the perinatal period.

Methods: Patients attending the anaesthetic high-risk clinic from Jan-Dec 2009 with cardiac conditions were identified using the clinic database and cross-checked with paper records. Medical case notes were reviewed for antenatal and perinatal information using a piloted proforma. For incomplete data the obstetric clinical database was interrogated for additional information.

Results: Twenty-nine patients were identified with median age 30 years [range 21-42], median gestation at clinic attendance 33 weeks [range 16-39] and median gestation at delivery 39 weeks [range 17-42]. 96.6% (28) of patients had a documented anaesthetic plan. 27.6% (8) of patients did not have adequate information to identify risk factors for cardiac events. Cardiac disease was represented by congenital heart disease 44.8% (13), arrhythmias 20.7% (6), essential hypertension 17.2% (5), acquired valvular disease 13.8% (4) and ischaemic heart disease 3.4% (1). The mode of delivery was vaginal 48.3% (14), caesarean section 48.3% (14) and vaginal with instrumentation 3.4% (1). Of the fourteen caesarian sections 85.7% (12) were elective and 14.3% (2) emergency procedures. The anaesthetic technique for caesarean section were spinal 64.3% (9), general anaesthesia 14.3% (2), combined spinal epidural 14.3% (2) and epidural 7.1% (1). Four patients had postpartum haemorrhage graded major or above and one patient had a primary cardiac event (peri-operative ventricular tachycardia). There were no deaths.

Discussion: We have established useful baseline information on this high-risk group. The documentation of an anaesthetic plan in the medical notes was excellent. Although information on the four identified risk factors to predict cardiac events was present in 72.4% of the patients’ medical notes, it was often not specific, structured or assimilated into an objective measure to stratify risk. In view of previous reports of similar caesarean section rates and anaesthetic technique to the general obstetric population, it was surprising to observe a comparatively high proportion of patients undergoing caesarean section (48.3% c.f. 32.6% for all obstetric patients in 2009) and the relative prominence of general anaesthesia.

References

P22 Management of labour and birth in a woman with refractory supraventricular tachycardia

M Lee, A Dennis
Dept of Anaesthesia, The Royal Women’s Hospital, The University of Melbourne, Parkville, Australia

Introduction: Supraventricular tachycardia (SVT) defined as a heart rate (HR) >120 beats/min in pregnancy, occurs with an incidence of approximately 0.1%. Most cases respond to non-pharmacological or initial pharmacological therapy or cardioversion. We report a case of sustained refractory pregnancy-induced SVT requiring delivery in order to stop the arrhythmia.

Case report: A 33 year-old multiparous woman at 35 weeks gestation presented to our emergency department with palpitations and SVT with a HR of 160. Vagal manoeuvres, adenosine, metoprolol, digoxin and flecaïnide as well as cardioversion were used to attempt to control her HR but all were unsuccessful. She was admitted to the coronary care unit. Her HR remained elevated and she developed breathlessness and hypotension (HR 210). Thoracoscopic echocardiography (TEE) at the time revealed an ejection fraction of ~20%. A multidisciplinary team meeting occurred and an urgent plan was made to deliver in the co-located obstetric hospital with a critical care nurse, a midwife, obstetric and anaesthetic team. Routine monitoring, as well as intravenous blood pressure, and thoracoscopic echocardiography were used during labour and birth (Figure). An epidural was inserted and carefully titrated to haemodynamics and labour was induced after rupture of membranes and commencement of a syntocinon infusion. Pharmacological agents used during labour were intravenous digoxin, metoprolol and flecaïnide. Labour progressed uneventfully and birth occurred after 7 h with no hypotension. Lowest HR during labour was 123; highest HR 211. Apgar scores were 9 & 9 at 1 and 5 min, respectively. Spontaneous conversion to sinus rhythm occurred 10 h after birth. She had an uneventful postpartum course and she was discharged home with no complications. No cause other than pregnancy was found for the SVT.

Discussion: In this case of refractory SVT, birth was necessary to terminate the arrhythmia. A multidisciplinary team, invasive monitoring, transthoracic echocardiography and neuraxial analgesia enabled safe birth in the delivery suite.

Reference
P23 Amniotic fluid emboli in transit - captured on transoesophageal echocardiogram  
L Lei, P Smith  
Department of Anaesthesia, Westmead Hospital, Sydney, Australia  

Introduction: Amniotic fluid embolism (AFE) is a rare but catastrophic complication of pregnancy. It has high mortality and morbidity. We report a case of AFE where massive emboli in transit were captured on transoesophageal echocardiogram (TOE) and the patient survived with no neurological sequelae.  

Case report: A 32-year-old (G4P1) woman presented at 30 gestational weeks with antepartum bleeding on a background of a grade IV anterior placenta praevia. Significant past obstetric history included an emergency LSCS at 36 weeks that was complicated by grade IV placenta praevia and postpartum haemorrhage of 5L. At 32 weeks, she had semi-elective LSCS under general anaesthesia because of ongoing recurrent vaginal bleeding. The patient was stable post induction. However, after incising through the placenta and at the time of delivering the fetal head through the placenta, the patient had a cardiac arrest. After 7 cycles of CPR and adrenaline 7 mg, there was a return of circulation. A TOE performed 10 min after cardiac arrest, showed a markedly dilated RV and RA, multiple mobile masses in the RA and RV, some moving from RA to RV, poor RV systolic function, but adequate LV function with poor LV filling and an IV septum markedly deviated to the left. The patient then developed severe coagulopathy with DIC and postpartum haemorrhage of 2L. Haemodynamics were maintained with inotropes, fluids and 11 units of packed red cells. Coagulopathy was corrected with platelets, FFP, cryoprecipitate, prothrombinix-VF, NovoSeven, Biostate and calcium. Oxytocin, tranexamic acid, bimanual compression and insertion of Bakari balloon were required to stop ongoing bleeding. 3h after induction of general anaesthesia, the patient was stabilised and transferred to ICU. A transthoracic echocardiogram was performed in ICU and the only significant finding was mildly impaired LV relaxation. Initially the patient required further correction of coagulopathy and inotropic support. However, on day 1 post LSCS she was extubated and on day 9 the patient was discharged home with no neurological sequelae.  

Discussion: In Australia, the incidence of AFE is 1 in 30 320 deliveries and the mortality is 35%. 1 Our patient presented with classical features of severe AFE, and the combination of early diagnosis aided by intraoperative TOE, effective resuscitation and correction of coagulopathy contributed to a favourable outcome. The pathogenesis of AFE is uncertain and very little is known about the hyperacute phase of AFE. Our TOE provides a rare glimpse into the events of this phase and it supports the current hypothesis that the AFE initially causes RV failure whilst preserving LV function, and cardiac output is compromised because of lack of LV filling. These changes are, however, transient. Echocardiogram is a powerful tool, and our case demonstrates that proficiency with this technology can be of immense benefit to obstetric anaesthetists, particularly in the management of obstetric emergencies.  

Reference  

P24 Anaesthetic management and outcome of parturients with hypermobility type Ehlers-Danlos syndrome: a case series  
H Kaskos, N Patel, R Bell  
Department of Anaesthesia, University College London Hospitals, London, UK  

Introduction: Ehlers-Danlos syndrome (EDS) is a heterogeneous group of inherited connective tissue disorders characterised by a defect in collagen synthesis. There are six types of which the hypermobility type (type 3), also known as joint hypermobility syndrome (JHS), is the most common, affecting 1 in 10,000 - 15,000. Pregnancy in patients with hypermobility type EDS may be complicated by severe joint pain, premature rupture of membranes, rapid labour and impaired wound healing. 1 Anaesthetic issues include resistance to local anaesthesia (LA), autonomic instability and concerns surrounding central neuraxial block (CNB) in the presence of a bleeding history. We conducted this retrospective cohort study to explore our experience of parturients with hypermobility type EDS.  

Methods: Following discussion with our ethics department, cases of hypermobility type EDS were identified from the anaesthetic antenatal clinic database from 2006 to 2011. Hospital notes of all cases were reviewed and data collected regarding co-morbidities including bleeding tendency. Anaesthetic and obstetric management were reviewed. Other data collected included mode of delivery and estimated blood loss (EBL).  

Results: Eleven cases were identified with a mean age of 33 years. Eight (72.7%) were primigravida. All patients attended the high-risk anaesthetic antenatal clinic. Six cases (54.5%) had significant joint pain of which two had chronic pain requiring multimodal analgesia. Seven (63.6%) gave a history of abnormal bleeding or bruising and three of these (27.3%) had abnormalities of haemostasis on testing and were advised against CNB. One case had malignant vasovagal syndrome with a dual chamber pacemaker in situ. Six cases had no previous documented exposure to LA. One had previously experienced effective dental LA and four gave a history suggestive of LA resistance. Two of these received CNB which was effective in both cases. Overall seven parturients received CNB of which was effective in all cases despite technical difficulties in four.  

<table>
<thead>
<tr>
<th>Mode of delivery</th>
<th>Anaesthesia intervention</th>
<th></th>
</tr>
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<tbody>
<tr>
<td></td>
<td>CNB</td>
<td>GA</td>
</tr>
<tr>
<td>SVD</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>CS emergency</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>CS elective</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Not delivered</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Four cases had postpartum haemorrhage (range 600 -1400 ml).  

Discussion: This is the largest obstetric anaesthesia series of hypermobility type EDS to date. We demonstrate successful multidisciplinary management of these patients. Full haemostatic investigation is indicated if there is a bleeding history. Neuraxial block was both effective and safe to use in all parturients who received it. The caesarean section rate was high in our series with higher than expected blood loss.  

Reference  
P25 Beware “normal” urea and creatinine on the delivery suite

RW Evans, GJ Lilley, RE Collis

Department of Anaesthetics, University Hospital of Wales, Cardiff, UK

Introduction: At term, renal blood flow and glomerular filtration rate are increased 50-60% above the non-pregnant state and plasma urea (U) and creatinine (C) reduced by 40%. The normal range produced by biochemical laboratories do not take into account these physiological changes of pregnancy and levels in the upper normal range may indicate significant renal impairment in pregnancy. A retrospective audit was therefore performed to evaluate if high normal urea and creatinine were associated with significant co-morbidity.

Methods: A review of all urea and electrolytes (U&E) requests over a one-month period on a consultant-led delivery suite were identified and analysed for distribution. All patients with U>5 mmol/L or C>70 μmol/L had paper and electronic notes reviewed for evidence of conditions or complications that may be associated with renal impairment.

Results: 450 women were admitted to a consultant-led delivery suite over the one month period. Of these 136 had U&E’s.

<table>
<thead>
<tr>
<th>Range</th>
<th>Urea (mmol/L)</th>
<th>Creatinine (μmol/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.9-8.3</td>
<td>40-103</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>3.3</td>
<td>55.9</td>
</tr>
<tr>
<td>Mode</td>
<td>2.4</td>
<td>54</td>
</tr>
<tr>
<td>Standard deviation (SD)</td>
<td>1.17</td>
<td>9.24</td>
</tr>
<tr>
<td>Mean + 2SD</td>
<td>4.64</td>
<td>74.4</td>
</tr>
</tbody>
</table>

18/136 patients had either a U >5 mmol/L or C >70 μmol/L (13%) around 2 SD from the mean or above. Of these 18, 17 had an operative delivery, 10 had hypertensive disease, of whom 3 had severe preeclampsia, 7 had a significant postpartum haemorrhage or antepartum haemorrhage, 6 had prolonged rupture of membranes or evidence of infection in pregnancy, 1 had gestational diabetes mellitus and 2 were known to have recurrent urinary tract infections. Some had two or more risk factors. Only one patient had U >7.8 mmol/L, and only one had C >100 μmol/L, the top of our laboratory reference ranges.

Discussion: Almost every women with a C > 70μmol/L or U > 5mm/L had conditions associated with renal dysfunction and nearly all had emergency operative delivery despite these values being well within the normal laboratory reference range. Great caution should be taken in interpreting urea and creatinine values that are in the upper half of laboratory normal ranges with an emphasis on the investigation of potential co-morbidities. We recommend that in late pregnancy, an upper limit of 5 mmol/L for Ur and 70 μmol/L for creatinine should give rise to a suspicion of renal compromise with monitoring of renal function and urine output.

Reference

P26 "The mortality of appendicitis complicating pregnancy is the mortality of delay"

AJ Downs, S Gopalakrishnan

Dept of Anaesthetics, Russells Hall Hospital, Dudley, UK

Introduction: Acute appendicitis is the most common general surgical emergency occurring in pregnancy.1 We describe a case from our maternity unit involving dual pathology and diagnostic uncertainty.

Case Report: A 24 year old nulliparous woman presented to our maternity unit at both 26 and 29 weeks gestation complaining of right sided abdominal pain. On each occasion an ultrasound scan of her abdomen revealed multiple gallstones. A diagnosis of cholecystitis was made and upon each presentation she was admitted for observation and treatment with antibiotics and analgesia. At 32 weeks she presented for a third time, again complaining of right sided abdominal pain, this time associated with nausea and vomiting. Laboratory investigations showed elevated white blood cell count (WCC) and C-reactive protein (CRP). Once again, treatment was initiated with intravenous antibiotics. After 4 days of i.v. antibiotics, the patient’s clinical condition was worsening. The WCC had risen from 13.8 to 19.0 and the CRP was 247. The clinical picture was that of a necrotising suppurative appendicitis. Aggressive fluid resuscitation was commenced, and arrangements made for urgent review by the general surgeons; whose management plan was for emergency laparotomy. Laparotomy revealed frank pus in the abdomen, secondary to a perforated appendix. Caesarean section was also performed once the appendicectomy was complete. Subsequently mother and baby did well.

Discussion: Differential diagnosis of abdominal pain in pregnancy can be extremely difficult.2 There needs to be a high index of suspicion for non-obstetric causes of abdominal pain. In this case the presence of gallstones presented a plausible explanation for the patient’s symptoms. When the patient’s clinical state worsened and laparotomy was performed, only then did the second pathology become apparent. Even in the absence of other pathology, the physiological and anatomical changes of pregnancy can obscure and thus delay the diagnosis of acute appendicitis. With the addition of another pathology, diagnosis becomes even more difficult. This case illustrates this point clearly. Risk of ruptured appendix is <2% if time from symptom onset to treatment is less than 36 h, rising to 5% in those with >36 h of untreated symptoms.3 During the 1st and 2nd trimesters, ruptured appendix is associated with significant complications, including miscarriage and premature labour. Evidence from the modern era adds credence to the work published by Balber in 1908 stating that “the mortality of appendicitis complicating pregnancy is the mortality of delay”.4

References
P27 Acute disc herniation in labour requiring decompressive surgery

N Broughton, M Morosan, K Hodge, E Sherman-James,† A Helmy,‡ K Barkshire
Department of Anaesthesia, Peterborough City Hospital, Peterborough, UK, *Department of Physiotherapy, Addenbrooke’s Hospital, Cambridge, UK, †Department of Neurosurgery, Addenbrooke’s Hospital, Cambridge, UK

Introduction: We describe the case of a primigravida presenting with acute postpartum neurological deficit following epidural analgesia and assisted vaginal delivery. MRI imaging confirmed acute lumbar disc herniation requiring urgent decompressive surgery.

Case report: A 31 year-old primigravida was admitted in labour at 38 weeks gestation. Her co-morbidities included a booking BMI of 32 and a history of unilateral sciatica without neurological deficit. Effective epidural analgesia was achieved uneventfully at maternal request. The following morning a live baby was born via ventouse delivery which necessitated a repair of a second-degree tear during which the patient remained in the lithotomy position for almost 2 h. Routine anaesthetic follow-up was delayed until the following evening due to workload pressure (>17h postpartum). She was found to be distressed with severe unilateral radicular pain and sensory disturbance, but with preserved bladder and bowel function. The patient reported mild symptomatic improvement overnight; lumbar spine MRI the following morning demonstrated L5-S1 disc herniation with right-sided nerve root compression. Epidural haematoma was not present. She was transferred to a neurosurgical unit, undergoing lumbar interlaminar decompression and discectomy the following day (2 days postpartum). At one year follow-up she suffers unilateral weak dorsiflexion, ankle areflexia, and paraesthesia over heel and lateral foot in keeping with right L5-S1 nerve root injury. Her daily activities are unaffected.

Discussion: Back pain is common in pregnancy due to physiological and biomechanical changes, but disc herniation is rare (incidence 1:10,000).1 Evidence for acute disc herniation in labour is limited to case reports.2 Whilst no evidence associates acute disc herniation with increased epidural and CSF pressure in labour, there is an association with lithotomy positioning; the incidence of neurological injury rises with lithotomy duration.3 Acute disc herniation is difficult to distinguish from other causes of postpartum neurological deficit. It may lead to cauda equina syndrome, yet present late due to epidural analgesia masking symptoms. Acute disc herniation in labour is a rare but serious phenomenon requiring urgent investigation and treatment. It should be considered in parturients with existing radicular symptoms and active surveillance employed postpartum. This condition may become increasingly common with rising maternal obesity.

References

P28 Where to start? Funding maternal critical care patients.

JC Roberts, B Lomas, D Dreni,† S Wheatley,‡ Anaesthesia, North West Deenery, Manchester, UK, *Department of Midwifery, UHSM, Manchester, UK, †Anaesthesia, UHSM, Manchester, UK

Background: A number of the confidential enquiries have made recommendations with regard to the availability of high dependency care within maternity units; indeed this provision is an assessment criterion of the Clinical Negligence Scheme for Trusts [CNST]. Around 5% of women require critical care on delivery suites in the UK.1 The financial burden of delivering critical care within maternity units is likely to be considerable. During 2004-2005, the University of Sheffield School of Health and Related Research unit undertook research into critical care determining cost incurred was related to the number of organs supported. From this the critical care minimum dataset (CCMDS) was developed, with the ultimate aim of funding patient activity via payment for results.

