Introduction: Women who become critically unwell during pregnancy present specific challenges for haemodynamic monitoring. Invasive devices are undesirable, as such women are usually breathing spontaneously, not sedated and may be labouring or coagulopathic. The ultrasound cardiac output monitor (USCOM 1A, USCOM Ltd, Sydney, NSW, Australia) is entirely non-invasive, measuring cardiac output via a Doppler probe placed on the suprasternal notch. Previous studies of this device in pregnancy include small numbers measuring changes in cardiac output, but none have assessed its accuracy in this patient population. Maternal haemodynamic changes such as increased aortic blood flow, displacement of the heart and increased left ventricular outflow tract diameter have potential to affect measurement. The aim was therefore to measure agreement between the USCOM and a reference method, in pregnant women.

Methods: Ethical approval was obtained and written informed consent was given by all participants. Ninety-two healthy women with a singleton pregnancy of 25 weeks of gestation onwards were recruited from antenatal clinics. In the left lateral position at rest, cardiac output was measured with the USCOM and a reference method, in pregnant women. The aim was therefore to measure agreement between the USCOM and a reference method, in pregnant women.

Results: USCOM readings were obtained in all 92, and 3D-TTE images in 85 participants. Mean cardiac output was 5.7, 7.7 and 6.2 L min\(^{-1}\), measured by 3D-TTE, USCOM FT and USCOM TP respectively. Bland-Altman analysis of agreement between 3D-TTE and USCOM for measurement of CO is shown in the table below.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Healthy</th>
<th>HIV+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean arterial pressure (mmHg)</td>
<td>84 ± 15.2</td>
<td>82 ± 13.1</td>
</tr>
<tr>
<td>SVR (dyne.s/cm(^5))</td>
<td>1237 ± 321</td>
<td>1323 ± 344</td>
</tr>
<tr>
<td>Cardiac index (L/min/m(^2))</td>
<td>3.1 ± 0.70</td>
<td>2.8 ± 0.64*</td>
</tr>
<tr>
<td>LV mass (g)</td>
<td>170 ± 40.4</td>
<td>140 ± 38.8*</td>
</tr>
<tr>
<td>Fractional shortening (%)</td>
<td>40 ± 8.8</td>
<td>42 ± 6.3</td>
</tr>
<tr>
<td>LV end diastolic area (cm(^2))</td>
<td>15.1 ± 2.7</td>
<td>17.2 ± 3.1*</td>
</tr>
<tr>
<td>Heart rate (BPM)</td>
<td>88 ± 13.1</td>
<td>83 ± 15.7</td>
</tr>
<tr>
<td>Septal IV relaxation (ms)</td>
<td>64 ± 17.3</td>
<td>63 ± 12.9</td>
</tr>
<tr>
<td>Septal s’ velocity (cm/s)</td>
<td>9.3 ± 1.7</td>
<td>8.5 ± 1.5*</td>
</tr>
<tr>
<td>Septal e’ velocity (cm/s)</td>
<td>12.4 ± 2.5</td>
<td>11.5 ± 2.4</td>
</tr>
<tr>
<td>Mitral valve E’/A</td>
<td>1.6 ± 0.50</td>
<td>1.7 ± 0.65</td>
</tr>
<tr>
<td>Mitral valve E/septal e’</td>
<td>7.7 ± 2.13</td>
<td>7.7 ± 2.0</td>
</tr>
<tr>
<td>RV IV relaxation (ms)</td>
<td>37.5 ± 12.8</td>
<td>44.1 ± 10.4*</td>
</tr>
<tr>
<td>RV s’ velocity (cm/s)</td>
<td>17.0 ± 2.9</td>
<td>14.7 ± 3.1*</td>
</tr>
<tr>
<td>RV e’ velocity (cm/s)</td>
<td>18.7 ± 3.4</td>
<td>16.3 ± 4.1*</td>
</tr>
<tr>
<td>Pericardial effusion</td>
<td>21 (53)</td>
<td>25 (83)*</td>
</tr>
<tr>
<td>Size of effusion (cm)</td>
<td>0.3 ± 0.28</td>
<td>0.5 ± 0.20*</td>
</tr>
</tbody>
</table>

Mean percentage difference for measurement of stroke volume was 27% (FT) and 27.5% (TP). Intra-class correlation for repeated USCOM measurements was 0.9 (FT) and 0.86 (TP).

Discussion: The USCOM has acceptable agreement with 3D-TTE for measurement of cardiac output in pregnancy. The large positive bias, particularly in FT mode, may be due to the hyperdynamic cardiovascular state of pregnancy. The clinician should be aware of this when using the device, and we recommend the use of TP mode in this patient population.

References
O3 Choice of drugs for neuraxial labour analgesia: An OAA approved survey of current practice

V Nalawade, U Misra
Anaesthetics, Sunderland Royal hospital, Sunderland, UK

Introduction: Bupivacaine has been used to provide labour analgesia for many years. It is, however, extremely cardiotoxic if accidental overdose were to occur. This led to the search for newer agents and ropivacaine was introduced followed by L-bupivacaine. Although less potent, in high doses ropivacaine and L-bupivacaine are less cardiotoxic than bupivacaine. Some serious adverse incidents involving accidental intravenous bolus administration of dilute bupivacaine solution led to the release of the NPSA-21 safety alert in the UK.1 It recommended the use of licensed premixed bags of local anaesthetic (LA) and adjuvants for use on labour wards. The aim of our survey was to investigate whether there is uniformity in the choice of LA and adjuvants used for maintenance of labour analgesia in the U.K. and whether most units have changed to using licensed bags of premixed LA and opioid.

Methods: An OAA approved on-line survey no.140 was distributed to lead obstetric anaesthetists in the UK. Results: Questionnaires were sent to 197 units and the response rate was 80.2%

57% of units use low-dose bupivacaine for labour analgesia: 0.1% is the commonest concentration in which bupivacaine (83.6%) and L-bupivacaine (85.0%) are used. Fentanyl is the most frequently used additive (98.1%) and the favourable concentration used is 2 µg/mL (94.8%). Labour epidural analgesia is maintained using patient-controlled epidural analgesia (PCEA) by 29.8% (46/154) units while PCEA plus background infusion, continuous infusion and intermittent top-ups are used by 20.1% (31/154), 26.6% (41/154) and 21.4% (33/154) units, respectively. Only one unit reported using a computer integrated PCEA. 64.5% (102/158) of units use licensed premixed bags from a manufacturer while 10.1% (16/158) were prepared by hospital pharmacy. Some units use syringes rather than bags which are prepared in a pharmacy (17.7%) or on labour ward (1.9%).

Discussion: Despite concerns regarding its toxicity, bupivacaine is still the favoured local anaesthetic in the UK. In spite of the NPSA safety alert LA syringes with additives are still prepared on the labour ward. It may be useful to have revised recommendations for providing safe maintenance of labour epidural analgesia.

Reference

O4 Haemodynamics using transthoracic echocardiography in women with untreated preeclampsia in South Africa

AT Dennis, RA Dyer*, M Gibbs*, L Nel*, JM Castro†, JL Swanevelder*
Anaesthesia, The Royal Womens Hospital, Melbourne, Australia, *Anaesthesia, Groote Schuur Hospital & University of Cape Town, Cape Town, South Africa, †Cardiology, St Vincent's Hospital, Melbourne, Australia

Introduction: Preeclampsia (PE) is a life-threatening hypertensive disease of pregnancy. From an aetiological and clinical perspective it is important to understand haemodynamics and quantify cardiac output (CO) in women with untreated (UT) disease. Continuing previous work in Australia, the aim of this study was to quantify haemodynamics in women with UTPE in South Africa (SA) using transthoracic echocardiography (TTE), as these women may represent a different phenotype and disease severity.

Methods: After ethics approval 15 HIV negative women with UTPE were recruited and compared with 40 healthy term pregnant (HP) women†. All underwent standardised TTE examination.