Methods: With the aim of assessing the potential income our maternity unit could be earning for the critical care we provide, we undertook a prospective review of all patients receiving critical care within our unit during the months of November and December 2011. A pro-forma was designed to capture all elements required of the CCMDS. Utilising this we ascertained the number of organs supported, level of support as determined by the CCMDS and the period of time this support was undertaken.

Results: Of 600 deliveries, 31 (5.3%) patients required higher levels care for a total of 80 calendar days during the period. The predominant reason for undertaking this care was pre-eclampsia followed by postpartum haemorrhage. Level 1 care was undertaken for 47 days, level 2 care for 32 days and level 3 care was undertaken for 1 day. Single organ support was undertaken for 32 days, and two organ support for 2 days. The predominant organ support offered was basic cardiovascular support (BCVS) for 12 parturients, occurring for a total of 31 days. Two patients required transfer to the adult intensive care during the period.

Discussion: Our next step is to liaise with the finance department and those commissioning healthcare services in establishing a health resource group tariff for maternal critical care. The precise financial implications are unknown but they are unlikely to be small even if using conservative estimates. On-going data collection will be undertaken by a dedicated midwife. Further discussion is required on a national level with the Department of Health regarding magnesium prophylaxis in those with pre-eclampsia, as currently this is not captured within the CCMDS thus despite consuming healthcare resources, no funding would be available. Robust data are the initial vital step in ensuring financial remuneration for critical care undertaken within maternity units. Comprehensive data collection will allow finance departments to approach those commissioning healthcare services. We suggest all maternity units offering critical care collect CCMDS data - as funding for critical care nationally will ultimately rely on this. Without data - no money will follow!

Reference
P29 Invasive monitoring within the maternal critical care unit
B James, P Barclay
Tom Bryson Department of Anaesthesia, Liverpool Women's Hospital, Liverpool, UK

Introduction: Invasive blood pressure monitoring is required for optimum care of parturients with critical illness due to conditions such as severe pregnancy induced hypertension, massive postpartum haemorrhage and sepsis. Accurate beat-to-beat systolic and diastolic pressure recording together with arterial blood sampling are required for optimal management. It was noted that the incidence of arterial line damping and and premature failure was higher than expected on a general critical care unit. Inaccurate BP readings have serious implications; inappropriate or missed treatment. It was our aim to determine the incidence of maternal critical care admissions, invasive arterial pressure monitoring and quality of care. The importance of maternal critical care has been recognised by CMACE together with the challenges of providing high quality care outside a critical care environment. The latest report states that 'substandard care remains a problem' and may contribute towards morbidity and mortality. A 'Top 10 Recommendation' of CMACE is to improve clinical skills, training and specialist care in managing the sick patient.

Methods: All patients with arterial lines in-situ were identified over a 4-week period. Reason for insertion was documented. The patients were followed-up at 8-12 h periods using a proforma to determine adherence to the hospital guidelines of arterial line care.

Results: 42 patients were admitted to the obstetric critical care over this period. 14 required arterial line insertion. Of these; 11 for haemorrhagic causes, 1 preeclampsia, 1 sepsis, 1 cardiac cause.

<table>
<thead>
<tr>
<th>Compliance (%)</th>
<th>[95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>NaCl infusion pressurised to 300mmHg</td>
<td>9 (56) [32-80]</td>
</tr>
<tr>
<td>Pressure transducer at correct level</td>
<td>12 (75) [54-96]</td>
</tr>
<tr>
<td>Giving set free of air</td>
<td>16 (100)</td>
</tr>
<tr>
<td>Giving set free of blood</td>
<td>8 (50) [26-75]</td>
</tr>
<tr>
<td>Optimally damped arterial trace</td>
<td>14 (87) [70-100]</td>
</tr>
</tbody>
</table>

Discussion: 44% of arterial line giving sets were incorrectly pressurised. 50% of lines had blood in the giving set. This may be a contributory factor leading a damped traces, incorrect readings and shortened lifespan of the arterial line. There was significant improvement following implementation of a 'laminated troubleshooter'. Recommendation that a 'laminated troubleshooter' should be available for use with every arterial line. Further midwifery training required in line with hospital guidance.

References
2. The Maternal Critical Care Working Group. Providing equity of critical and maternity care for the critically ill pregnant or recently pregnant woman. OAA, RCoA, RCOG. 2011; 7

P30 Maternal critical care, a survey of knowledge of midwives and intensive care nurses.
A Sabharwal, S J Napier, C Ron, F S Plaat
Department of Anaesthesia, Queen Charlotte's and Chelsea Hospital, London, UK

Introduction: The last confidential enquiry into maternal deaths in the UK highlighted sepsis as an emerging cause. The optimal location for caring for critically ill women is still a matter of debate. The RCOG equity document states that the quality of care for critically ill mothers should be the same regardless of location and by staff with the same level of competence. In 2011 8 obstetric patients were admitted to our Intensive Care Unit (ICU) with a larger number of level 2 patients being nursed by midwives (MW) on labour ward (LW). On both units the staff voiced their concern about looking after these patients. To understand these concerns, we undertook a survey of knowledge and experience of maternal critical care.

Methods: A questionnaire designed to discover gaps in knowledge about resuscitation, obstetric haemorrhage and maternal sepsis was distributed to all permanent members of nursing/midwifery staff on ICU and LW.

Results: We received completed surveys from 53% of the ICU nurses and 89% of MW. 75% of the ICU nurses had some labour ward experience, mostly as students and 9% were also trained midwives. 72% of midwives were qualified nurses and 34% had HDU training. The table below details specific knowledge in the two groups.

<table>
<thead>
<tr>
<th>Question</th>
<th>ICU nurses</th>
<th>MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many knew correct position to nurse pregnant patients?</td>
<td>56%</td>
<td>100%</td>
</tr>
<tr>
<td>How many knew correct position to place a pregnant woman in cardiac arrest?</td>
<td>34%</td>
<td>88%</td>
</tr>
<tr>
<td>How many were confident palpating the uterus?</td>
<td>25%</td>
<td>100%</td>
</tr>
<tr>
<td>How many knew amount of blood loss in a normal vaginal delivery?</td>
<td>25%</td>
<td>66%</td>
</tr>
<tr>
<td>How many knew amount of blood loss at Caesarean section?</td>
<td>25%</td>
<td>50%</td>
</tr>
<tr>
<td>How many knew what Syntocinon is used for post-natally?</td>
<td>72%</td>
<td>100%</td>
</tr>
</tbody>
</table>

When asked to list signs of bleeding, both groups answered similarly. With reference to signs of sepsis, the ICU nurses scored slightly higher than the MW and more knew that patients could also be hypothermic. A similar number of ICU nurses and midwives knew a raised respiratory rate was a sign of both haemorrhage and sepsis. 22% of midwives feel unsure about looking after patients with invasive monitoring.

Discussion: This survey reveals that knowledge on both sites is lacking. Despite monthly MW teaching of maternal early warning scores and resuscitation, the importance of changes in respiratory rate is still not appreciated as a sign of deterioration. With 19% of ICU nurses and 63% of MW admitting to be out of their depth looking after obstetric HDU patients, the need for a more robust education programme for both groups is highlighted.

Reference
P31 Obstetric critical care in south-west Uganda: an 18-month survey of maternal critical care admissions and outcomes

K Webster, H Buckley, S Tiendo,*
*Department of Anaesthesia and Critical Care, Mbarara University Teaching Hospital, Mbarara, Uganda, Department of Anaesthesia and Critical Care, North Western Deanery, Manchester, UK

Introduction: Maternal complications remain the predominant cause of female morbidity and mortality worldwide. 34 out of the 40 countries with the worst maternal mortality rates are on the African continent. Uganda ranks 32nd worldwide, with a maternal mortality rate of 430/100,000 live births.1 Whilst many women in Uganda are managed at home or in rural health centres some manage to make the journey to one of the 3 national teaching hospitals.2 Here they can be offered an anaesthetic-led critical-care service. This is the collection of data from one unit over an 18-month period.

Methods: After local ethics and research approval we interrogated the critical care unit’s database of all admissions over an 18-month period. Data were then filtered to include only maternal cases and information regarding age, diagnosis, length of stay and outcome was collected.

Results: In an 18-month period there were 20 obstetric admissions, accounting for 21% of all critical care admissions. Data were complete for 14 patients with length of stay being the only missing information. 30% of patients presented with sepsis, 30% with a ruptured uterus, 15% with eclampsia and 25% with other causes including malaria. Mean age was 25 years and mortality was 45%. A third of deaths were the result of sepsis and a third from a ruptured uterus with no direct relationship demonstrated to patient age. The mean length of stay was 2.9 days.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number of cases</th>
<th>Mortality %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sepsis</td>
<td>6</td>
<td>50</td>
</tr>
<tr>
<td>Eclampsia</td>
<td>3</td>
<td>33</td>
</tr>
<tr>
<td>Ruptured Uterus</td>
<td>6</td>
<td>50</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>40</td>
</tr>
</tbody>
</table>

Discussion: The unit has two beds which are under enormous demand from the hospital population. Even so, maternal patients account for 21% of admissions and still carry a 45% mortality rate. This can be accounted for, in part, due to the late hospital presentation of patients and the need, due to a lack of beds, to admit only the most unstable. It is unsurprising that sepsis and massive haemorrhage (common amongst patients with a ruptured uterus) carry the highest mortality rate. The staff are handicapped through a continuous struggle against a lack of medicines, equipment, blood and the lack of a reliable electricity and oxygen supply. Despite this, plans are in place to expand to an 8-bedded unit. The highly motivated critical care team are involved in medical and public educational courses and are continuously campaigning for an increase in service provision and resources. It would be of interest to re-visit the unit in a year's time to re-analyse data.

References

P32 Attendance at the anaesthetic BMI antenatal clinic - does it increase uptake of labour epidural?

L Savic, E Mcdonnell, G Lyons
Obstetric Anaesthesia, St James’ University Hospital, Leeds, UK

Introduction: Pregnant women with a body mass index (BMI) greater than 40kg/m² are recommended to attend an anaesthetic high-risk antenatal clinic.1 One of the key aims of this clinic is to promote the use of epidural in labour. We aimed to establish whether attendance at the clinic increased subsequent epidural uptake in labour.

Methods: The need for ethical approval for this retrospective case note review was waived. Case notes of all referrals to the high-risk anaesthesia antenatal clinic between October 2007 and December 2010 were analysed. Information collected included: referral reason, age, ethnicity, parity, booking BMI, attendance and use of labour epidural.

Results: 111 (49%) of the total 225 analysed were referred for BMI. 81 (73%) of the BMI patients attended clinic. There was no difference in age, BMI or ethnicity between clinic attenders and non-attenders. There was no significant difference in epidural uptake between attenders and non-attenders (P=0.917), even when adjusted for age and parity (P=0.934). Multiparity was associated with a decreased tendency to attend clinic and have a labour epidural, with each increase in parity associated with a 37% decreased likelihood of having an epidural (P=0.013).

Discussion: High BMI accounted for half of all referrals to clinic and for 60% of all non-attenders. We found that attendance at clinic did not increase the likelihood of obese parturients using a labour epidural. Multiparous women in particular were unlikely to attend or to have an epidural. With the increasing burden of obesity in pregnancy we question whether routine referral to clinic for obese women of all parities can be justified when there is little evidence of positive impact on outcome.

Reference
P33 The effect of the anaesthetist’s attendance at the obstetric ward round on pre-operative assessment of non-elective caesarean section

RA Leslie, J Astin, J Tuckey, SM Kinsella,†
†Anaesthetic Department, St Michaels Hospital, Bristol, UK,
Anaesthetic Department, Royal United Hospital, Bath, UK,
*Anaesthetic Department, Frenchay Hospital, Bristol, UK

Introduction: Twenty years ago it was shown that the general anaesthetic rate for emergency caesarean section (CS) could be reduced to 30% by regular multidisciplinary labour ward rounds and proactive management of epidural analgesia. We wished to assess our practice in two hospitals with regard to communication with the anaesthetist about cases needing delivery in the operating.

Methods: A prospective audit was performed on cases having operative delivery in the operating theatre in our two hospitals. Both units have 24-h resident anaesthetic cover 7 days a week.

Results: Data on 295 non-elective CS were collected including 59 Cat 1 CS. Data for both hospitals are pooled except where specified. 178 (60%) of cases had no antepartum risk factors. Only 52 (18%) of cases had neither antepartum nor intrapartum risk factors and thus could not be identified in advance of the decision for CS. The corresponding figures for Cat 1 CS were 36 (61%) and 5 (8%). Of the 54 Cat 1 CS cases with risk factors, 30 (56%) had seen an anaesthetist before the decision for theatre, 48 (89%) had advance preparations made including 38 (70%) who had antacid before the procedure. Only 2 cases who had a GA did not have ranitidine; one had a cord prolapse. We only detected the effect of the presence of the anaesthetist on ward rounds at one hospital. If the anaesthetist missed the ward round only 51% of cases with risk factors were assessed by an anaesthetist in advance of the decision for CS compared to 73% if the anaesthetist was present on the ward round. At the second hospital the corresponding figures were 72% and 63%. However in both units 81% of cases with antepartum or intrapartum risk factors had advance preparations whether assessed by an anaesthetist or not.

Discussion: In our units with a resident anaesthetist and good multidisciplinary communication, there did not seem to be a problem with regard to preparation as shown by widespread use of ranitidine, intravenous cannulation and fluids in women with risk factors whether seen by the anaesthetist or not. Communication of high-risk women to the anaesthetist was less good in one hospital if the anaesthetist missed the ward rounds. This audit has not clearly demonstrated the utility or otherwise of the presence of an anaesthetist on the obstetric ward round. It may be that the audit should be repeated in a unit where the baseline of preparation and communication is poor. To improve patient flow we are developing a CS care pathway as described by Sanders et al.2

References

P34 A national survey of the management of major obstetric haemorrhage: availability of diagnostic and interventional radiology.

DH Evans, E Lewis
Anaesthetic Department, Singleton Hospital, Swansea, UK

Introduction: A survey published in 2008 demonstrated vast differences in the availability of interventional radiological (IR) services across the UK.1 We undertook an OAA approved survey in order to ascertain whether there had been any change in the differences of the availability of this service.

Methods: An OAA approved survey (no.114) was emailed to 205 lead obstetric anaesthetists in April 2011. Questions were asked regarding the availability of services for detailed diagnosis of the placental site in women who had had a previous caesarean section. In addition the availability of IR services for the management of obstetric haemorrhage was sought.

Results: Of the 205 invited participants, 144 responded (70.2%). Detailed imaging, either MRI or Doppler ultrasound, was performed in 66% of units if there was concern regarding placental site.

Table: Availability of IR services in the UK.

<table>
<thead>
<tr>
<th>Number of units offering prophylactic IR(%)</th>
<th>Number of units with 24-hour IR (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes; on site</td>
<td>53 (36.8)</td>
</tr>
<tr>
<td>Yes; another site or unit</td>
<td>29 (20.1)</td>
</tr>
<tr>
<td>No</td>
<td>62 (43.1)</td>
</tr>
</tbody>
</table>

There was a wide variation in availability of prophylactic IR. 23 units (66%) with >5000 deliveries/year offered this service whilst in those units with <3000 deliveries/year, it was only available in 7 (15%). Smaller units transferred more patients electively; however, 43 units (56%) with <4000 deliveries/year had no access (either on site or by transfer) to prophylactic IR. This compared to 17 units (28%) with >4000 deliveries/year. The variation in 24-h access was even greater. 21 units (57%) with >5000 deliveries/year had on site access, but only 7 units (8%) with <4000 deliveries/year had the same service. The overall 24-h access is similar to the situation 4 years ago.1

Discussion: There is a wide variation in access to IR both prophylactically and in an emergency. Reasons for this may include lack of specialist vascular radiologists at smaller units and equivocal evidence thus far to demonstrate the benefits of IR.2 Access to detailed imaging of the placenta may allow a timely transfer to units with IR availability. The discrepancy of IR availability both prophylactically and as an emergency service persists with little evidence of change in the last 4 years.

References
P35 A national survey on the management of major obstetric haemorrhage: drugs for uterine atony.

DH Evans, E Lewis
Anaesthetic Department, Singleton Hospital, Swansea, UK

Introduction: Uterine atony accounts for 80% of all primary postpartum haemorrhages and occurs in 1 in 20 deliveries. Our survey aimed to establish current practice regarding the pharmacological management of uterine atony.

Methods: An OAA approved survey (no.114) was emailed to 205 lead obstetric anaesthetists in the UK. Three questions were asked regarding the routine use of the drugs and dose of those drugs used to treat uterine atony.

Results: 146 of participants answered two questions (71.2%), with the third question was answered by 147 participants (71.7%). The majority of units, 117 (79.6%) used a 5-U bolus of Syntocinon. 18 units (12%) use an intravenous infusion of Syntocinon without a preceeding bolus.

Table: Use of ergometrine for the treatment of uterine atony

<table>
<thead>
<tr>
<th>Response</th>
<th>Number of units (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes; 0.5mg IV</td>
<td>55 (37.7)</td>
</tr>
<tr>
<td>Yes; 0.5mg IM</td>
<td>64 (43.8)</td>
</tr>
<tr>
<td>Not routinely used</td>
<td>27 (18.5)</td>
</tr>
</tbody>
</table>

Carboprost was used routinely given intramuscularly in 104 units(71%), with 64 units (44%) giving it intramyometrially. The remaining 2 units (1.4%) did not routinely use carboprost.

Discussion: Although ergometrine does have unpleasant side effects (nausea and vomiting) and is contraindicated in some patients (e.g. hypertensive disease), it is strongly advocated as an effective treatment of obstetric haemorrhage due to uterine atony. It is therefore interesting that a significant proportion of units (18.5%) do not routinely use ergometrine in this in this situation. Carboprost, which may lead to the development of more serious side effects such as bronchospasm seems to be administered in preference to ergometrine.