Results: Fourteen women (93%) had severe PE. Women were similar in body mass index, parity and age.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Healthy</th>
<th>Untreated PE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestation (weeks)</td>
<td>40 ± 1.8</td>
<td>36 ± 5.6*</td>
</tr>
<tr>
<td>Haemoglobin (g/dL)</td>
<td>10.7 ± 1.42</td>
<td>10.3 ± 1.9</td>
</tr>
<tr>
<td>Mean arterial pressure (mmHg)</td>
<td>84 ± 15.2</td>
<td>120 ± 11.9*</td>
</tr>
<tr>
<td>Cardiac index (L/min/m²)</td>
<td>3.1 ± 0.70</td>
<td>3.6 ± 0.94</td>
</tr>
<tr>
<td>SVR (dyne.s/cm⁵)</td>
<td>1237 ± 321</td>
<td>1592 ± 531*</td>
</tr>
<tr>
<td>Cardiac output (L/min)</td>
<td>5.7 ± 1.3</td>
<td>6.6 ± 2.1</td>
</tr>
<tr>
<td>SV (mL)</td>
<td>66 ± 14</td>
<td>79 ± 15.8*</td>
</tr>
<tr>
<td>CWI (mmHg.L/m²)</td>
<td>266 ± 77.7</td>
<td>425 ± 109.7*</td>
</tr>
<tr>
<td>LV ED diameter (cm)</td>
<td>4.6 ± 0.44</td>
<td>4.5 ± 0.49</td>
</tr>
<tr>
<td>LV mass (g)</td>
<td>170 ± 40.4</td>
<td>216 ± 32.2*</td>
</tr>
<tr>
<td>Fractional shortening (%)</td>
<td>40 ± 8.8</td>
<td>40 ± 7.1</td>
</tr>
<tr>
<td>Heart rate (beats/min)</td>
<td>88 ± 13.1</td>
<td>83 ± 14.2</td>
</tr>
<tr>
<td>Septal s’ velocity (cm/s)</td>
<td>9.3 ± 1.7</td>
<td>8.4 ± 1.6</td>
</tr>
<tr>
<td>Biventricular septal s’ wave</td>
<td>6 (15)</td>
<td>7 (47)*</td>
</tr>
<tr>
<td>Mitral valve E/Septal e’</td>
<td>7.7 ± 2.13</td>
<td>10.5 ± 3.3*</td>
</tr>
<tr>
<td>TAPSE</td>
<td>2.6 ± 0.39</td>
<td>2.6 ± 0.36</td>
</tr>
<tr>
<td>Pericardial effusion</td>
<td>21 (53)</td>
<td>10 (67)</td>
</tr>
<tr>
<td>Size of effusion (cm)</td>
<td>0.3 ± 0.28</td>
<td>0.5 ± 0.24*</td>
</tr>
<tr>
<td>Longitudinal Strain (%)</td>
<td>-</td>
<td>-18.1 ± 3.7</td>
</tr>
</tbody>
</table>

Data are mean ± SD, number (%), SVR=systemic vascular resistance, SV=stroke volume, CWI=cardiac work index, LV=left ventricle, ED=end-diastolic, HR=heart rate, TAPSE=tricuspid annular plane systolic excursion *P<0.05 compared using unpaired two-tailed t-tests with Welsh’s correction. †These SA women were also a control group for a study investigating haemodynamics in HIV positive women.

Discussion: Anaemia was common. Compared with term HP women, women with UTPE had increased SVR and SV and preserved systolic function with no change in HR or LVED diameter. Women with UTPE had reduced diastolic function, abnormal interventricular septum movement, increased LV mass and larger pericardial effusions than HP women. There is variability in haemodynamics between women; however TTE can assess cardiac function in individual women with PE.

Reference
05 Measurement of epidural insertion pressures in labouring women of varying body mass indices

MYK Wee, R Isaacs, B Parker, N Vaughan*, V Dubey*
Dept. of Anaesthesia, Poole Hospital NHS Foundation Trust, Poole, UK, *School of Design, Engineering and Computing, Bournemouth University, Bournemouth, UK

Introduction: To create high-fidelity epidural simulators it is important to incorporate in vivo epidural pressure measurements. This study presents the results of insertion pressures as a Tuohy needle (Smiths Medical) utilising a 3-way tap, pressure transducer (Kimal) and a custom designed wireless transmitter and receiver allowing remote recording of pressures. Following informed consent, epidural pressures were measured in four groups of labouring women (5/group) with BMIs between <25 to >45 (see Table 1). Ultrasound images of the lumbar region were done before the procedure and MRI were taken within 72 h of delivery.

Methods: Ethics approval was granted. A porcine saddle cut was obtained within 24 h of slaughter. Epidural pressure measurements were made using a 16-G Tuohy needle (Smiths Medical) utilising a 3-way tap, pressure transducer (Kimal) and a custom designed wireless transmitter and receiver allowing remote recording of pressures. Following informed consent, epidural pressures were measured in four groups of labouring women (5/group) with BMIs between <25 to >45 (see Table 1). Ultrasound images of the lumbar region were done before the procedure and MRI images were taken within 72 h of delivery.

Results: The maximum porcine epidural pressure ranged from 470-500 mmHg equivalent to a peak force of 11.1-11.8 N. The maximum maternal epidural pressure ranged from 450-530 mmHg equivalent to a peak force of 10.6-12.3 N. Mean epidural pressures decrease with increasing BMI (Table). Epidural pressure recordings by different operators demonstrate individual characteristic properties.

Table: Measured epidural pressures in labouring women

<table>
<thead>
<tr>
<th>BMI (kg/m²)</th>
<th>Highest mean pressure (mmHg)</th>
<th>Lowest mean pressure (mmHg)</th>
<th>Mean (mmHg)</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.5-24.9</td>
<td>530</td>
<td>363</td>
<td>461</td>
<td>46.94</td>
</tr>
<tr>
<td>25-34.9</td>
<td>520</td>
<td>320</td>
<td>430</td>
<td>79.68</td>
</tr>
<tr>
<td>35-44.9</td>
<td>510</td>
<td>285</td>
<td>415</td>
<td>101.19</td>
</tr>
<tr>
<td>&gt;45</td>
<td>450</td>
<td>280</td>
<td>376</td>
<td>71.33</td>
</tr>
</tbody>
</table>

Discussion: The clinical trial in labouring women of various BMI demonstrated that the mean epidural pressures decrease with increasing BMI. The reason for this is being investigated. The measured pressures with ultrasound and MRI lumbar images will be incorporated into a novel epidural simulator currently under development. Individual pressure recordings can be used to refine the individual’s epidural technique improving efficacy and safety.

Acknowledgements: We are grateful to the OAA for funding.

Reference

06 Pharmacokinetics of ondansetron in non-pregnant and pregnant women

P Sultan, M Elkomy*, G Peltz*, C Clavijo*, M Wu*, JL Galinkin*, D Drover*, B Carvalho*
Anaesthesiology, Royal Free Hospital, London, UK, *Anesthesiology, Stanford University School of Medicine, California, USA

Introduction: Ondansetron is a potent and selective 5-hydroxytryptamine receptor antagonist that is widely used to treat nausea and vomiting in women undergoing caesarean surgery. Ondansetron may also be effective in preventing maternal or neonatal narcotic drug withdrawal symptoms. However, there is no information about ondansetron pharmacokinetics in pregnant women or neonates. The aim of this study was to characterise ondansetron pharmacokinetics in non-pregnant, pregnant women and neonates, and determine the drug’s trans-placental passage.

Methods: Healthy women undergoing elective caesarean delivery at Stanford University, California were randomly assigned to receive 4 or 8 mg intravenous ondansetron for this prospective, open-label, Institutional Review Board-approved study. A population pharmacokinetic approach was used to analyse the measured ondansetron concentrations in 372 blood samples obtained from 20 non-pregnant and 40 pregnant women after treatment with either 4 or 8 mg of ondansetron. Maternal blood samples were taken again 7, 15, and 40 min, and 8 h after the drug was administered. Ondansteron levels were also measured from venous umbilical cord blood at delivery, and from neonates 30 min to 24 h after birth.

Results: The analysis demonstrated that: ondansetron disposition is not affected by pregnancy; the ondansetron dose was the most important covariate affecting its pharmacokinetics; ondansetron readily crossed the placenta; and ondansetron displayed a significantly longer half-life in neonates. The mean population parameter estimates were central distribution volume of 28 L; clearances of 22 L/h and 15 L/h for the 4- and 8-mg doses respectively; steady-state volumes of 167 L and 124 L for the 4- and 8-mg doses respectively; and inter-compartmental clearance of 329 L/h.