References

P36 A retrospective audit of obstetric red cell transfusions

SH El-Sheikha, R A Cross
Obstetric Department, Blackpool Victoria Teaching Hospital, Blackpool, UK

Introduction: Obstetric haemorrhage remains the most common cause of maternal mortality worldwide. Despite being life saving, blood transfusions are not without significant complications. The recipient is at risk of blood borne disease, allergic reaction and alloimmunisation. This may affect future fertility. Our audit aimed to review our usage of red cells within our obstetric unit, and to evaluate if patients were being transfused appropriately.

Methods: A retrospective audit was performed of deliveries from April to June 2011. In total there were 744 deliveries. 29 patients were identified to have received red cells. Case notes were analysed and evaluated against standards. Our standards were based on our hospital trust guidelines. These recommend a red cell transfusion if the estimated blood loss is over 1500 mL or the haemoglobin is <7g/dL (8g/dL in patients with cardiovascular or respiratory disease).

Results: The majority of patients had vaginal deliveries (51.7%), of these two-thirds were instrumental. The remainder of patients had caesarean section. Most caesarean sections were emergencies (57.1%). The majority of patients received 2 units (75.8%), the most being 6 units. The most frequently cited justification for transfusion was estimated blood loss in theatre (41.4%). 78.6% of caesarean sections had an estimated blood loss of over 1500 mL. According to our standards, 82% of patients were transfused correctly. From reviewing the data, it was apparent that patients were being transfused from the results from their estimated haemoglobin (hemocue) rather than their venous haemoglobin. Only 10 patients (34.5%) had a confirmed venous haemoglobin of <7g/dL, however, if the results from the hemocue are included, this increases to 48.2%. Of the patients who were transfused with a haemoglobin of over 7g/dL, the most common reason was estimated blood loss in theatre (52%).

Discussion: Despite showing that 82% of patients were transfused correctly according to our standards, it is apparent that the majority of transfusions occur before having a venous haemoglobin to confirm severe anaemia. The majority patients were transfused with a haemoglobin >7g/dL, with the most commonly cited reasoning being estimated blood loss. This clearly demonstrates the inaccuracies of estimated blood loss. Our results show that haemocue was within the accepted 10% variance of venous haemoglobin, and we would recommend further use of predicted haemoglobin before starting a red cell transfusion. Our audit recommends that clinicians should be more vigilant before commencing a red cell transfusion as they may be putting their patients at unnecessary risk of receiving blood when it is not required.

References
P37 Peripartum hysterectomy - an anaesthesia perspective
MA Barry, B Byrne,* RA Fanning
Department of Perioperative Medicine, Coombe Women and Infants University Hospital, Dublin, Ireland, *RCSI
Department of Obstetrics and Gynaecology, Coombe Women and Infants University Hospital, Dublin, Ireland
Introduction: Peripartum hysterectomy is one of the most severe complications of pregnancy and can be the definitive treatment for life-threatening major obstetric haemorrhage unresponsive to a variety of medical and conservative surgical measures. Regional anaesthesia (RA) is safer than general anaesthesia (GA) in pregnant women and literature reports increasing use of RA techniques for peripartum hysterectomy in selected cases. The aim of this study was to retrospectively examine the perioperative anaesthetic management of peripartum hysterectomy performed in this tertiary referral centre over a five-year period.
Methods: All peripartum hysterectomies between 2006 - 2011 were identified from a severe morbidity database. Data collected included maternal demographics, indication for hysterectomy, obstetrical medical and prior surgical management (data not presented) and anaesthetic management. Other data recorded included estimated blood loss (EBL), amount of blood products used, associated maternal morbidity, length of ICU/HDU and hospital stay.
Results: 28 peripartum hysterectomies were performed in this period (0.66/1,000 deliveries). Data were available for 26 cases. Women had a mean age of 34 +/- 5 years and all women were delivered by caesarean section. The most common indications for hysterectomy were abnormal placentaion (65.4%), uterine atony (19.2%) and uterine rupture (15.4%). 84.6% of hysterectomies were performed at the time of caesarean section, the others were performed in the peripartum period. The majority (61.5%) of cases were managed with GA. 15.4% had a RA technique alone and a further 23.1% required conversion to a GA from RA. Invasive arterial monitoring and central venous monitoring was used in 84.6% and 19.2% of cases respectively. Mean EBL recorded was 5.4 +/- 3.8 L. Quantities of blood products are given in the table. There were no associated maternal mortalities One case required ICU admission for ventilation. 92.3% were admitted to HDU. The average length of hospital stay was 8 +/- 2 days.

<table>
<thead>
<tr>
<th>Product</th>
<th>Mean no. Units (SD)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Cell Concentrate</td>
<td>8 (5)</td>
<td>0-18</td>
</tr>
<tr>
<td>Platelets</td>
<td>1 (1)</td>
<td>0-4</td>
</tr>
<tr>
<td>FFP/Octoplas</td>
<td>3 (4)</td>
<td>0-14</td>
</tr>
<tr>
<td>Fibrinogen concentrate</td>
<td>0.65 (1.9)</td>
<td>1-7</td>
</tr>
<tr>
<td>Cryoprecipitate</td>
<td>0.89 (1.2)</td>
<td>1-5</td>
</tr>
</tbody>
</table>

Discussion: Our rate of peripartum hysterectomy compares with reported international figures 0.2 to 1.5/1000 deliveries. Factors that influenced the use of general anaesthesia included the EBL, presence of a morbidly adherent placenta and length of surgery whether the hysterectomy was performed at the time of caesarean section or later in peripartum period.

References

P38 A survey of the management of major obstetric haemorrhage in Scotland
A Jenkins, B McCreath, J Roberts,† O Wu,‡ J Moss,§
Anaesthetics, Southern General Hospital, Glasgow, UK, *Obstetrics, Southern General Hospital, Glasgow, UK, †Health Economics, University of Glasgow, Glasgow, UK, §Radiology, Gartnavel General Hospital, Glasgow, UK
Introduction: Major obstetric haemorrhage (MOH) is the leading cause of maternal morbidity in Scotland.1 In 2009, the rate of MOH in Scotland was 5.2 per 1000 live births. A wide range of clinical interventions have been proposed in the management of MOH, including pharmacological methods, surgical interventions, supportive interventions (including cell salvage) as well as interventional radiology (IR).2 We aimed to assess access to each of these modalities in obstetric units throughout Scotland.
Methods: We sent postal questionnaires to the lead consultants in both anaesthetics and obstetrics in each of the 16 consultant-led maternity units in Scotland. Firstly, we asked whether each unit had a protocol for the management of MOH, how this was distributed among staff and whether a formal record of training was kept in the department. Secondly, we asked about access to clinical interventions, including blood transfusion services, rapid infusers, patient warmers, balloon tamponade, cell salvage and IR. Finally, we asked whether access to IR was specified in the protocol for the management of anticipated and unanticipated MOH.
Results: We received replies from 14 out of 16 units (88%). All units had a protocol for the management of MOH. The most common methods of distribution of the protocol were via the Intranet and departmental guideline folders. Only 4 units (29%) kept a formal record of training in the use of the protocol. Access to clinical resources is tabulated below.

<table>
<thead>
<tr>
<th>Table: Access to clinical resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
</tr>
<tr>
<td>24h blood transfusion service</td>
</tr>
<tr>
<td>Rapid infusers</td>
</tr>
<tr>
<td>Patient warmers</td>
</tr>
<tr>
<td>Balloon tamponade</td>
</tr>
<tr>
<td>Cell salvage</td>
</tr>
<tr>
<td>Access to interventional radiology</td>
</tr>
</tbody>
</table>

The use of IR was included in 7 protocols (50%); its use was specified for elective situations in 3 protocols (21%) and for emergency situations in 3 protocols (21%).

Discussion: Scottish maternity units consistently demonstrated that they have protocols in place for the management of MOH. These protocols are well distributed, although formal training is poorly documented. Access to long-established interventions is universal. However, access to more recent interventions, including 24-h cell salvage and onsite IR is less reliable. Further resource allocation in these areas may improve the morbidity associated with MOH.

References
P39 Placenta praevia in a district general hospital: a five year retrospective audit, 2007-2011
CM Shevin, ROK Laird
Anaesthetics, Almagelvin Area Hospital, Londonderry, UK

Introduction: The incidence of placenta praevia is estimated at 1 in 200-250 births and is likely to increase with the rising caesarean section rate. It is of particular relevance to anaesthetists due to the potential it represents for major obstetric haemorrhage and other maternal complications. This audit was conducted at a district general hospital which manages approximately 3000 deliveries annually with a section rate of approximately 30%.

Methods: A retrospective review was conducted of the case records of all women delivered via caesarean section for which the stated reason was 'placenta praevia' during the five year period January 1, 2007 to December 31st 2011. As no centralised reporting system or means of identification existed, patients were identified through review of the theatre logbook, risk management records, ICNARC data and antenatal admission records.

Results: 67 patients with a diagnosis of placenta praevia were delivered by caesarean section in this time period. All but 3 were classified as 'major' plaerias and 60% were performed as elective sections. 14 were performed outside of a 'normal' working day of 08:00-17:00. Patients had a median age of 33 and 58% had a history of previous section. 49% were parous. Their hospital stays ranged from 2 to 53 days, 40% were given general anaesthetics. 23.8% (16) required blood transfusion, with a mean of 3.5 units being given (max 8) intraoperatively. There were 6 hysterectomies performed in order to achieve haemostasis. 8 patients were admitted to critical care. In keeping with current literature, there was a positive correlation between adverse outcomes (blood transfusion, hysterectomy, critical care admission) and parity/number of previous sections.

Discussion: The rising incidence of placenta praevia means it is likely to continue to form a significant part of the obstetric anaesthesia workload. Even given the variance between hospitals the data contained in this audit may be extrapolated to other DGH’s experience and used to apprise patients of their risk of adverse events and compare current practice. Also a significant percentage of these high risk caesarean sections are taking place as emergencies and 'out of hours'. Are we equipped - both staffing, training and resource wise - to cope with the increasing demand of these higher risk procedures?

References

P40 Prophylactic internal iliac artery balloon catheters for caesarean section in a Jehovah’s Witness with sickle cell disease and placenta praevia
PS Beavan, KG England
Anaesthetic Department, Dudley Group NHS Foundation Trust, Dudley, UK

Introduction: Placenta praevia is a cause of major haemorrhage and potential postpartum hysterectomy. We report the use of prophylactic internal artery balloons as part of a management strategy to control potential haemorrhage in a Jehovah's Witness patient with sickle cell disease and grade 4 placenta praevia.

Case report: A 32-year-old multiparous woman was admitted with decreased fetal movements at 27 weeks gestation. She had a history of sickle cell disease with frequent crises during the pregnancy. Preoperative haemoglobin was 7.6g/dL. Ultrasound scan confirmed intrauterine death and grade 4 placenta praevia. This combined with a history of previous uterine surgery increased the risk for placenta accreta. The patient's advanced directive refused red blood cells, plasma and platelets. She accepted the use of cryoprecipitate, recombinant factor VII and autologous salvaged blood. Bilateral internal iliac artery balloon catheters were placed under combined spinal-epidural anaesthesia. The patient was then transferred to the obstetric theatre for classic caesarean section under general anaesthesia. Operative blood loss was estimated 200 mL therefore salvaged blood was not transfused. Postoperative haemoglobin was 6.7g/dL. Analgesia was provided by a continuous epidural infusion. The patient was discharged uneventfully 4 days postoperatively.

Discussion: The unusual combination of factors associated with this case gave rise to limited management options. Prophylactic balloon catheterisation is a complex intervention and there are no randomised trials to support its use. There are many reports of successful maternal outcome, however radiological and anaesthetic techniques vary greatly. To date there are no reports of balloon catheter use in obstetric sickle cell patients. In this case the balloons were left uninfalted to prevent sickle cell crisis. A radiologist was present to inflate the balloons if significant haemorrhage had occurred. Cell salvage has been used with success in patients with sickle cell trait. In sickle cell disease the high percentage of sickle haemoglobin could potentially result in a high percentage of red cell sickling in the cell saver reservoir. This could lead to a sickle cell crisis. Currently cell salvage is avoided in sickle cell disease unless the potential benefit outweighs the risk. This patient agreed to the use of cell salvage and its associated risks in the event of uncontrollable haemorrhage.

References
1. Knight M. Peripartum hysterectomy in the UK: Management and outcomes of the associated haemorrhage. BJOG 2007; 114: 1380-7
P41 The joint obstetric and anaesthetic management of women who decline blood products: a tertiary referral centre experience

O Clancy, L Byrd, P Kochhar,*
Department of Obstetrics, St Mary's Hospital, Manchester, UK. *Department of Anaesthesia, St Mary's Hospital, Manchester, UK

Introduction: Refusal of blood products increases the risk of death from maternal haemorrhage and presents a variety of challenges to clinicians.1 As a tertiary unit with around 7500 deliveries per annum and a dedicated cell saver service, we care for many women in this situation. In a previous audit we found documentation around the care of women who decline blood products to be lacking. We have since developed a care pathway, and re-audited to ensure improvements had been made in management and documentation.

Methods: We retrospectively identified 18 women over an eight month period who had declined blood products. We audited notes according to local trust guidelines, and the Royal College of Obstetricians and Gynaecologists standards for the management of Jehovah's Witnesses.

Results: All women who declined blood products had been offered an obstetric anaesthetist appointment and 84% had accepted. In regards to pre-optimisation: 93% had a booking haemoglobin (Hb) documented; 100% with a booking Hb ≤11g/dL were started on iron sulphate therapy; 93% had a Hb measurement within one month of delivery, but 37% entered labour with a Hb ≤10.5g/dL. In terms of communication around transfusion options: 73% of women had an advance care plan; 100% had a documented decision regarding blood transfusion; 73% had a decision regarding blood products, recombinitive clotting factors and plasma expanders; 87% had a documented decision regarding cell savage; 87% had a documented decision in the specific situation of life or death. In regards to obstetric management: 71% went into spontaneous labour; 69% had a vaginal delivery; 14% instrumental delivery; 14% had a caesarean section; 64% of women had some form of anaesthetic intervention during labour; 100% of women had an active third stage; 20% had an estimated blood loss ≥500mL, all of whom were managed with a Syntocinon infusion. Only one woman had an estimated blood loss (EBL) ≥1.5L. We have a dedicated cell saver in the unit that is available for use in all patients if needed.

Discussion: Since the original audit and introduction of the care plan we have significantly improved the management and documentation of women who decline blood products, but there is room for improvement. We will now focus on joint consultations between patient, consultant obstetricians and anaesthetists through simultaneous anaesthetic clinics and obstetric haematology clinics. Pre-labour Hb levels should be ≥10.5g/dL in line with RCOG standards, along with the use of a 'check-list' in the care pathway, active monitoring and management of haemoglobin levels, and consideration of the use of intravenous iron in the third trimester.

References

P42 Trends in major obstetric haemorrhage cases in a university hospital, a decade on

J Kaur, R Pandey, K Dasgupta, A Joseph
Anaesthesia, University Hospitals of Leicester, Leicester, UK

Introduction: Massive obstetric haemorrhage (MOH) remains a significant cause of maternal mortality and morbidity.1 It features regularly in leading causes of death in CEMACH reports. Incidence of post partum haemorrhage (PPH) has increased in Australia, United States and Ireland.2 We examined our obstetric database to find the incidence of MOH in our hospital from 2001 to 2011.

Methods: Retrospective analysis of the database was undertaken and cases with blood loss >1500 mL were identified. These cases were analysed for mode of delivery - spontaneous or vaginal, assisted vaginal, emergency or elective caesarean section (CS).

Results: The delivery rates increased by 16.7% from 2001 (5380) to 2011 (6280). The incidence of MOH has risen from 0.6% in 2001(32) to 2.8% in 2011(176) which is a 450% increase. On further subset analysis - there has been a 7-fold increased incidence with spontaneous vaginal delivery (from 0.2% to 1.4%) and 5-fold with assisted vaginal delivery (0.8% to 4.1%). In case of emergency CS there is 2.7-fold rise (2.4% to 6.6%) and 5.4-fold increase with elective CS(1.0% to 5.4%).

Discussion: Our incidence of MOH rates compared with national rates of were 6.7 per 1000 deliveries in 2005.3 To compare the incidence of MOH uniform inclusion criteria is essential. Further analysis of data is necessary to identify causes for the increased incidence. Increased rates of MOH highlight the pressing need for research and for clinical audit focusing on aetiological factors, preventative measures and quality of care, to guide current clinical practice. As rates of PPH have risen in other countries, national data in the UK need review.

References
P43 Counselling for epidural blood patches

EJ Robson, SM Yentis

Department of Anaesthesia, Chelsea and Westminster Hospital, London, UK

Introduction: Whilst counselling a woman with postdural puncture headache (PDPH) for epidural blood patch (EBP) it emerged that three anaesthetists each quoted different lengths of duration of headache without an EBP, making it difficult to gain her trust. We therefore investigated different anaesthetists' counselling practice at our institution.

Methods: Anaesthetists covering our labour ward currently and in the last 9 months were invited to complete a questionnaire in person or by e-mail, asking what EBP success rate and duration of headache without EBP they quoted when counselling women, what complications they mentioned, and the associated paperwork they used. Data were analysed by Fisher's exact test, P < 0.05 indicating statistical significance.

Results: Responses were received from 40/48 anaesthetists, an overall response rate of 83% (Table 1). There were no differences between consultants and trainees. Duration of headache without EBP was given precisely by 22 (55%) anaesthetists and vaguely (e.g. ‘weeks’ or ‘months’) by 18 (45%).

Table 1. Counselling practice of anaesthetists regarding EBP.

<table>
<thead>
<tr>
<th></th>
<th>Consultants (n=20)</th>
<th>Trainees (n=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quoted headache duration without EBP*</td>
<td>2 days - ‘months’</td>
<td>5 days - ‘months’</td>
</tr>
<tr>
<td>Quoted success rate of EBP*</td>
<td>60-95%</td>
<td>50-90%</td>
</tr>
<tr>
<td>Partial reduction in headache</td>
<td>14 (70%)</td>
<td>10 (50%)</td>
</tr>
<tr>
<td>Chance of recurrence</td>
<td>15 (75%)</td>
<td>8 (40%)</td>
</tr>
</tbody>
</table>

Complications of EBP
- back pain during procedure | 18 (90%) | 18 (90%) |
- long-term back pain | 5 (25%) | 1 (5%) |
- subdural haematoma | 5 (25%) | 5 (25%) |
- cauda equina syndrome | 2 (10%) | 0 (0%) |
- seisure | 4 (20%) | 0 (0%) |
- aseptic meningitis | 5 (25%) | 6 (30%) |
- arachnoiditis | 2 (10%) | 7 (35%) |
- epidural abscess | 12 (60%) | 17 (85%) |

Complications of no EBP
- seizure | 4 (20%) | 2 (10%) |
- subdural haematoma | 8 (40%) | 3 (15%) |
- coning | 1 (5%) | 0 (0%) |

Written information given | 14 (70%) | 15 (75%) |
Risk discussion documented | 18 (90%) | 20 (100%) |
Written consent obtained | 7 (35%) | 10 (50%) |

Values are number (proportion) of respondents apart from quoted incidences*

Discussion: Both the duration of headache and success rate of EBP quoted by individual anaesthetists vary greatly. We believe this has a negative impact on the consenting process and intend to introduce a more rigid consenting framework for EBP, similar to the one we currently use for epidurals.

Reference

P44 Dual pathology following inadvertent dural puncture

IS Banga, AJ Downs, J Rees, J Danks

Anaesthetics, Russells Hall Hospital, Dudley, UK

Introduction: Epidural analgesia in labour carries the risk of accidental dural puncture and with an incidence of between 0.2% and 2.6%.1 Up to 70% of these women will develop a post dural puncture headache (PDPH).2 We report the case of a young woman presenting with a headache after accidental dural puncture.

Case Report: A 23-year-old multiparous woman requested epidural analgesia during labour. A combined spinal-epidural (CSE) was performed. Cerebrospinal fluid (CSF) was noted in the epidural catheter at the time of insertion. The catheter was labeled as intrathecal and left in situ. After the third stage of labour, the intrathecal catheter was removed and standard postnatal care given. A short time post-delivery the patient complained of symptoms suggestive of PDPH. Initially her symptoms resolved with conservative management. However, she represented with similar symptoms a few hours later. Two consecutive epidural blood patches provided immediate and complete relief. Her presentation for a third time with a unilateral headache and altered conscious level prompted a CT scan of her brain. This showed a venous sinus thrombosis in the superior sagittal and right transverse sinuses, causing a haemorrhagic infarct in the right parietal lobe. In light of these findings, she was admitted for anticoagulation and was discharged home with a plan for 6 months of warfarin therapy.

Discussion: PDPH is characterised by a set of classical symptoms. The intracranial hypotension resulting from CSF leakage will typically lead to a bilateral fronto-occipital headache. The salient feature is worsening of headache in the upright posture. Other symptoms include nausea, vomiting, auditory and visual disturbances. Subdural haematoma and cerebral herniation are recognised sequelae of PDPH and accordingly may be accompanied by additional symptoms and hard neurological signs. In the absence of a postural element to symptoms, the diagnosis must be questioned. Similarly, persisting headache should prompt further investigation. Approximately 70% of PDPHs will resolve irrespective of intervention by 7 days.3 Furthermore, epidural blood patching has a success rate of between 70-98% if carried out greater than 24 hours post dural puncture.4 Similar success rates are quoted for repeat patches. Persisting symptoms despite this intervention should also raise suspicion. In this case the patient complained of classical PDPH symptoms that were fully responsive to two epidural blood patches. This is strongly suggestive of a true PDPH. What distinguishes it, is the change in her symptoms, which ultimately unmasked dual pathology.

References
P45 Do intrauterine resuscitation guidelines increase use of these techniques? A comparison of two tertiary centres

WS Burnsida, PJ Morris,a R Marr,a T Meeka
aDepartment of Anaesthesia, Royal Victoria Infirmary, Newcastle upon Tyne, UK, Department of Anaesthesia, James Cook University Hospital, Middlesbrough, UK

Introduction: Intrauterine resuscitation (IUR) can improve fetal condition by improving oxygen delivery to the placenta reversing hypoxia and acidosis.1 Techniques recognised in the mother to attempt this include left lateral position; administering oxygen; administering a fluid bolus; stopping augmentation of contractions and the use of tocolysis, e.g. terbutaline, GTN.2 There is debate over the efficacy and necessity of these procedures, but there does not appear to be any harm to mother or fetus.3 While an irreversible fetal bradycardia may be directly time linked to a poor outcome, treating a reversible bradycardia may allow greater time to assess the mother and greater freedom of anaesthetic technique to ensure minimum risk. We audited IUR practice in two different tertiary centre delivery suites; one with written IUR technique guidelines (unit A) and one without (unit B).

Methods: The duty anaesthetist completed a proforma retrospectively for all category I caesarean sections (CS). The indications for CS and the IUR techniques in place on anaesthetist arrival were recorded.

Results: The indication for CS was fetal distress except one case (cord prolapse). 45 patients in unit A and 51 in unit B were reviewed.

<table>
<thead>
<tr>
<th>Techniques</th>
<th>Unit A (%)</th>
<th>Unit B (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left lateral position</td>
<td>27 (60)</td>
<td>8 (16)</td>
</tr>
<tr>
<td>Oxygen</td>
<td>3 (7)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Fluid bolus</td>
<td>17 (38)</td>
<td>9 (19)</td>
</tr>
<tr>
<td>Stop syntocinon</td>
<td>12/14 (86)</td>
<td>17/20 (85)</td>
</tr>
<tr>
<td>Tocolysis</td>
<td>1 (2)</td>
<td>1 (2)</td>
</tr>
<tr>
<td>None commenced</td>
<td>4 (9)</td>
<td>27 (53)</td>
</tr>
</tbody>
</table>

Discussion: IUR guidelines increase the use of these mostly quick and simple techniques with minimum risk and may correct a reversible fetal bradycardia. Cases were missed from data collection (<5 in each unit). As the proforma was completed retrospectively there may be errors in the IUR recollection. Despite this there is still room for improvement in both centres. We recommend multidisciplinary discussions and education on IUR techniques in both units, and guideline production in unit B to increase compliance with IUR. Future repeat audits should also include the response, if any, to assess the usefulness of IUR techniques.

References

P46 Teaching anaesthetists about fetal monitoring and resuscitation

RJ Pierson, J Marriott, S Millett
Anaesthesia, Worcestershire Royal Hospital, Worcester, UK

Introduction: Anaesthetists working in obstetrics should be familiar with the fetal monitoring methods that allow recognition of the at-risk fetus (CTG, blood gas analysis). Understanding of intra-uterine resuscitation techniques is also vital, both for fetal wellbeing, and for prevention of unnecessary GA caesarean section. Fetal monitoring and resuscitation is part of the Royal College of Anaesthetists training curriculum.1,2 We felt there may be a lack of knowledge among anaesthetists at our institution as these aspects of care are often felt to be the responsibility of obstetricians and midwives.

Methods: We conducted a survey of 22 consultant and trainee anaesthetists with responsibility for the labour ward. The survey assessed their knowledge of CTG/fetal blood gas parameters and methods of intra-uterine resuscitation. A departmental teaching session was then provided by an obstetric colleague, both face-to-face and by email. A second survey was conducted one month following teaching, asking to same questions to 21 consultant and trainee anaesthetists.

Results:

<table>
<thead>
<tr>
<th>Knowledge Field</th>
<th>Pre-teaching (% correct response)</th>
<th>Post-teaching (% correct response)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FETAL MONITORING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal fetal heart rate (FHR)</td>
<td>0</td>
<td>48</td>
</tr>
<tr>
<td>Normal variability in FHR</td>
<td>0</td>
<td>33</td>
</tr>
<tr>
<td>Most worrying category of deceleration (early vs. late)</td>
<td>73</td>
<td>81</td>
</tr>
<tr>
<td>Duration of prolonged deceleration</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>What to do if fetal pH 7.23</td>
<td>9</td>
<td>76</td>
</tr>
<tr>
<td>Fetal pH mandating immediate delivery</td>
<td>50</td>
<td>90</td>
</tr>
<tr>
<td>FETAL RESUSCITATION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positioning of mother</td>
<td>91</td>
<td>95</td>
</tr>
<tr>
<td>Maternal oxygen</td>
<td>77</td>
<td>95</td>
</tr>
<tr>
<td>Maternal fluid</td>
<td>64</td>
<td>100</td>
</tr>
<tr>
<td>Maternal vasopressor</td>
<td>14</td>
<td>48</td>
</tr>
<tr>
<td>Stop Syntocinon</td>
<td>36</td>
<td>67</td>
</tr>
<tr>
<td>Stop epidural</td>
<td>0</td>
<td>43</td>
</tr>
<tr>
<td>Tocolysis</td>
<td>36</td>
<td>81</td>
</tr>
</tbody>
</table>

Discussion: The initial survey showed a lack of knowledge of fetal monitoring and resuscitation among anaesthetists in our institution (a district general hospital with approximately 4000 deliveries per annum). This appeared to be much improved following a teaching session. This was quick and simple to arrange, promoted teamwork between obstetricians and anaesthetists, and did not involve financial outlay. As a result, our department now arranges regular teaching from obstetric colleagues to keep this knowledge up to date.

References
P47 Obstetric anaesthesia career intentions: a trainee survey
JS Dawson, DM Levy
Anaesthetics Department, Nottingham University Hospitals NHS Trust, Nottingham, UK

Introduction: This survey sought principally to establish whether a sub-speciality on-call rota is desirable amongst trainees with a career interest in obstetric anaesthesia.

Methods: Obstetric Anaesthetists’ Association (OAA) Survey 124 was sent electronically to all 380 UK trainee members of the OAA in November 2011. This constituted the first trainee-specific OAA survey. Questions were asked about grade, location and consultant career aspirations in obstetric anaesthesia.

Results: The response rate was 53% (203 replies). 155 trainees (76%) identified obstetric anaesthesia as their principal sub-speciality interest; 30 trainees (15%) indicated that obstetric anaesthesia was not their principal interest. 125/155 trainees (81%) with a principal sub-speciality interest indicated that their out of hours commitment would ideally encompass both an obstetric and non-obstetric workload; 25/155 trainees (16%) responded that they would ideally provide cover exclusively to obstetric anaesthesia. One trainee out of the 155 did not want to cover obstetric anaesthesia out of hours. 141/155 trainees (91%) indicated they would not be deterred from applying for a consultant post which included non-obstetric out of hours commitments; 3/155 trainees (2%) indicated they would be deterred from applying for such a post.

![Distribution of desired obstetric direct clinical care (DCC) PAs amongst trainees with a principal sub-speciality interest in obstetric anaesthesia. A whole-time consultant appointment with 8 DCC PAs (32 h) is assumed.](image)

Discussion: Anaesthesia trainees with a sub-speciality interest in obstetric anaesthesia who responded to this survey appear to aspire to a consultant job plan which has 2, 3 or 4 DCC PAs in obstetric anaesthesia. A large majority desire an out of hours commitment which covers both obstetric and non-obstetric emergency cases. Only 2% of respondents would be deterred from applying for a consultant post in obstetric anaesthesia if the on-call commitment included non-obstetric duties. Trainee anaesthetists with an interest in obstetric anaesthesia are keen to undertake non-obstetric duties during the working week and out of hours when on-call.

P48 An audit of epidurals in morbidly obese parturients
KG Srinivas, C Elton,*
*Anaesthetics, Leicester Royal Infirmary, Leicester, UK, Anaesthetics, University Hospitals of Leicester NHS Trust, Leicester, UK

Introduction: The CMACE/RCOG joint guideline regarding management of obesity in pregnancy recommends antenatal anaesthetic assessment and early epidurals for morbidly obese women in labour.1 We performed a retrospective audit of morbidly obese women who attended our anaesthetic clinic to see if this altered their request for epidural analgesia in labour.

Methods: We retrospectively studied 76 women with body mass index >40 kg/m² who had an emergency caesarean section (CS). All women had singleton pregnancy and no other co-morbidities. We divided them into two groups (n=38), one group having attended the anaesthetic antenatal clinic and the other having not attended the clinic.

Results: Of the 38 women who attended the clinic, 24 (63%) had an epidural for labour while only 18 (47%) of the 38 women who did not attend the clinic had an epidural. Of the 38 women who attended the clinic, 37 (97%) had a regional technique for the CS while in the group which did not attend the clinic only 32 (84%) had a regional technique. In the group which attended the clinic the average decision to delivery time for a category 1 CS with an epidural in-situ was 21 min and that without an epidural was 35 min. Similarly, in the group which did not attend the clinic the average decision to delivery times with and without an epidural was 23 min and 39 min respectively.

<table>
<thead>
<tr>
<th></th>
<th>Attended clinic</th>
<th>Did not attend clinic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total no</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>Epidural for labour</td>
<td>24</td>
<td>18</td>
</tr>
<tr>
<td>Regional technique for CS</td>
<td>37</td>
<td>32</td>
</tr>
<tr>
<td>GA for CS</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Mean decision to delivery time with epidural in-situ (min) for cat 1 CS</td>
<td>21</td>
<td>23</td>
</tr>
<tr>
<td>Mean decision to delivery time with no epidural in-situ (min) for cat 1 CS</td>
<td>35</td>
<td>39</td>
</tr>
</tbody>
</table>

Discussion: Our audit showed that attending the anaesthetic antenatal clinic did appear to modify the behaviour of morbidly obese women in opting for an epidural for labour analgesia. It also suggested that presence of an epidural in-situ reduces the decision to delivery time for category 1 CS.

Reference
P49 Management of parturients with obesity in UK obstetric units. OAA approved Survey.
H Alfoudi, S Catling, S Davies
Anaesthetic Department, Singleton Hospital, Swansea, UK

Introduction: Obesity has become more common in obstetric patients. Guidelines for the management of obese patients have been published by the AAGBI1 and jointly by the RCOG and CMACE.2 We carried out this survey in order to identify the current practice regarding the management of obese patients in the UK.

Methods: Background information and an electronic survey were sent to 207 UK lead obstetric anaesthetists in June 2011. The survey ascertained different units' policies relating to the management of morbid obesity in pregnancy, including thromboprophylaxis management and availability of equipment and facilities.

Results: The response rate was 75% (156 replies). In 141 (90%) of UK maternity units anaesthetic review is routinely performed in antenatal period for patients with high BMI. 126 (78%) units have guidelines for the management of the obese parturient. In 42 (26%) of units, care for the parturients with BMI >40 was provided by a core trainee year 2. Regarding thromboprophylaxis management of the obese parturient, 150 (94%) units have guidelines but only 111 (76%) units differentiate in their dose between the obese and the morbidity obese patients. Regarding availability of facilities and equipment, a quarter of units have an equipment list and a named consultant/team member responsible for its management. Less than 50% of the units surveyed had appropriate equipment for morbid obesity.

Discussion: It is reassuring to see that the majority of obese parturients are routinely identified and reviewed antenatally by the anaesthetist. However, guidelines produced by the CMACE and RCOG regarding providing care for the obese parturient by a senior trainee as a minimum are not universally followed; neither is the differentiation in the thromboprophylaxis dose between the obese and the morbidity obese (only 75% of units follow the guideline). The AAGBI guidelines regarding provision of a central list of all facilities and equipment required for the obese parturient with their location and access, and a named team member in charge of its management, is also not followed (only 25% of units follow the guideline). The equipment recommended to be available for the management of the obese patients such as wide theatre trolley, lifting equipment, and a weighing scale up to 250 kg is only available in less than half of the units surveyed. This poor compliance may be attributed to lack of resources and financial limitation. However, compliance with thromboprophylaxis guidelines does not require extra resources or major increase in cost. Poor compliance with the latter may be due to guidelines not being updated as the CMACE/RCOG recommendation was recently released in March 2010.

References

P50 Does bilateral sympathetic block in labour epidural analgesia predict a successful extension to epidural anaesthesia for caesarean section?
A Kumar, J Bamber
Department of Anaesthesia, Addenbrooke's Hospital, Cambridge, UK

Introduction: Saving Mothers' Lives 2011 recommended converting effective labour epidural analgesia to epidural anaesthesia for operative delivery. The challenge is to identify epidurals most likely to be successfully converted to anaesthesia and those for which alternative methods of anaesthesia should be considered. Inadequate labour analgesia indicated by more epidural top-ups is an independent risk factor for failed epidural anaesthesia.1 The importance of a bilateral sympathetic block has not been studied. It has been demonstrated that sympathetic block asymmetry can be reliably detected from the difference in foot temperature which correlates with sensory block asymmetry.2 In our hospital we record the comparative warmth or coolness of the feet as part of routine epidural analgesia observations. We undertook a retrospective investigation to identify risk factors for failure to convert labour epidural analgesia to anaesthesia for caesarean section (CS).

Methods: With ethics committee approval we retrieved data of women with labour epidural analgesia who subsequently had a CS under general anaesthesia (GA) from April 2006 to April 2008. We collected data from an equal number randomly selected over the same period who had labour epidurals which were successfully topped-up for CS. Statistical analysis included Mann-Whitney U test, unpaired t test and chi-square test as appropriate.