Discussion: Ondansetron exhibits pregnancy-independent kinetics suggesting that the ondansetron dose does not need to be altered during pregnancy. The study also shows that ondansetron readily crosses the placenta, however drug elimination in the neonate during the first day of life is delayed compared to their mother. These findings will help facilitate accurate maternal, trans-placental and neonatal dosing of ondansetron.

References
O7 Randomized evaluative study of phenylephrine or norepinephrine for maintenance of blood pressure during spinal anesthesia for caesarean delivery: The RESPOND study
WD Ngan Kee, SWY Lee, FF Ng, PE Tan, KS Khaw
Department of Anaesthesia & Intensive Care, The Chinese University of Hong Kong, Shatin, Hong Kong

Introduction: When phenylephrine (PHE), a pure alpha-agonist, is used to maintain blood pressure (BP) during spinal anesthesia (SA) for caesarean delivery (CD), heart rate (HR) often decreases, which may also decrease cardiac output (CO). Norepinephrine (NOR) is a potent vasoconstrictor but also a weak beta-agonist. In this double-blind study we hypothesized that NOR would be effective for maintaining BP with less tendency to decrease HR and CO vs PHE.

Methods: With ethics approval and written consent, we randomized 104 healthy women having elective CD under SA to have BP maintained using PHE 100 µg/mL or NOR 5 µg/mL, relative doses based on previous animal studies. Vasopressors were infused by computer control to maintain systolic BP near baseline, with crystalloid colloid BP and HR were measured Q1min and CO was measured by suprasternal Doppler Q5min. We compared area under the curve for serial haemodynamic values normalized to % of baseline vs. time for 15 min, BP control with performance error calculations, Apgar scores, and cord blood gases and O2 content.

Results: 101 patients completed the study. The incidences of hypotension, hypertension and nausea/vomiting were low and similar between groups. Serial haemodynamics analysis showed that for NOR, HR and CO were greater over time but SBP and SVR were lower (Table). BP control analysis showed higher bias for PHE (2.3±3.5%) vs NOR (0.7±3.1%, P=0.01) but no other differences. Mean vasopressor infusion rate was greater in the NOR group (0.48±0.13 ml/min) vs. the PHE group (0.41±0.12ml/min, P=0.007). Umbilical venous pH and O2 content were higher in the NOR group (P<0.05).

Table: Analysis of area under the curve for serial haemodynamic changes (units are value*time).

<table>
<thead>
<tr>
<th></th>
<th>PHE</th>
<th>NOR</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic blood pressure</td>
<td>1532±67</td>
<td>1494±67</td>
<td>0.005</td>
</tr>
<tr>
<td>Heart rate</td>
<td>1343±130</td>
<td>1443±185</td>
<td>0.002</td>
</tr>
<tr>
<td>Cardiac output</td>
<td>1497±176</td>
<td>1639±189</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Stroke volume</td>
<td>1638±188</td>
<td>1648±156</td>
<td>0.8</td>
</tr>
<tr>
<td>Systemic vascular resistance</td>
<td>1552±244</td>
<td>1374±158</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Discussion: NOR was associated with greater HR and CO; the greater umbilical venous pH and O2 content with NOR could be explained by greater uteroplacental blood flow. Because of its intrinsic beta-agonist activity, NOR may be a better obstetric vasopressor than PHE. However, our results may also be partly explained by use of a less potent dose in the NOR group. NOR has potential to be an ideal vasopressor for maintaining BP during SA for CD. Further work is suggested to confirm our findings and to compare NOR with PHE at different potency ratios.

Reference

O8 Evaluation of non-Luer epidural equipment
AG Ling, R Vedantham, P Sharpe
Anaesthesia, University Hospitals of Leicester, Leicester, UK

Introduction: Data on non-Luer neuraxial connectors has focused mainly on spinal needles.1,2 We evaluated opinions on four Surety compliant epidural systems (Sarstedt, Pajunk, Vygon and BBraun) in comparison with our current Portex (Luer) equipment using a high-fidelity epidural training mannequin.