Results: 564 women with labour epidural analgesia required CS, 53 (9.4%) required GA, 32 had GA for failed epidural top-up (maternal pain (66%) or inadequate block height) and 21 were not topped up ("lack of time" (60%), maternal request, maternal collapse). Those with failed epidural anaesthesia (FE) were younger and had a longer duration of labour epidural analgesia than those with successful epidural (SE) anaesthesia. There were data on sympathetic block on 28 of the FE group and 43 of the SE group. Bilateral sympathetic block was present in 24 (86%) of the FE group and 34 (79%) of the SE group. There was no difference in the proportion with and without symmetric sympathetic block (P=0.69)

Table: Failed and successful epidural conversion

<table>
<thead>
<tr>
<th></th>
<th>FE (n=32)</th>
<th>SE (n=53)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>27.7 (6)</td>
<td>31.5 (5)</td>
<td>0.004</td>
</tr>
<tr>
<td>BMI</td>
<td>27.4 (5)</td>
<td>26.4 (5)</td>
<td>0.34</td>
</tr>
<tr>
<td>Gestation</td>
<td>41 [39-41]</td>
<td>40 [39-41]</td>
<td>0.95</td>
</tr>
<tr>
<td>Duration (min)</td>
<td>445 [251-678]</td>
<td>300 [170-420]</td>
<td>0.03</td>
</tr>
<tr>
<td>Pain (0-10)</td>
<td>0 [0-1]</td>
<td>0 [0-2]</td>
<td>0.12</td>
</tr>
<tr>
<td>Top-up number</td>
<td>0 [1-2.5]</td>
<td>0 [0-1]</td>
<td>0.21</td>
</tr>
</tbody>
</table>

Data are mean (SD) or median [range]

Discussion: Our preliminary results suggest that the presence or absence of a bilateral sympathetic block does not indicate whether conversion of epidural analgesia to epidural anaesthesia will provide successful anaesthesia for CS.

References
P51 Factors affecting mobilisation after caesarean section
A Sugavanam, S Thakrar, M Cassim,* S Gowie-Mohan,* K Jani,*
Anaesthetics Department, Royal Free Hospital, London, UK,
*Aanaesthetics Department, Lister Hospital, Stevenage, UK

Introduction: Increasing demands on maternity units make it important to address factors determining time to ambulation after lower segment caesarean section (LSCS). Early feeding and multimodal analgesia lead to earlier ambulation and shorter hospital stay. We looked at times to ambulation and assessed any relationships with patient demographics or anaesthetic technique in our institution.

Methods: A questionnaire was completed for all LSCS between November 2009 to January 2010. Time of urinary catheter removal was raised as an important factor on initial analysis and a further 50 patients were surveyed. All data were analysed as continuous variables with a Student’s t test and linear regression performed to assess any correlation.

Results: No significant differences in time to ambulation between emergency, elective, primiparous or multiparous patients were observed. There was no correlation with BMI. There was no significant difference between intrathecal diamorphine (values expressed as mean time in hours +/- 1 SD: 16.2 +/- 6.14) or other anaesthetic techniques when performing Student’s two-tailed t test (epidural diamorphine 11.5 +/- 5.8, epidural fentanyl 17.89 +/- 8.98, general anaesthetic 17.21 +/- 6.49, intrathecal fentanyl and epidural diamorphine 17.36 +/- 9.01, intrathecal fentanyl 15.84 +/- 6.82). Figure 1 shows a correlation between time to ambulation and urinary catheter removal. The calculated (Pearson’s r) correlation coefficient was 0.76.

Discussion: Patient demographics and anaesthetic technique does not influence time to mobilisation according to our data. Time to urinary catheter removal does have an influence. This study cannot determine whether mobilisation leads to catheter removal or vice versa, although previous studies do confirm uncatheterised women mobilise earlier than catheterised. We plan to encourage earlier removal of catheters in uncomplicated LSCS and re-audit.

References

P52 Early feeding post caesarean section: empowering patients and staff education led to the successful implementation of a new guideline
G Subash, A Philips, H Roberts, I Wrench
Anaesthetics, Sheffield teaching Hospitals, Sheffield, UK

Introduction: Early feeding post caesarean section enhances patient wellbeing and facilitates early recovery. Successive audits in our unit have demonstrated that we have managed to reduce times to patients receiving food and drink post caesarean section. This was associated with increased patient satisfaction. In our last audit some patients received food and drink prior to the recommended times (1 h for fluid and 6 h for food) without detrimental effect. We therefore introduced new guidelines of within 30 min for water and after 1 h for food. We now present the results of two audits, one prior to (2009) and the other following (2011) this change.

Methods: There was a programme of staff education and laminated copies of the guideline were prominently displayed. Patients presenting for elective surgery were also given copies. 100 patients were reviewed up to 48 hours post caesarean section. Data collected included emergency (EM), elective (EL), regional (RA) or general anaesthesia (GA) and times to first postoperative food and drink.

Results: The time to first oral intake was dramatically reduced for all types of anaesthetic and urgency of case.

Table: Mean time (range) for first food and drink

<table>
<thead>
<tr>
<th></th>
<th>Hours to first drink - mean (range)</th>
<th>Hours to first food - mean (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL RA 2009 (n=36)</td>
<td>1.6(1-7)*</td>
<td>5.1(1-25)*</td>
</tr>
<tr>
<td>EL RA 2011 (n=46)</td>
<td>0.3(0.25-1)</td>
<td>2.3(0.75-9)</td>
</tr>
<tr>
<td>EM RA 2009 (n=51)</td>
<td>3.2(1-17)*</td>
<td>8(1-28)*</td>
</tr>
<tr>
<td>EM RA 2011 (n=46)</td>
<td>0.27(0.25-1)</td>
<td>3(0.5-11)</td>
</tr>
<tr>
<td>GA(EL+EM) 2009 (n=13)</td>
<td>2.73(1-9)*</td>
<td>7.69(1-16)</td>
</tr>
<tr>
<td>GA(EL+EM) 2011 (n=8)</td>
<td>0.37(0.25-1)</td>
<td>4.12(1-7)</td>
</tr>
</tbody>
</table>

(* P<0.001)

In 2009 43% of patients would have liked to have had either food or drink earlier than they did. In 2011 no patients complained of having to wait for oral intake or of ill effects from early alimentation.

Discussion: By empowering patients and staff education we have dramatically reduced times to postoperative oral intake without detrimental effect and with improved levels of satisfaction.

Reference
P53 National survey of practice in adherence to WHO safer surgery checklists on the labour ward

V Gopinathan, I Sivanandan, E McDonnell, H McLure
Dept of Anaesthesia, Leeds Teaching Hospitals, Leeds, UK

Introduction: The WHO surgical safety checklist was released globally by the Safe Surgery Saves Lives Initiative in June 2008. An international pilot study by WHO in 2007-2008 demonstrated that the use of a checklist can lower the incidence of surgery related complications by one third and deaths by almost half (1.5% to 0.8%).1 WHO checklists have been modified to suit the specialty area of care like obstetrics as advocated by National Patient Safety Agency and Royal College of Obstetricians and Gynaecologists.2

Methods: A postal questionnaire was sent to 213 UK lead obstetric anaesthetic consultants after OAA approval. Questions were posed on the practice and conduct of using WHO checklist for the team briefing in obstetric theatres and its impact on team working and quality of patient care.

Results: Of the 213 questionnaires sent out, 150 (70.4%) responded. Obstetric units had delivery rates ranging from 57 to 7400 per year. 92% of the units were using the WHO checklist for caesarean sections and majorities of the units (79%) were using a checklist adapted to obstetrics. 91% of the units conducted the prelist briefing and majority of the units performed the "Sign out" with the patients awake in theatre. In 55% of the units surgeons were present at the "Sign in". Majority of the units (54%) felt that the checklist had changed team working, but only 24.7% of the units felt it had led to change in quality of patient care.

Discussion: There is a widespread adherence to the WHO checklist in obstetric units with most of them suitably adapting the list at local level. The majority of the units felt that the practice of using the checklist had improved communication, encouraged team working and emphasized on joint responsibility of all the theatre staff. Time is the major factor limiting its use for Category 1 section. Larger units with deliveries >6000 per year were found to be more adherent to the practice of using an adapted WHO checklist for all categories of caesarean sections, but unfortunately they did not feel very positive about the impact of WHO checklist on quality of patient care compared to the smaller units. Further, standardisation of the checklist for obstetrics and designating a team member to do the "Sign in" and "Time out" would help in improving the adherence rate.

References
2. http://www.nrls.npsa.nhs.uk/resources/?EntryId45=83972

P54 Investigation of suspected maternal pulmonary thromboembolism

M W Lambert, A P McGlennan
Department of Anaesthesia, Royal Free Hospital, London, UK

Introduction: 18 mothers died from thromboembolic disease during the 2006-08 CMACE triennium with ‘inadequate risk assessment’ and ‘failure to investigate chest symptoms’ cited as areas of substandard care in their management.1 In spite of highlighting these issues, there is no nationally agreed diagnostic algorithm for investigating suspected maternal pulmonary thromboembolism (PTE). Simple, rapid and safe investigations (e.g. chest radiography) may yield a diagnosis other than PTE and avoid the risk of maternal harm from computed tomography pulmonary angiography (CTPA). A recent review has suggested a diagnostic imaging algorithm for investigation of maternal PTE.2 We audited the investigative pathway of women in our institution that had undergone CTPA in comparison to this imaging algorithm.

Methods: Using our local picture archiving and communications system (PACS) maternity patients undergoing CTPA during a four-year window were identified. These case notes were reviewed to determine which clinical investigations were performed prior to CTPA, CTPA result and commencement of therapeutic anticoagulation. The results were compared with the published diagnostic imaging algorithm.2

Results: 20 maternity patients underwent CTPA within the study period. Chest radiography (CXR), electrocardiography (ECG) and arterial blood gas (ABG) sampling was performed prior to CTPA in the majority of cases (85%, 95% and 80% respectively). D-dimer assay and lower-limb venous ultrasound were not commonly performed (25% and 10% respectively). One CTPA was positive for maternal PTE. 75% of women were therapeutically anticoagulated prior to CTPA. The mean duration of therapeutic anticoagulation of women with a negative CTPA was 20.5 hours.

Discussion: There is considerable inconsistency in the investigation of suspected maternal pulmonary embolism. It is surprising that CXR and ABG sampling are not performed in all cases of suspected maternal PTE as they may suggest a diagnosis other than maternal PTE without requirement for CTPA. There was low utilisation of d-dimer assay and lower-limb ultrasound. Both of these investigations may prevent the requirement for CTPA - a negative d-dimer test may permit exclusion of maternal thromboembolism whereas a positive lower limb venous ultrasound may confirm thromboembolism. We intend to implement this diagnostic imaging algorithm for cases of suspected maternal PTE and re-audit the results. In our study the incidence of PTE in women with clinical suspicion of PTE was 5% yet 75% of our study population received therapeutic anticoagulation. Morbidity from unnecessary therapeutic anticoagulation may be reduced if an expedited diagnostic imaging pathway can be achieved for suspected maternal PTE.

References
P55 Ability of non-Luer spinal anaesthesia syringes to unlock the Epifuse epidural catheter connector

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Introduction: By April 2012, in the NHS, all connectors for intrathecal injection should have non-Luer connectors that will not connect with intravenous equipment, with similar changes for epidurals by April 2013. In our institution, we use the Epifuse™ epidural connector (Portex, Smiths Medical) which requires insertion of a Luer syringe tip to unlock it (Figure). We evaluated whether the currently available non-Luer syringe tips could also unlock the device.

Figure: An Epifuse being opened using a Luer syringe tip

Methods: We obtained samples of the non-Luer spinal anaesthesia syringes currently available in the UK: CorrectInject™ (Smiths Medical); Hall Lock® (Flexicare Medical Ltd); Neurax® (B-Link (UK) Ltd; Surety® (InterVene Ltd); and UniVia® (BD). We tested whether each syringe tip could unlock the Epifuse connector, and also whether any existing equipment in our epidural packs (Portex) could unlock the device. Each syringe was tested five times on three Epifuse connectors.

Results: None of the five non-Luer syringe tips could unlock the Epifuse. In the epidural packs, both the loss-of-resistance (LOR) syringe and the threading assist device could be used to unlock the connector (the latter with some difficulty because of its small size).

Discussion: Unlocking an Epifuse connector may be needed after checking catheter patency before sitting an epidural, or when adjusting an epidural catheter connection. While the current Portex (Luer) LOR syringe will unlock the Epifuse, a change to the corresponding non-Luer fitting (CorrectInject) will prevent this. The threading assist device will also have to change to be compatible with the new epidural needle design. A mixture of different manufacturers’ equipment (e.g. for a combined spinal-epidural) will not solve the problem. Thus, when non-Luer epidural equipment is introduced in 2013, the anaesthetist may be unable to unlock the Epifuse connector unless he/she opens a Luer syringe, or the manufacturer of the Epifuse supplies a specific opening device or modifies the unlocking port of the connector.

Acknowledgement: We are grateful to the manufacturers for supplying samples of their syringes.

Reference

P56 How much safer can needles be? One year audit of outcomes of caesarean sections performed with current luer connector spinal needles

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Introduction: By the 1 April 2012, the National Patient Safety Agency (NPSA) requires all spinal (intrathecal) bolus doses and lumbar puncture samples to be performed using syringes and needles that are fitted with safer connectors that will not connect with intravenous Luer ones. This is to further reduce the incidence of inadvertent intrathecal injection of intravenous drugs, a very rare, but potentially fatal complication of neuraxial access. The introduction of needles that are fitted with non-Luer compatible connectors has already been delayed due to manufacturers inability to meet target dates and the concerns raised by the specialty membership organisations. This audit aims to establish adverse outcomes and quality issues of current Luer needles in the obstetric population and also to serve as a baseline prior to the introduction of safer neuraxial connectors.

Methods: Data were prospectively collected for all caesarean sections performed under spinal or combined spinal-epidural (CSE) anaesthesia between July 2010 and July 2011. Data included technical difficulties during needle insertion, adequacy of anaesthesia, the need for additional anaesthesia and pain during surgery and its management. User satisfaction with the spinal equipment was also recorded.

Results: During the above period, 923 caesarean sections were performed, of which adequate data were available from 897 cases (96.7%). Of these, the intended anaesthesia was spinal in 727 patients (79%) and CSE in 166 patients (21%). Overall, the conversion to general anaesthesia was 0.45% (4/897). One was converted before and three after skin incision. 1.3% of women who initially received spinal anaesthesia and 5.2% of those received a CSE required a repeat spinal or epidural insertion. Pain during surgery was 2.5% for spinal and 3.7% for CSE anaesthesia The majority of these were managed with intravenous and inhalational analgesia and/or epidural top-up in the case of CSE.

Discussion: Current Luer spinal needles have very low rate of block failure, pain during surgery and conversion to GA. User satisfaction was also rated extremely high at an average of 9/10. Newly introduced equipment should be at least of similar profile otherwise additional morbidity may result from repeated or failed regional anaesthesia. In addition, delay in providing adequate anaesthesia may compromise the well being of the fetus and increase maternal anxiety. Replacement of the Luer connector without very good evidence of increased safety poses unnecessary risk to our patients especially the pregnant population. Testing of new devices must therefore be carried out rigorously with clinicians’ engagement and with evidence of safety before change over.

References
1. Safer spinal (intrathecal), epidural and regional devices. http://www.nrls.npsa.nhs.uk/resources/?EntryId45=94529
**P57 Assessment of an urgency classification for assisted vaginal delivery**

RA Leslie, J Astin,* J Tuckey, SM Kinsella,†
†Anaesthetic Department, St Michaels Hospital, Bristol, UK, Anaesthetic Department, Royal United Hospital, Bath, UK, *Anaesthetic Department, Frenchay Hospital, Bristol, UK.

**Introduction:** More attempted (trial) assisted vaginal deliveries (AVD) are being done in the operating theatre since Murphy et al showed that neonatal trauma could result from repeated attempts. The urgency categories 1-3 developed for caesarean section (CS) have been applied locally to AVD using the same definitions [1-immediate threat; 2-compromise; 3-no compromise]. We speculated that peripartum management of AVD and CS would be similar, because of the possibility of AVD failure with conversion to CS.

**Methods:** We collected information prospectively on 105 AVD and 295 CS at two hospitals as part of a wider registered audit.

**Results:** Overall mean decision to delivery interval (DDI) for AVD was shorter than for CS, though this was not true in the presence of fetal distress. 2 (50%) Cat 1 AVD were delivered in ≤20 min and 17 (29%) Cat 1 CS. 1 (0.1%) AVD case had general anaesthesia (GA) compared to 12 (4%) CS. 12 CS cases followed failed AVD in theatre. The mean DDI for these cases was 66 min from initial decision, whilst the decision-for-CS to delivery time was 11 min.

**Table:** Mean DDI in different urgency groups.

<table>
<thead>
<tr>
<th></th>
<th>AVD1</th>
<th>AVD2</th>
<th>AVD3</th>
<th>All AVD</th>
<th>All CS</th>
<th>CS1</th>
<th>CS2</th>
<th>CS3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number</td>
<td>105</td>
<td>4</td>
<td>89</td>
<td>12</td>
<td>295</td>
<td>59</td>
<td>182</td>
<td>54</td>
</tr>
<tr>
<td>DDI (min:sec)</td>
<td>50:04</td>
<td>24:15</td>
<td>52:07</td>
<td>43:25</td>
<td>71:27</td>
<td>32:06</td>
<td>58:30</td>
<td>158:07</td>
</tr>
<tr>
<td>Number with FD</td>
<td>33</td>
<td>4</td>
<td>29</td>
<td>0</td>
<td>78</td>
<td>33</td>
<td>44</td>
<td>1</td>
</tr>
</tbody>
</table>

**Discussion:** Mean DDI for AVD with fetal compromise was 49 min compared to a published range of 20-30 minutes, although the latter includes cases delivered in the labour room. Urgency categories 1 and 2 were comparable between AVD and CS in terms of DDI. DDI for category 3 AVD was shorter than category 3 CS, because the latter may not be in labour and there is greater leeway to schedule the operation. Use of GA was less in AVD compared to CS. The usefulness of the urgency classification applied to AVD requires further evaluation, for example by comparing AVD in the delivery room with AVD in the operating theatre.

**References**

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**P58 Sepsis in pregnancy: development and pilot of a screening tool and management guideline**

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**Introduction:** For the first time since the Confidential Enquiries into Maternal Death commenced in 1952, genital tract sepsis is the leading cause of direct maternal death. The most recent report called for urgent guidelines for the detection, investigation and management of suspected sepsis. Recognising the signs and symptoms of serious illness is essential in optimising care and outcome, by ensuring timely senior review and appropriate intervention. Utilising expertise from Critical Care, Microbiology and Midwife Educators, we hoped to produce a Pregnancy-specific Sepsis Screening Tool and a Resuscitation/Management guideline.

**Methods:** We designed a screening tool and management guideline consisting of one A4 sheet. By mandating a set of 4 basic observations, the screening tool determines the identification of Systemic Inflammatory Response Syndrome (SIRS). It highlights those who may have sepsis on clinical grounds and then establishes a possible focus of infection. These patients are subsequently reviewed and managed according to the guidelines. A 5-week pilot study for all admissions to the Maternity Unit was undertaken.

**Results:** 363 women were screened.

<table>
<thead>
<tr>
<th>Abnormal variable (n=363)</th>
<th>Abnormal in possible SIRS diagnosis (n=6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temp ≤36°C or ≥38.3°C</td>
<td>1</td>
</tr>
<tr>
<td>Heart rate ≥ 90</td>
<td>68</td>
</tr>
<tr>
<td>Resp rate ≥20</td>
<td>11</td>
</tr>
<tr>
<td>SBP ≤ 90mmHg</td>
<td>6</td>
</tr>
</tbody>
</table>

Six women showed two altered variables, identifying possible SIRS and triggering senior review. Physiological parameters for accuracy of diagnosis of SIRS in pregnancy were analysed.

**Discussion:** The notes for those who triggered urgent review were scrutinised. Two had accurate diagnoses and management of sepsis in line with the guideline; the other 4 were treated appropriately according to diagnosis after senior review. These results indicate we have designed an effective sepsis screening tool and management guideline. Parameters used for diagnosis of SIRS have not been validated in pregnancy. We anticipated that the SIRS criteria might need adaptation, but we chose to pilot with the best available evidence. Although 74/363 patients triggered on 1 parameter, none received inappropriate investigation / review. No change has been made to the original SIRS criteria. The guideline has been unanimously supported and enthusiastically accepted in our unit and has been formally introduced for all admissions with the intention of wider introduction into the community, MAU and ED. It plays a valuable role in raising the awareness, detection and management of sepsis in pregnancy and could result in a reduction in avoidable morbidity and mortality.

**References**
P59 Obstetric Sepsis: the experience of a tertiary centre
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University of Glasgow, Glasgow, UK, *Anaesthetics, Glasgow Royal Infirmary, Glasgow, UK
Introduction: The worrying rise in obstetric sepsis and attendant mortality has been marked by the last two confidential enquiries. Concerns have been raised about delays in diagnosis and treatment of sepsis in the obstetric population, and management has been described as suboptimal.1
Methods: All admissions from August 2010 to August 2011 to the obstetric high dependency unit at the Princess Royal Maternity unit were inspected. The clinical portal was used to identify potential cases of sepsis and casenotes requested. In cases of dubious case notes were reviewed to ascertain the reason for admission. Neonatal outcomes were accessed via the Proteus database.
Results: There were 155 HDU admissions over the year, with the most common presentation being haemorrhage: 55 (35%). Sepsis was the main diagnosis in 26 (17%); being split into antenatal (29%), peripartum (50%) and postpartum (21%). 13 (46%) were primiparous, and the population had a mean age of 27.4 (SD 6.8). The median HDU length of stay was 3.3 days [IQR 1-5], with a median hospital length of stay of 8 days [IQR 7-11]. Anaesthetic staff had documented reviews in 15 (58%) cases, ICU reviews being asked for in 5 (19%) of cases. 3 patients were admitted to ITU with no mortality. Positive cultures were obtained in 13 (50%) of cases of sepsis, blood cultures were taken in 23 (88%) of cases. In the peripartum cases 7 (77%) of infants were admitted to NICU. Median time from admission to first antibiotic was 11 h. The sources of sepsis are shown below

<table>
<thead>
<tr>
<th>Source of Sepsis</th>
<th>Number of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest</td>
<td>8</td>
</tr>
<tr>
<td>Choriomnionitis</td>
<td>7</td>
</tr>
<tr>
<td>Urosepsis</td>
<td>7</td>
</tr>
<tr>
<td>Wound Infection</td>
<td>1</td>
</tr>
<tr>
<td>Pancreatitis</td>
<td>1</td>
</tr>
<tr>
<td>RPOC</td>
<td>2</td>
</tr>
</tbody>
</table>

Discussion: The incidence of sepsis in our dataset is much higher than in the recent Scotland-wide audit. This may be due to the tertiary nature of the unit which receives older women with more attendant comorbidities. It is pleasing to see frequent use of invasive monitoring, and of anaesthetic clinical reviews of women who are truly receiving critical care in the accepted terminology. Wide use of cultures should be continued and the earlier administration of antibiotics encouraged.

References
3. Providing equity of critical care for the critically ill pregnant or recently pregnant woman. Maternal Critical Care Working Group, 2011

P60 Postpartum Group C Streptococcus sepsis complicated by ovarian vein thrombosis
ECB Harty, E Hartsilver, J Blackman,* T Kay,* M Morgan,† Anaesthetics, Royal Devon & Exeter Foundation Trust, Exeter, UK, *Obstetrics and Gynaecology, Royal Devon & Exeter Foundation Trust, Exeter, UK, †Microbiology, Royal Devon & Exeter Foundation Trust, Exeter, UK
Introduction: Maternal sepsis was highlighted in the 2006-2008 CMACE report as the most common cause of direct maternal death.1 Here we present a case of sepsis arising from Group C Streptococcus associated with an ovarian vein thrombosis and complicated by pulmonary emboli.
Case Report: A 34-year-old para 3 woman presented to our delivery ward with a moderate ante-partum haemorrhage at 32 weeks gestation. After 2 h of contractions and passing clots per vaginum she delivered a live male infant who was taken to neonatal intensive care. Day 1 postpartum the patient complained of severe right iliac fossa pains. These were thought to be afterpains and treated with oral morphine. Day 2 post partum she collapsed in the corridor to NICU and was found to be febrile, tachycardic and tachypnoeic. Her CRP was 350mg/L. It was noted that the patient had grown group C streptococcus from a vaginal swab taken during a previous admission. Blood cultures were taken and treatment with meropenem and clindamycin commenced on microbiological advice. The patient was places on an early warning score observation chart. On day 4 postpartum the patient became acutely short of breath, desaturating to 89% on air. A CTPA revealed bilateral pulmonary emboli. Her haemoptysis sample grew the same group C streptococcus that had grown on the vaginal swab; throat swabs had previously only grown mixed flora. This led to a suspicion of septic emboli and a review of her abdominal imaging confirmed thrombosis in the right ovarian vein. Treatment with low-molecular-weight heparin was commenced. The suspicion of tricuspid valve endocarditis was raised and treated with rifampicin. Repeat trans-thoracic echocardiograms were negative. The patient was discharged day 20 postpartum on daptomycin (subsequently changed to oral cephradine) and warfarin.
Discussion: CMACE 2006-8 demonstrated a rising incidence of maternal sepsis, particularly from group A streptococci. The routine use of a maternal early warning chart is recommended by the report and in our opinion may have lead to earlier recognition of severity of this patient’s condition. The incidence of ovarian vein thrombosis in pregnancy is 0.02% to 0.18% and will commonly present as right sided iliac fossa pain. It is associated with pelvic infection, multiparous women and thrombophilia.2

References
P61 Anaesthesia for external cephalic version: a survey of UK lead obstetric anaesthetists

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Introduction: In the UK, the rate of delivery by caesarean section has been on a continual rise. This has both a clinical and an economic impact leading to a desire from maternity units to promote vaginal delivery wherever possible. Clinical studies have shown an improvement in the success rates of external cephalic version (ECV) in both primigravida and multigravida following low dose spinal anaesthesia. These patients have also reported lower visual analogue scores for pain and have experienced minimal adverse effects.

Methods: An OAA approved survey was sent electronically to 213 registered Lead Obstetric Consultants (OAA Survey number 120). 140 were returned: a response rate of 65.7%. This survey addressed issues regarding anaesthetic services and protocols supporting ECV.

Results: Over 96% of respondents reported that in their unit patients attending for ECV rarely or never received an anaesthetic. In addition, 87% stated that these patients were not pre-assessed by an anaesthetist unless requested by the obstetric team on medical grounds. Of the remainder, 5.7% reported that all patients were seen on the day and a further 4.3% stated patients were assessed if caesarean section was planned (if ECV failed). Patients were required to be starved and receive antacid prophylaxis in 28% of responses (plus a further 25.7% if failed ECV would result in caesarean section). Over 80% of responses stated that ECV would be performed in the delivery suite. Only 4.4% were performed in the operating theatre with the remainder in antenatal clinic, the antenatal ward or a day assessment unit.

Discussion: In the UK, obstetric practice is to perform ECV without spinal anaesthesia. The majority of units report that patients are not pre-assessed by an anaesthetist despite the potential for immediate caesarean section for fetal bradycardia. Up to half of units in the UK require patients to be fasted prior to the procedure. Most procedures are performed in the delivery suite providing close proximity to anaesthetic services and the operating room. The vast majority of ECV procedures appear to take place with little or no anaesthetic intervention causing no apparent concern from the obstetric team. Routine use of low-dose spinal anaesthesia for all patients having ECV would therefore seem excessive. However, with recent evidence of improved success and patient satisfaction, perhaps this technique should be considered for patients where the first attempt at ECV has failed in an attempt to stem the rise in caesarean delivery rate.

References

P62 Anaesthetic interventions in VBAC: a 2-year review

AP Singh, A Moyer, M Kitching, K Gladwell,* Anaesthetics, Lister Hospital, Stevenage, UK, *Obstetrics, Lister Hospital, Stevenage, UK

Introduction: Increasing rates of primary caesarean section (CS) has led to an increased obstetric population with history of prior CS. This group of patients are either offered VBAC (vaginal birth after caesarean section) or ERCS (elective repeat caesarean section). Individual studies and systemic reviews suggest a successful VBAC rate of 72-76%. In the UK, 33% of women who had a previous CS achieve a vaginal delivery. However, VBAC success rates of 74% have been stated in a Scottish report. Several factors are associated with a successful VBAC. Planned VBAC success rates were higher among women receiving epidural analgesia. VBAC carried a higher rate of uterine rupture, dehiscence, hysterectomy and blood transfusion. It is therefore imperative to plan VBAC deliveries in a consultant-led obstetric unit. An anaesthetic plan and timely intervention is recommended.

Methods: Expectant mothers with previous CS attend our antenatal VBAC clinic for delivery planning. We followed up patients who had opted for a VBAC delivery. We looked at parturients over a 2-year period (2010-2011) and followed-up 153 patients. The modes of delivery were documented as spontaneous vaginal delivery (SVD), instrumental delivery and emergency CS (category 1,2,3). Anaesthetic interventions if any, were recorded. These included spinals, epidurals, CSE or GA. The method of pain relief in SVD and instrumental delivery was also noted.

Results: 6.5%(10) of patients underwent category 1 CS. 43% of patients who underwent emergency CS did not have epidural for labour. Suprisingly, only 25% of instrumental deliveries did have labour analgesia.

Table: Delivery rates and type of anaesthetic

<table>
<thead>
<tr>
<th>Deliveries</th>
<th>Rates</th>
<th>Anaesthetic</th>
<th>% patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVD</td>
<td>41%(63)</td>
<td>Spinal</td>
<td>15%(23)</td>
</tr>
<tr>
<td>Instrumental</td>
<td>18.5%(28)</td>
<td>Epidural</td>
<td>30%(47)</td>
</tr>
<tr>
<td>Em CS</td>
<td>40.5%(62)</td>
<td>CSE</td>
<td>5%(8)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GA</td>
<td>6%(9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>None</td>
<td>44%(69)</td>
</tr>
</tbody>
</table>

Discussion: The overall percentage of vaginal deliveries (59.5%) was low, compared to the previously published data but much better than other UK studies. This rate is also much lower than our overall vaginal delivery rate in women without previous CS (78%). The epidural uptake, at 31%, was only slightly higher than our average epidural rate (26%). A large number of patients (56%) had some form of anaesthetic interventions. We recommend that an anaesthetic policy should be incorporated with the VBAC policy. Women should be encouraged to request early epidurals in labour.

References
3. Ball E, Hinshaw K. The current management of vaginal birth after previous caesarean delivery. The Obstetrician & Gynaecologist 2007;9:77-82
P63 Attenuation of pressor response to laryngoscopy during general anaesthesia for caesarean section in preeclampsia: a review of 12 years practice

W Birts, R Savine, A Addei
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Introduction: Preeclampsia remains the second leading cause of direct maternal death. Pre-eclamptic mothers undergoing caesarean section (CS) under general anaesthesia (GA) are at risk of hypertensive surges if measures to attenuate the pressor response to laryngoscopy are not undertaken. There is a lack of national guidance surrounding this topic. Our unit guidelines suggest a "modified rapid sequence induction (RSI) technique with an opioid" and a "low threshold for invasice arterial blood pressure (IABP) monitoring". CMACE states, "Direct arterial pressure monitoring should be considered if a more accurate measurement of systolic and diastolic arterial pressures is required". We reviewed our practice with reference to these recommendations.

Methods: All preeclamptic mothers who underwent CS under GA from 2000-2011 were included. Type and dose of opioid used for induction was recorded. Change in systolic blood pressure (SBP) >20% was regarded as clinically 'significant'. IABP monitoring used for induction of anaesthesia was noted as was intravenous anti-hypertensive treatment.

Results: 28 women were included. 15/28 received intravenous infusions of antihypertensive, magnesium sulphate (MgSO₄) or both before theatre; 11/15 received only MgSO₄ infusions. 18/28 women received an opioid as part of a modified RSI: alfentanil in 16 cases and fentanyl in 2. All women receiving MgSO₄ and 12/15 women on intravenous therapy had an opioid at induction. 2/28 women had a rise in SBP of >20% after intubation; neither had received an opioid at induction. 18/28 women had no significant change in SBP and 5/28 had a drop in SBP of >20% after intubation. Of the 18 women in whom an opioid was administered, 14 had no significant change, 4 had a decrease and none had a rise in SBP. IABP was used in 7/28 cases. None of the women were recorded to have had any subsequent adverse neurological sequelae.

Discussion: Prevention of surges in SBP during induction and emergence is the responsibility of the anaesthetist. We were reassured to see that no woman who received an opioid at induction suffered a significant rise in SBP and that this included all 11 women receiving MgSO₄. National guidance may help to clarify which group of pre-eclamptic mothers should receive opioids on induction and a suitable dosing regimen. It is likely that rises in SBP are underdetected and therefore under treated in the absence of IABP. An OAA approved survey revealed that 34% of anaesthetists would use IABP monitoring routinely in the management of women with severe pre-eclampsia for caesarean section. Our data is in keeping with this if women requiring intravenous therapy are considered to be severe.

References

P64 General anaesthesia in obstetrics: what about the trainers?

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Dept of Anaesthetics, Northwick Park Hospital, Harrow, UK, *Dept of Anaesthetics, Hillingdon Hospital, Uxbridge, UK

Introduction: The declining numbers of general anaesthetics in obstetrics combined with the impact of changes in training have lead to ongoing concern about how to provide training in general anaesthesia (GA) for caesarean section. Much of this discussion has focussed on the appropriate number of GAs for caesarean section required by trainees to become competent. There has been much less discussion on the impact of reduced numbers of GA caesarean sections on maintenance of consultant skills. We were interested in looking at the number of GAs for caesarean section performed by consultant obstetric anaesthetists in our units.

Methods: Between 1 January 2011 and 31 December 2011 the caesarean sections performed under GA in our units were classified into those performed by a consultant anaesthetist and those performed by all other grades of anaesthetist.

Results: In the 12-month period evaluated, a total of 172 caesarean sections were performed under GA in our two units. Of these, 39 were performed by a total of 14 consultant anaesthetists, giving an average of 2.78 cases per consultant [range 1-6 cases].

Discussion: This evaluation shows that consultant anaesthetists in our busy units are only performing a very small number of GAs for caesarean section per year. While the difficulties of providing training in GA for caesarean section are well recognised there is much less discussion about the number of cases required, or alternative ways to maintain consultant expertise. It is incumbent on all anaesthetists that they maintain relevant knowledge and skills in relation to clinical practice to facilitate their role as trainers, as well as to comply with continuing professional development requirements. The ‘vanishing art of general anaesthesia in obstetrics’ was formally recognised more than 10 years ago and many of these trainees will now be consultants. The potential for problems to arise must be greater if inexperienced or de-skilled consultants are being asked to train inexperienced trainees in the emergency situation. The American ‘Maintenance of Certification in Anaesthesiology’ program is used to assist consultant revalidation and some of the assessment is simulation based. With consultant revalidation looming in the UK, perhaps regular simulation training in obstetric general anaesthesia is now essential for both trainees and consultants?