Methods: Ethical approval was deemed unnecessary for this project. Twenty post-fellowship anaesthetists were asked to assess and compare five epidural kits in a random order on a training mannequin. They evaluated on a 10-point scale: the needle, feel of loss of resistance, connection stability of the syringe, ease of feeding the catheter, assembly of the adaptor and filter, stability of the connection between catheter and adaptor, feel of aspiration/flushing, overall satisfaction and whether they would be prepared to use the equipment on a patient. Data were analysed using independent samples Kruskal-Wallis tests.

Results: The Portex (Luer) package scored better in most assessment criteria. Of the four Surety compliant systems there was no difference between needles. During loss of resistance testing, all four Surety compliant systems scored similarly but below the Portex system. Catheters by Sarstedt and Pajunk scored significantly worse than other systems. No single non-Luer package was recommended for patient evaluation or being as good as our original, Portex (Fig. 1).

Discussion: Of the current non-Luer kits available, no single brand had an ideal kit that rivalled the Portex (Luer) equipment. Most concerns were around catheters and connectors. The Sarstedt catheter was too flexible and the markings difficult to read and the Pajunk reinforced catheter was too soft to thread having to be replaced multiple times during testing due to kinking or other damage. There were also concerns with some of the adaptor to filter combinations, many anaesthetists feeling that the design may lead to easy disconnection of the catheters from the adaptor and filter. The components in these new epidural kits are constantly evolving. Our assessment suggests that at present no single non-Luer product is as good as the original system it is aimed to replace.

References
O9 Epidural asepsis: a pilot study on potential contamination using two techniques when drawing up normal saline
YMK Wei, M Onofrei, B Parker, M Stewart, S Hill
Dept. of Anaesthesia, Poole Hospital NHS Foundation Trust, Poole, UK

Introduction: Infection complications associated with central neuraxial blockade (CNB) have potentially devastating consequences including meningitis, paralysis and even death. The reported incidence of epidural abscess after CNB varies from 1:1000 to 1:1 000 000. A UK national survey of aseptic technique in obstetric CNB in 2009 showed 99% use of gown, gloves and sterile drape, 87% use of a surgical cap and 91% use of a face mask. However, there is no consensus in the most aseptic technique used for drawing up saline to be used for the epidural procedure. The aim of this study was to ascertain if there is a difference in drawing up saline with a sterile needle directly from the ampoule or saline from a sterile tray after being expressed by an assistant.

Methods: Ethics approval was sought but not required. Women in labour consented to the study in their labour rooms. An initial laboratory study indicated that 0/5 and 3/5 grew commensals from epidural saline samples taken via the needle technique (NT) and tray technique (TT), respectively. This informed a sample size calculation where we assumed contamination of 5% using NT and 50% using the TT. To detect this difference at the 5% significance level with 90% power required 23 samples per group (46 in total). The technique used was randomised using computer generated randomisation. The anaesthetist used the standard aseptic technique used was randomised using computer generated randomisation. The anaesthetist used the standard aseptic technique (surgical hat, mask, gown and sterile gloves) after randomisation. The anaesthetist used the standard aseptic technique used for drawing up saline to be used for the epidural procedure. The aim of this study was to ascertain if there is a difference in drawing up saline with a sterile needle directly from the ampoule or saline from a sterile tray after being expressed by an assistant.

Results: One culture from the NT and 4 cultures from the TT arm grew staphylococci, streptococci and other commensals. Using a 2-sided Fisher’s exact test \( P = 0.35 \) which was not significant.

Discussion: Although the results were not statistically significant, there is a tendency for more contamination using the expression of saline into the epidural tray. The clinical implications of this are unknown. The non-significant result could be due to our error in overestimating the potential contamination using the tray technique. A larger sample size is planned based on the results of this pilot study.

References

O10 Feasibility testing of a model for assessing flow characteristics of epidural boluses
T Hussein, I Nikiforos*, R Fernando, T Girard†
Anaesthesia, University College London Hospitals, London, UK. *Medical Physics, University College London Hospitals, London, UK. †Anaesthesiology; University Hospital of Basel, Basel, Switzerland

Introduction: Compared to continuous infusion, the use of intermittent techniques, such as patient-controlled epidural analgesia, are associated with less aseptic interventions and motor block. Studies of in vitro epidural bolus flow have shown that intermittent boluses result in greater bolus distribution, compared to continuous infusions, suggesting a greater pressure was generated within the catheter. In multi-orifice epidural catheters, lower pressures have been shown to result in preferential flow through more proximal orifices. We aimed to produce a bench top model in order to assess flow distribution characteristics of epidural boluses generated at various flow rates by commonly used epidural pumps.