References
P65 Persistent pain following caesarean section: a retrospective questionnaire based survey of 150 women  
I Mihaylov, T Rajamanickam, I Suri  
Department of Anaesthesia, Warwick Hospital, Warwick, UK  
Introduction: According to a definition of the International Association for the Study of Pain, pain is considered to be persistent when it has lasted for at least 2 months.1 Although persistent pain states have been described to occur after various types of surgery, relatively little is known about this entity following caesarean section. Our survey aimed to identify the incidence of persistent pain following this procedure and the effect on daily functioning. The relationship to previous pain problems, chronic diseases and some features of caesarean section also were examined.  
Methods: We conducted a retrospective questionnaire – based survey of 150 consecutive women who had undergone caesarean section in our unit approximately 12 months prior to the survey.  
Results: The response rate was 49% (74 out of 150 returned questionnaires). Approximately 30% of women (22 out of 74) had pain 2 months following caesarean section. Nearly all of the women suffering with persistent pain (20 out of 22) complained of pain localised at the site of surgical incision and two had pain primarily in the perineal region. About 64% of those with persistent pain (14 out of 22), continued to suffer pain at 12 months following their procedure. The commonest pain description was allodynia and hyperaesthesia in the vicinity of the surgical scar. Sleep was disturbed to a degree in 54% of women with persistent pain (12 of 22). No association was found with previous pain problems, level of acute post – surgical pain or type of anaesthesia employed.  
Discussion: Caesarean section is one of the commonest surgical procedures worldwide. This survey suggests that persistent pain following this procedure is a significant problem, which may affect daily functioning. We believe that further research, in the form of controlled studies is necessary in order to identify any contributing factors.  
Reference  

P66 Prevalence of chronic pain after caesarean section  
S Muthukrishnan, K Soundararajan,* K Litchfield  
Department of Anaesthesia, Princess Royal Maternity Unit, , Glasgow, UK, *General Practice, Jamieson Medical Practice, Glasgow, UK  
Introduction: The prevalence of chronic pain after caesarean section (CS) has been variously reported between 6% and 18%.1-2 The majority of patients who develop persistent pain longer than 2 months describe it as mild to moderate with no hindrance to daily activities.2 The purpose of this audit was to determine the prevalence of chronic pain after CS requiring at least one visit by the patient to the general practitioner (GP) for pain complaint in our general practice surgery population.  
Methods: We retrospectively collected data from case notes of women who underwent caesarean section over a five-year period from Aug 2006-Aug 2011 in our general practice surgery. We identified patients who developed pain after CS which persisted for >2 months. Categorical variables were compared with chi-square test. The prevalence of chronic pain with 95% confidence intervals (CI) was calculated.  
Results: 225 patients underwent CS during the audit period. One patient’s case notes were missing and she was excluded from the audit. 26 (11.6%) patients had pain requiring at least one visit to the GP. Among them 7 (3.1%) had pain or discomfort over the scar; 13 (5.8%) had backache; 4 (1.7%) had pelvic girdle pain and 2 (0.8%) had abdominal pain. None were referred to secondary care for management of chronic pain. Most patients (21 patients) who developed chronic pain had two or less visits to GP for pain complaint.  

<table>
<thead>
<tr>
<th>Persistent pain following CS</th>
<th>Yes (n = 198)</th>
<th>No (n = 26)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elective CS</td>
<td>8</td>
<td>95</td>
</tr>
<tr>
<td>Emergency CS</td>
<td>18</td>
<td>103</td>
</tr>
<tr>
<td>Previous Pain problems</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

There was no significant difference in age and number of previous CS between patients who developed persistent pain and those who did not. Five out of six patients who had previous history of pain related problems developed persistent pain after CS.  
Discussion: Prevalence of chronic pain following CS requiring at least one visit to GP (95% CI) was 11.6% (7.7-16.5%). This is comparable to prevalence of moderate to severe persistent pain reported by Kainu et al of 7.4%.2 In our audit population, we did not find statistically significant difference in patients developing persistent pain following either emergency or elective caesarean section (P=0.098).  
References  
P67 What’s the white stuff? Improvement in staff knowledge of local anaesthetic toxicity and its management with Intralipid® after targeted educational intervention. A completed audit loop.

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Introduction: Local anaesthetic (LA) toxicity can prove fatal. The NPSA alert on the Safer practice with epidural injections and infusions and infusions states, “Ensure all staff... have adequate training... on how to manage toxicity and use resuscitation protocol wherever bupivacaine is administered.” We wanted to determine whether our staff had sufficient knowledge to identify LA toxicity, knew about the resuscitation guidelines and could locate Intralipid® in an emergency.

Methods: A questionnaire was offered to labour ward staff over a 10-day period to determine baseline knowledge. Questions included: role; signs and symptoms of LA toxicity; awareness of treatment guidelines and Intralipid® together with their locations. Standards were not met. We initiated a poster campaign and educational materials were incorporated into the mandatory local intrapartum study day curriculum. A second round of questionnaires was given out 6 months later, and results compared.

Results: 63 completed forms were collected from staff who managed labouring women receiving epidural bupivacaine. Following the educational intervention a further 53 forms were collected. 15 were excluded from staff who did not manage epidurals in labour, leaving 38 for comparison. 76% of responders in the second round had seen the “Epidural Safety Update” posters on the delivery suite.

Table: Knowledge before and after educational intervention

<table>
<thead>
<tr>
<th>Anaesthetists (A), Midwives (MW), Obstetricians (OB)</th>
<th>BEFORE</th>
<th>AFTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of signs and symptoms of LA toxicity</td>
<td>A: 14/14 (100%)</td>
<td>6/6 (100%)</td>
</tr>
<tr>
<td></td>
<td>MW: 14/37 (38%)</td>
<td>21/25 (84%)</td>
</tr>
<tr>
<td></td>
<td>OB: 7/12 (58%)</td>
<td>6/7 (86%)</td>
</tr>
<tr>
<td>Awareness of guidelines for managing severe toxicity</td>
<td>A: 12/14 (86%)</td>
<td>6/6 (100%)</td>
</tr>
<tr>
<td></td>
<td>MW: 1/37 (3%)</td>
<td>18/25 (72%)</td>
</tr>
<tr>
<td></td>
<td>OB: 1/12 (8%)</td>
<td>2/7 (29%)</td>
</tr>
<tr>
<td>Location of Intralipid</td>
<td>A: 10/14 (71%)</td>
<td>5/6 (83%)</td>
</tr>
<tr>
<td></td>
<td>MW: 3/37 (8%)</td>
<td>18/25 (72%)</td>
</tr>
<tr>
<td></td>
<td>OB: 0/12 (0%)</td>
<td>2/7 (29%)</td>
</tr>
</tbody>
</table>

Discussion: The GMC states we have a duty to maintain performance: “[You must] monitor and maintain quality of care... and maintain a high awareness of patient safety.” The multidisciplinary nature of obstetric management necessitates that all staff should be able to recognise and manage LA toxicity. Initial findings showed poor knowledge, particularly amongst midwives and obstetricians. The former group demonstrated a considerable improvement following intervention. We have shown the benefit of visual aids and targeted educational material to improve knowledge and fulfill the NPSA requirement to improve epidural safety.

References
1. NPSA. Epidural injections and infusions. 2007. http://www.nrls.npsa.nhs.uk/resources/type/alerts/?entryid45=59807&pg=1

P68 The Intralipid “life belt”; knowledge rescue measures to close the audit loop

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Introduction: Lipid emulsion (Intralipid®) has been in the guidelines for the management of severe local anaesthetic (LA) toxicity since 2007. An audit carried out in our department in 2009 found that anaesthetists were aware of the role of Intralipid® but there were large gaps in the knowledge of anaesthetic support staff, midwives and obstetricians.

Following this, several interventions were employed. Intralipid® was included in the resuscitation lecture at monthly midwifery and obstetric statutory training sessions, at which attendance is mandatory every two years. The indication for use and the location of Intralipid® was printed in red on all regional analgesia prescription charts. Severe LA toxicity was included among teaching scenarios in regular multidisciplinary skills and drills sessions. In 2011, after a 2 year cycle of these interventions, we re-audited the knowledge of Intralipid® and LA toxicity among members of the labour ward team.

Method: The original questionnaire was repeated among anaesthetic support staff, midwives and obstetricians (n=23). Staff were invited to answer a series of open-ended questions about the use of Intralipid®, its location and the initial dose. Yes/No questions explored knowledge of the signs and immediate management of severe LA toxicity. The results were compared with those of the same staff groups (n=25) audited in 2009.

Results:

Table: Change in percentage of correct answers between 2009 and 2011.

<table>
<thead>
<tr>
<th>Anaesthetist Senior</th>
<th>Obstetrician Senior</th>
<th>Midwife Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indication</td>
<td>+20</td>
<td>+51</td>
</tr>
<tr>
<td>Location</td>
<td>0</td>
<td>+9</td>
</tr>
<tr>
<td>Dose</td>
<td>+20</td>
<td>0</td>
</tr>
<tr>
<td>Signs</td>
<td>+53</td>
<td>+13</td>
</tr>
<tr>
<td>Management</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Data are percentage point difference

Discussion: With three simple measures we have demonstrated improved knowledge and awareness of lipid emulsion as potential rescue for severe LA toxicity. Given the continuous flux of staff on the labour ward, it is essential to employ measures that can be easily and regularly reproduced over a period of time. In these times of financial austerity, we have successfully achieved this by tailoring existing resources. Moreover, our interventions have been cost and time neutral and will be continued in our unit.

References
P69 Awareness about local anaesthetic toxicity and management: a survey of our delivery suite team

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Introduction: The National audit project [NAP]3 identified 6 cases of inadvertent intravenous local anaesthetic (LA) injections in the obstetric setting. A fatal intravenous LA injection1 on a labour ward in the UK triggered numerous safety alerts2 and highlighted the need for further training and awareness amongst the staff. In our hospital senior midwives are allowed to top-up epidurals for rescue analgesia and for instrumental delivery in the labour room. This survey was conducted among the members of the multidisciplinary obstetric team, to assess their awareness about LA toxicity, its recognition and management.

Methods: The survey questions were designed to enquire about the type of LA procedures they were involved in, LA type and volume used for such procedures, knowledge about signs and symptoms of toxicity, management of LA toxicity based on the recent AAGBI/ALS guidelines and awareness about lipid emulsion and its location. A total of 105 questionnaires were distributed and participants were asked to complete it without discussion or searching the internet.

Results: 100 completed questionnaires were returned by 54/59 midwives, 25/25 obstetricians, 15/15 anaesthetists and 5/5 ODPS, with an overall response rate of 95%. Among the respondents, 94% had either performed or assisted in episiotomy repairs, pudendal nerve blocks or epidural top-ups. Although 75% of the respondents knew some signs and symptoms of LA toxicity, only 25% were aware of LA toxicity management guidelines published by the AAGBI.3 23% of the respondents knew the approximate location of the lipid rescue pack in the delivery suite, but only three knew the exact location.

Discussion: The results of this survey were presented to midwives, obstetricians and anaesthetists. The AAGBI guidelines are displayed in strategic locations on the delivery suite to improve the awareness about LA toxicity recognition and management. LA toxicity management has also been incorporated into the epidural refresher training sessions conducted for midwives by the anaesthetists. The result of this survey has helped to promote safe clinical practice in our delivery suite. We intend to repeat this survey on an annual basis to maintain awareness about LA toxicity and take in to account staff movement and change.

References

P70 Epidural then spinal at the same interspace: is it safe?

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Introduction: Combined spinal epidural (CSE) is popular in obstetric anaesthesia, both for analgesia in labour and for anaesthesia for caesarean section. CSE can be performed using two separate injections or a “needle-through-needle” approach. The latter is the most widely used CSE technique.1 In this approach the subarachnoid block is performed first, meaning if the epidural catheter is difficult to pass the neuraxial drugs may become fixed resulting in suboptimal block. When a technique involving two injections is used, expert opinion is that the spinal component should be performed first,1 due to theoretical concerns of damage to the epidural catheter by the spinal needle, a complication that has not been reported.2 We designed a series of bench experiments to quantify the theoretical risk of epidural catheter damage if placed before the insertion of the spinal needle.

Methods: We used a 16-gauge Touhy needle to pass a segment of epidural catheter through a sample of gelatin. Using a 25-gauge Whitacre needle 5 contacts were made, under direct vision, between the spinal needle and catheter. This was performed on ten separate catheter segments, using a fresh piece of gelatin each time. Each segment was subsequently removed, attached to the connector and Methylene blue dye injected to assess for any leaks along its length. To determine the force required to damage a 16-gauge catheter, a segment was secured on top of scales and force applied by a surgical scalpel, increasing in approximately 2.5N steps. After each step the catheter segment was tested for leaks by the injection of methylene blue, and a new segment used for the next step. Finally, the force required to bend ten 25-gauge Whitacre needles in the gelatin was determined.

Results: None of the ten epidural catheter segments were breached by the spinal needle. There was no detectable breach in the epidural catheters when forces less than 13N were exerted by the scalpel. Above 13N, a leak was persistently detectable, repeated on five samples of catheter. The mean force required to cause a 25-gauge Whitacre needle to bend was 2.53N (95% CI 2.42-2.64).

Discussion: Our results confirm that it should not be possible for a 16-gauge epidural catheter to be damaged by a 25-gauge Whitacre needle, as it requires much greater force to breach the catheter with a scalpel than to bend the spinal needle. By siting the epidural catheter prior to spinal block, warning signs of catheter misplacement (e.g. paraesthesia) are preserved. This allows a test dose to be given before subarachnoid injection. It also eliminates the risk of significant delay between spinal and epidural components resulting in the spinal becoming “fixed” before the anaesthetist can position the patient. Also, significant side-effects of the spinal block (e.g. hypotension) may occur when the anaesthetist’s attention is centred on inserting the epidural catheter. This approach will also prevent the risk of the catheter being accidentally inserted into the subarachnoid space via the dural puncture created by the spinal needle.

References
P71 Spinal anaesthesia for emergency caesarean section in patients with labour epidural analgesia

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Introduction: Breakthrough pain under regional anaesthesia (RA) for caesarean section (CS) is the most common cause of litigation in obstetric anaesthesia. Unless the epidural block has been fully effective, conversion to spinal anaesthesia is recommended for CS.1 As a result of a high block requiring intubation at 5 min following epidural to spinal conversion, a snapshot audit over 6 weeks showed a very high epidural to spinal conversion rate of 34.9% in 63 patients. We aimed to establish epidural to spinal conversion rates for emergency CS from January to September 2011 and compare to previous audit period in 2006.

Methods: All patients receiving a labour epidural who proceeded to emergency CS were identified in the obstetric database and anaesthesia and obstetric urgent notes.

Results: Labour epidural analgesia had been established in 271 patients who proceeded to emergency CS under RA. Effective epidural top-ups were achieved in 200/271 (73.8%) while a further 14/271 (5.2%) required to be converted to spinal blocks. In 57/271 (21.8%) epidural block was abandoned without top-up and spinal anaesthesia induced. The total spinal conversion rate was 71/271 (26.2%) which was statistically significantly higher than 19/239 (7.9%) from the 2006 database (P<0.0001). There were no high blocks during either audit period.

Table 1. RA for CS and degree of obstetric urgency.

<table>
<thead>
<tr>
<th></th>
<th>CS cat 1</th>
<th>CS cat 2</th>
<th>CS cat 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>epidural top-up n=200</td>
<td>9(4.5%)</td>
<td>126(63%)</td>
<td>65(32.5%)</td>
</tr>
<tr>
<td>spinal +epidural+top-up n=14</td>
<td>1(7.1%)</td>
<td>4(28.6%)</td>
<td>9(64.3%)</td>
</tr>
<tr>
<td>spinal +epidural only n=57</td>
<td>2(3.5%)</td>
<td>33(57.9%)</td>
<td>22(38.6%)</td>
</tr>
</tbody>
</table>

Discussion: In keeping with recommendations, obstetric anaesthetists have a lower threshold to convert to spinal block during 2011 than previously in 2006. In 80.3% (57/71) of spinal conversions, the epidural block had been abandoned minimising the dangers of a high block. Maintenance of epidural analgesia has changed from midwife top-up to continuous infusion (CEI) on hospital merger in 2010. CEI are well recognised to require a higher number of supplementary top-ups, which perhaps influences the decision to abandon epidural block for CS. Category 3 CS accounted for 64.3% (9/14) of the epidural top-ups requiring spinal supplement where ample time was available to establish an epidural block. There has been a statistically significant 3-fold rise from 7.9% in 2006 to 26.2% in 2011 of spinal anaesthesia for Emergency CS in patients with labour epidural analgesia. This is a significant change in clinical practice. Further large audit numbers will be required to establish whether or not this change in practice leads to a reduction in breakthrough pain during RA for emergency CS.

Reference

P72 An investigation into the effects of ergometrine on human myometrium in vitro

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Introduction: Uterine atony is consistently the commonest cause of postpartum haemorrhage (PPH).1 Guidelines emphasise the use of oxytocins in a sequential manner for the management of uterine atony associated with PPH including ergometrine.2 The precise mechanisms of action of ergometrine as an oxytocin remain unknown. Ergometrine may act through 5-HT receptors. Research points to the 5-HT3A receptor subtype being coupled to pathways that stimulate contraction.3 We investigated the effect of ergometrine in the presence of ketanserin (a selective 5-HT3A receptor antagonist) on the contractility of term human myometrium.

Methods: With institutional ethical approval myometrial biopsies from term parturients undergoing elective caesarean section were obtained (n=7). In vitro contractile responses to a range of ergometrine concentrations (10^-7 to 10^-3M) in the presence and absence of ketanserin (10^-5M) were analysed. Control strips were run simultaneously. The effects of ergometrine with and without ketanserin were compared using 2-way repeated ANOVA with Bonferroni post tests where appropriate. P<0.05 was considered significant.