Methods: Local research & ethics committee approval was waived. Funding to manufacture the model was received from Smiths Medical (St Paul, USA). A clear perspex container of know dimensions, was superimposed with a standardised 10 cm x 10 cm grid. Epidural catheters (19G & 20G) were introduced into the container, with the distal portion of the catheter submerged in a standardised gelatin-saline solution. Boluses of 5 mL of ink-stained saline were delivered at high (500 mL/h), medium (250 mL/h) and low (180mL/h) flow rates by epidural pumps, and by manual bolus. The flow patterns of boluses were recorded, and the area of spread was calculated using image analyser software (Digimiser®, Mariakerke, Belgium).

Results: Bolus distribution areas (frontal and transverse) are shown for three flow rates below. Although there was no significant difference in area of distribution between the flow rates, flow was noted to be more uniformly through all catheter orifices at higher flow rates.

Table: Epidural bolus distribution for three epidural flow rates

<table>
<thead>
<tr>
<th>Area (cm²)</th>
<th>500 mL/hr</th>
<th>250 mL/hr</th>
<th>180 mL/hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frontal</td>
<td>2.43 [0.85]</td>
<td>2.41 [0.7]</td>
<td>2.39 [0.83]</td>
</tr>
<tr>
<td>Transverse</td>
<td>17.73 [5.17]</td>
<td>16.58 [5.27]</td>
<td>17.83 [5.97]</td>
</tr>
</tbody>
</table>

Data are mean ± SD.

Discussion: Our novel bench top model to assess epidural bolus epidural flow distribution has allowed us to quantify the affect of bolus flow rate on bolus distribution. Surprisingly, at the rates that currently available epidural pumps deliver boluses, there is no difference in the area of distribution. Further work will validate the model in the use of manually delivered boluses, so that the optimal flow rate for epidural bolus delivery can be found.

References
O11 Identification of the midline in late pregnancy: normal vs raised body mass index

M Butcher, R George, J Ip, J Campbell, SM Yentis
Obstetric Anaesthesia, Chelsea & Westminster hospital, London, UK

Introduction: Identifying the midline in parturients, especially obese ones, during central neuraxial blockade can be difficult, even using ultrasound.¹ We previously found that non-obese parturients can accurately identify their midline when asked to place a finger along Tuffer’s line, though their pinprick discrimination was less precise.² The aim of this study was to repeat our investigation in obese parturients in late pregnancy.

Methods: After research ethics committee approval and written consent, we asked 25 mothers of ≥36 weeks of gestation and body mass index ≥30 kg/m² to point to the middle of their back along Tuffer’s line using the index finger of their dominant hand. This point was marked. The true midline at the L3-4 interspace was located using ultrasound and also marked. The distance between these points was measured. A 20-cm horizontal line was drawn level with the L3-4 interspace, centred on the true midline, and pinpricks delivered at 0.5-cm intervals along this line using a Neuropen® (Owen Mumford Ltd, Oxford, UK) with neurological examination pin attached, starting first from the left and then the right. The woman was asked to describe whether each pinprick was felt in the middle, left or right of her back. The distance between those pinpricks described as being in the midline and the true midline was measured, starting from both the left and the right, and averaged to give a final ‘discrimination range’. Data were analysed with the Mann-Whitney U-test or unpaired t-test, P <0.05 indicating statistical significance.

Results: Obese women were less able to discriminate the midline and deviations from it than non-obese parturients (Table). However, if a participant stated that the stimulus was to the left or the right, she was correct 99% of the time in both groups.

Table: Comparison of non-obese (data from Ip et al.) and obese parturients in late pregnancy.