Results: Ergometrine exerted a significant concentration dependent uterotic effect compared to time matched controls at 10^-7 (P<0.05) and at 10^-6 and 10^-5M concentrations (P<0.001) (Fig A). Frequency of contractions significantly increased only at 10^-4M concentration (P<0.01). The addition of ketanserin (10^-5M) did not alter either the uterotic effect (Fig B) or the effect on contractile frequency of ergometrine.

Figure: Effect of ergometrine alone on amplitude of myometrial contractions and in the presence of ketanserin.

Discussion: We have shown that the selective 5-HT3A receptor antagonist ketanserin at this dose has no effect on the uterotic action of ergometrine in human myometrium in vitro. It is therefore unlikely that this receptor subtype is involved in the mechanism of action of ergometrine.

References
P73 Leptin resistance in human pregnancy: cerebrospinal fluid concentrations of proopiomelanocortin (POMC), agouti-related protein (AGRP) and leptin
RM Smiley, G Page-Wilson,* E Reitman-Ivashkov, K Meece,* A White,† M Rosenbaum,§ SL Wardlaw,*
Anesthesiology, Columbia University College of Physicians and Surgeons, New York, USA, *Internal Medicine, Columbia University College of Physicians and Surgeons, New York, USA, †Life Sciences and Medical and Human Sciences, University of Manchester, Manchester, UK, §Pediatrics, Columbia University College of Physicians and Surgeons, New York, USA
Introduction: Obesity is perhaps the greatest public health issue facing the developed world. Leptin is a peptide that regulates food intake and energy expenditure. Pregnancy is characterized by elevated plasma leptin levels. Leptin decreases food intake by modulating the expression of hypothalamic neuropeptides, including POMC and AgRP. POMC-derived melanocyte-stimulating hormone (MSH) inhibits food intake, while AgRP stimulates food intake by antagonizing effects of MSH. In pregnancy, despite hyperleptinemia, appetite and caloric consumption increase.
Methods: To investigate leptin transport and target neuropeptides in human pregnancy we measured leptin, POMC, and AgRP in CSF, and plasma leptin, in samples obtained from 21 fasting women prior to caesarean section and from 13 fasting non-pregnant female volunteers in the follicular phase. Plasma leptin was measured by RIA. CSF leptin and AgRP were measured using highly sensitive ELISAs. POMC was measured using a specific monoclonal based ELISA that detects the intact POMC prohormone.
Results: BMI was 31.3 ± 1.3 (SEM) in pregnancy vs 26.8 ± 1.7 in controls; pre-pregnancy BMI was 24.6 ± 1.1. Plasma leptin levels were higher in pregnant women (32.8 ± 4.6 vs 17.5 ± 3.2 ng/mL, P = 0.02). Despite this nearly two-fold elevation in plasma leptin in pregnant subjects, CSF leptin did not differ between the two groups (283 ± 34 vs 311 ± 32 pg/mL), consistent with a decrease in leptin transport into CSF during pregnancy. The CSF/plasma leptin percentage was 1.0 ± 0.01% in pregnant subjects vs 2.1 ± 0.2% in controls (P < 0.0001). CSF levels of the orexigenic peptide AgRP were significantly higher in pregnant subjects (32.4 ± 2.7 vs 24.1 ± 2.6 pg/mL, P = 0.02). CSF levels of the anorexigenic peptide precursor POMC tended to be lower in pregnant subjects (200 ± 14 vs 225 ± 18 nmol/mL), but this difference was not significant. However, the POMC/AgRP ratio was significantly lower in pregnancy (6.8 ± 0.6 vs 10.1 ± 0.9, P = 0.004), consistent with a decrease in melanocortin tone favoring increased food intake.
Discussion: We have demonstrated for the first time in human pregnancy that women are protected from the suppressive effects of hyperleptinemia on appetite by both decreased leptin transport into brain and by resistance to leptin’s effects on target neuropeptides that regulate energy balance. Understanding the factors that govern appetite and food intake, and energy and metabolic balance during pregnancy may be important in developing strategies for decreasing obesity and gestational diabetes, and for improving the understanding of the control of appetite and weight regulation in pregnancy and the non-pregnant state.
References

P74 Staffing on labour ward; is it at a critical level?
K Gough, K Bexon, R Bedson
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Introduction: Increasingly maternal critical care is being provided on the labour ward. Patient safety and provision of equitable critical care, regardless of location, is crucial. The Safer Childbirth Report (2007)1 asserts that in a high-risk unit there should be 1.4 whole-time equivalent (WTE) midwives per woman and at least one appropriately trained midwife per critical care case. We conducted an audit to quantify the critical care provision on our 24-bed tertiary care labour ward.
Methods: Over a period of 36 days, the obstetric anaesthetic team was asked to record a twice daily assessment of the level of care being provided in each bed space on labour ward using recent maternal critical care definitions.2 The proportion of midwives with formal critical care training was recorded at each snapshot.
Results: 57 of 72 audit forms were completed (79.2%). In total, 623 level of care assessments were made of which 57.1% were assessed as level 0, 40.8% level 1 and 2.1% level 2. During the 36 days of the audit there were 411 deliveries representing 8.4% of the annual delivery rate. On average there were only 0.87 WTE midwives per woman. 40.5% of our labour ward midwives have had formal training. The provision of critical care trained midwives ranged from 0% to 55.6% of the total midwives per shift. On 2 out of 13 occasions, where level 2 care was required, staffing skill mix did not allow 1:1 care by critical care trained midwives.

Fig 1: Number of critical care trained midwives at time points when level 2 care was required
Discussion: Nationally, there is a lack of information regarding numbers of parturients requiring level 2 care. 1:1 midwifery care reflects the intensive input that these patients may require.3 There is a need to further define how many critical care trained midwives are required on each shift in our unit to account for peaks and troughs in service demand and to ensure that high standards of care can always be achieved.
References
P75 A national survey of obstetric anaesthetic data collection methods in the UK

NJ Campbell, P Youngs, I Anderson
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Introduction: Clinical audit and the monitoring of performance is a cornerstone of high quality healthcare provision. Proof of monitoring of practice and audit of adherence to guidelines, form the crux of reaching level 3 in the NHS-Litigation Authority assessment process which will qualify a unit for a 30% discount in its Clinical Negligence Scheme for Trusts insurance premium.1,2 Across the UK, obstetric anaesthesia units use different methods of data collection, some introducing computerised systems. This survey aims to document the methods and software currently used in the UK for this purpose, identifying the advantages and potential pitfalls of different systems.

Methods: An Obstetric Anaesthetists’ Association approved electronic survey (OAA survey number 110) was sent to each lead obstetric anaesthetist in the UK.

Results: The response rate was 73%. 40% of responders use an electronic data collection system at the point of care, with a further 32% transferring paper records to electronic records later on. 29% of responding units do not use a computer for data collection or collation. The electronic methods in use are described. 18 different types of computerised system were reported, not including self designed systems. Responders using electronic systems reported being more satisfied with their systems.

<table>
<thead>
<tr>
<th>Data collection method</th>
<th>direct electronic collection n(%)</th>
<th>non-electronic collection n(%)</th>
<th>absolute risk reduction</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data loss</td>
<td>26(43)</td>
<td>38(41)</td>
<td>2%</td>
<td>0.79</td>
</tr>
<tr>
<td>No data loss</td>
<td>35(57)</td>
<td>55(59)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfied</td>
<td>36(59)</td>
<td>23(25)</td>
<td>34%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Unsatisfied</td>
<td>25(41)</td>
<td>70(75)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discussion: There are currently a large number of data collection systems in use, with no single system emerging as superior. There is demand for a standardised, national, computerised system for obstetric anaesthetic data collection.

References

P76 A simple tick box system improves documentation on the obstetric epidural anaesthesia record: a complete audit cycle

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Introduction: In the General Medical Council’s publication “Good Medical Practice” it is stated that doctors have an overriding duty to “keep clear, accurate and legible records”.

In addition to this from a medico-legal point of view, “if it’s not written down, then it didn’t happen.” In our institution we have just introduced a new epidural chart with tick boxes for the recording of aseptic technique and explanation of risk factors. We performed a service evaluation to see whether the introduction of the new chart had improved the quality of information recorded by anaesthetic staff.

Methods: We audited 100 old charts prior to the change and 100 new charts following it. Amongst other things we looked at the recording of risks explained to the patient (failure, headache, drop in blood pressure and nerve damage) and aseptic technique (wearing of gown, sterile gloves, hat, mask, and use of chlorhexidine skin preparation and drapes). Results were analysed with chi-square tests.

Results:

Figure: Parameters correctly documented on old and new epidural charts.

The recording of aseptic technique and discussion of side effects was significantly improved following the introduction of the new chart (P<0.001).

Discussion: The design of epidural charts can be an important tool to influence clinician practice and recording of information. This clearly has implications for the design of medical proforma generally.

References
P77 Oral intake in labour: a UK survey in collaboration with the Royal College of Midwives (RCM)
S Jigajinni, J Munro,* J Hoyle, C Falvey-Browne, C Mammakara, D Radhakrishnan
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Introduction: In recent years the incidence of pulmonary aspiration in obstetric anaesthesia has fallen, leading to more liberal UK oral intake practices in labour. In 2007 NICE issued guidance for oral intake in labour, with different recommendations for uncomplicated labour (low aspiration risk—LAR); versus those who developed risk factors making general anaesthesia (GA) more likely, or who received opioids (higher aspiration risk—HAR). We reviewed practice in 2010.

Methods: Following RCM approval, the online survey was distributed to the Heads of Midwifery Services (HOMS) in all NHS obstetric midwifery units.

Results: 145/243 (60%) HOMS replied. 105/145 (72%) units had a policy for oral intake in labour. Of these units: 90/105 (86%) policies differentiated, as NICE recommended, between women with uncomplicated labour (LAR) and women who had opioids or developed risk factors for operative delivery/GA (HAR); 15/105 (14%) policies did not differentiate.

<table>
<thead>
<tr>
<th>Unit Policy</th>
<th>LAR</th>
<th>HAR</th>
<th>All women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>women</td>
<td>women</td>
<td>All women</td>
</tr>
<tr>
<td>NBM &amp; IV</td>
<td>0/90 units</td>
<td>6/90 units</td>
<td>3/15 units</td>
</tr>
<tr>
<td>Water/Ice</td>
<td>5/90 units</td>
<td>16/90 units</td>
<td>1/15 units</td>
</tr>
<tr>
<td>Isotonic/clear fluids</td>
<td>5/90 units</td>
<td>45/90 units</td>
<td>3/15 units</td>
</tr>
<tr>
<td>Unrestricted fluids</td>
<td>1/90 units</td>
<td>9/90 units</td>
<td>1/15 units</td>
</tr>
<tr>
<td>Light diet</td>
<td>6/90 units</td>
<td>8/90 units</td>
<td>3/15 units</td>
</tr>
<tr>
<td>Unrestricted diet</td>
<td>10/90 units</td>
<td>0/90 units</td>
<td>3/15 units</td>
</tr>
<tr>
<td>Maternal</td>
<td>6/90 units</td>
<td>0/90 units</td>
<td>0/15 units</td>
</tr>
<tr>
<td>Obstetric/Midwifery</td>
<td>1/90 units</td>
<td>6/90 units</td>
<td>1/15 units</td>
</tr>
</tbody>
</table>

7/145 (5%) units reported an adverse event relating directly to feeding/fasting: 3 aspiration cases; 4 ketoacidosis cases.

Discussion: Balancing evidence for oral intake in labour with the rare risk of aspiration underpins why NICE recommendations differ for uncomplicated labour (light diet) and women who receive opioids or develop risk factors for GA (liquids only). The majority of units had a policy for oral intake in labour, and most differentiated between LAR/HAR groups. A significant number of these policies however were either more restrictive or liberal than NICE recommended. Of note were units who kept all labouring women NBM, and those who allowed all labouring women unrestricted diet. Practice varied widely despite 2007 guidelines. Should they be reinforced again? Should we adopt a more US approach where no solids are advised in labour? Units reported aspiration does still occur, and with one case in the last confidential enquiry it is food for thought.

References

P78 Distraction and interruption to anaesthetic practice during caesarean sections
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Introduction: Human error is known to contribute to anaesthetic risk and it is well recognised that distraction increases the risk of error. The purpose of this study was to determine the frequency and nature of distracting events to the anaesthetist and the possible consequences to the patient.

Methods: After ethical approval we carried out non-participant practice observations of typical caesarean sections in an English hospital and used qualitative methods to analyse the resulting transcripts.

Results: We observed 10 anaesthetics for caesarean section (6 elective and 4 urgent). All were performed using a regional technique. 238 distracting events occurred during the 689 minutes of observed anaesthetic time (1 per 2 min 53 sec). Urgent caesarean sections had more distracting events (1 per 2 min 31 sec) than elective ones (1 per 3 min 13 sec). Sources of distracting events were other team members (76), workspace (44), patient (39), equipment (36), noise (23) and communication devices (20). 157 of these distracting events had no consequences, 44 had negative patient consequences and 37 positive consequences. Maternity theatre was a busy environment with 7-12 (mean 9) team members present at any one time and sufficiently noisy for the anaesthetist not to hear instructions on 3 separate occasions.

Discussion: Caesarean sections occur in a busy, often noisy theatre environment with members of anaesthetic team, obstetric team, scrub staff, midwifery staff and paediatric teams present. Similar to previous studies distracting events originate predominately from other team members. Distracting events are more common during caesarean section than other surgeries but display similar rates (18%) of negative patient consequences though we report higher numbers of positive consequences (15.5%) than other surgeries.1 Attending to an awake and potentially anxious patient and their partner adds distraction and requires skill from the anaesthetist to balance close monitoring of the clinical situation as well as providing appropriate reassurance - this can often result in positive patient consequences. It is important to minimise distracting events in theatre by better communication between team members and limiting unnecessary noise.

Reference
P79 Response rates to OAA-approved surveys 1998-2010

EJ Robson, JP Campbell, SM Yentis
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Introduction: The OAA has been facilitating surveys in obstetric anaesthesia since 1998, moving to an electronic ‘e-survey’ system in late 2009. Russell recently questioned the value of surveys, stating: “…barely a week goes by in which senior obstetric anaesthetists are not plagued by… surveys, many of which are of modest value.”1 If this view was widespread, one might expect low and/or diminishing response rates. We therefore investigated response rates to OAA-approved surveys since 1998.

Methods: All OAA-approved surveys listed on the OAA website were examined and the year each survey was done and the format (postal/electronic), response rate, and target group were recorded. Individual investigators were contacted if any data were missing.

Results: There were 107 OAA-approved surveys. The year of survey could not be ascertained for five surveys; the remaining 102 were analysed for changes over time (Figure). One survey in 2009 and all 13 in 2010 used the e-survey system; the rest were postal apart from four ad-hoc email/web-based surveys (2003-08). Response rates varied with the target group: mean (SD) rate was 76 (7)% for lead obstetric anaesthetists (n=65), 60 (12)% for consultants (n=17) and 52 (18)% for all OAA members (n=7; P=0.0001 by one-way ANOVA). The highest response rate was for heads of midwifery (91%; n=1) and the lowest was for trainees (44%; n=1).

Discussion: Higher response rates allow more reliable extrapolation of surveys’ findings, and an ideal rate of > 70% has been suggested.2 The response rate to OAA-approved surveys has drifted down over the years, but remains above 60% despite an increase in the number of surveys performed. It is too early to tell what effect the relatively new e-survey system will have.

References

P80 Outcomes of OAA approved/non-approved surveys

JP Campbell, EJ Robson, SM Yentis
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Introduction: Since 1998, proposed surveys on current topics in obstetric anaesthesia may be submitted to the OAA Audit Subcommittee for approval.1 It is expected that approved surveys are presented at national level or published on completion. Recently, the value of surveys in obstetric anaesthesia has been questioned.2 We reviewed both OAA approved and non-approved surveys in obstetric anaesthesia carried out between 1998 and 2010 to determine whether they were subsequently presented, published and cited.

Methods: We identified all surveys approved by the OAA Audit Subcommittee from the OAA website, and determined whether they were presented at an OAA or other national meeting (as an oral presentation or poster). We also determined which surveys were subsequently published as an abstract and/or full paper or correspondence, and the number of times each publication had been cited (using Web of Science). We then compared these with UK national obstetric anaesthesia surveys carried out over the same period that had not been approved by the OAA, identified via a PubMed search of seven anaesthesia journals and a hand search of OAA abstracts. Data were compared with Fisher’s exact test or Mann-Whitney rank-sum test, P < 0.05 indicating statistical significance.

Results: There were no significant differences between OAA approved and non-approved surveys (Table).

Table: Outcomes of OAA approved/non-approved surveys.

<table>
<thead>
<tr>
<th>OAA (n = 107)</th>
<th>Non-OAA (n = 9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presented:</td>
<td>OAA 77 (72%)</td>
</tr>
<tr>
<td></td>
<td>Other 5 (5%)</td>
</tr>
<tr>
<td>Published:</td>
<td>Abstract 71 (66%)</td>
</tr>
<tr>
<td></td>
<td>Paper 29 (27%)</td>
</tr>
<tr>
<td></td>
<td>Correspondence 9 (8%)</td>
</tr>
<tr>
<td></td>
<td>None 19 (18%)</td>
</tr>
<tr>
<td>Citations:</td>
<td>Abstract 22 (0.3%)</td>
</tr>
<tr>
<td></td>
<td>Paper 199 (6.9%)</td>
</tr>
<tr>
<td></td>
<td>Correspondence 1 (0.1%)</td>
</tr>
</tbody>
</table>

Data are number (proportion). For citations, data are total number (number per publication)

Discussion: Most (92%) UK national surveys in obstetric anaesthesia conducted between 1998 and 2010 were OAA-approved; 88 (82%) of these were published in some form. The small number of non-OAA surveys means our study has low power to detect differences, though there is a suggestion that publication (as a paper) and citation rates may be lower than for OAA-approved surveys. We conclude that the OAA approval system is of value to obstetric anaesthetists.

References