<table>
<thead>
<tr>
<th></th>
<th>Non-Obese</th>
<th>Obese</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI (kg/m²)</td>
<td>22.0 (1.8)</td>
<td>39.6 (7.7)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Gestation (weeks)</td>
<td>38.4 (1.0)</td>
<td>37.6 (1.4)</td>
<td>0.04</td>
</tr>
<tr>
<td>F-M dist (mm)</td>
<td>2 (0-5 [0-12])</td>
<td>5 (5-10 [0-10])</td>
<td>0.007</td>
</tr>
<tr>
<td>DR (mm)</td>
<td>18 (13-25 [8-40])</td>
<td>33 (25-45 [3-85])</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Data are median (IQR [range]). F-M dist: finger-midline distance; DR: discrimination range.

Discussion: We found that whilst obese and non-obese parturients were similarly accurate at identifying left/right, obese women were less accurate at identifying and discriminating their midline than non-obese women. This may add to the difficulty in situating a neuraxial block in obese women, in whom palpation of bony landmarks may already be more difficult and the depth of insertion greater.

References

O12 The severity of preeclampsia score: an e-Delphi study

W Pollock, M Flood, AT Dennis*, S Lapinsky†, K Konig, N Harley ‡, S McDonald
Midwifery, Anaesthesia, Obstetrics & Intensive Care, La Trobe University & Mercy Hospital for Women, Heidelberg, Australia, *Royal Women’s Hospital, Parkville, Australia, †University of Toronto & Mt Sinai Hospital, Toronto, Canada, §Royal Melbourne Hospital, Parkville, Australia

Introduction: Preeclampsia is a life-threatening hypertensive multi-system disorder of pregnancy with no agreed definition of severity. It is a major reason for admission to an intensive care (IC) unit yet severity of illness scores have not been adapted for this condition. Basing our work on the established Acute Physiology And Chronic Health Evaluation version II (APACHE II) framework widely used in IC medicine, we aim to develop a severity of preeclampsia score applicable to all women presenting with preeclampsia to aid immediate clinical recognition of severity, management, staffing and resource allocation, and numerical classification for research purposes.

As the first step we obtained international expert consensus on key variables to include in the adapted framework.

Methods: Following ethics approval, a 3-round on-line electronic Delphi (e-Delphi) study was conducted sampling international multi-disciplinary professionals with expertise in preeclampsia. Participants ranked variables as to usefulness in describing severity of preeclampsia, using a 7-point Likert scale, and added any new variables. New suggestions and variables with disagreement were considered in Round 2. All variables with median ≥4 score were retained for Round 3.

Results: Round 1 comprised 113 survey invitations with 54 (48%) responses. 48 considered themselves expert in preeclampsia and were included in Rounds 2 and 3. They were from 9 countries, with 54% from Australia. Most were obstetricians and/or maternal-fetal specialists (59%), whilst 10% were anaesthetists. 94% acknowledged the score’s research utility and 81% agreed there was clinical utility. Usefulness was defined as variables with median score ≥6 and least useful defined as variables with median score ≤3.

Table: Median (IQR)

<table>
<thead>
<tr>
<th>Useful variables</th>
<th>Median (IQR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulmonary oedema</td>
<td>7.0 (6.0-7.0)</td>
</tr>
<tr>
<td>Neurological symptoms</td>
<td>6.5 (6.0-7.0)</td>
</tr>
<tr>
<td>Haemolysis or red blood cell fragmentation</td>
<td>6.0 (5.0-7.0)</td>
</tr>
<tr>
<td>Platelet count</td>
<td>6.0 (5.0-7.0)</td>
</tr>
<tr>
<td>Placental abruption</td>
<td>6.0 (5.0-6.8)</td>
</tr>
<tr>
<td>Least useful variables</td>
<td></td>
</tr>
<tr>
<td>Maternal uterine artery (UA) Doppler</td>
<td>3.0 (2.0-5.0)</td>
</tr>
<tr>
<td>Serum bilirubin</td>
<td>3.0 (2.0-4.0)</td>
</tr>
<tr>
<td>sFLT-1/PIGF ratio</td>
<td>3.0 (2.0-4.0)</td>
</tr>
<tr>
<td>Plasma fibrinectin</td>
<td>2.0 (1.0-3.0)</td>
</tr>
<tr>
<td>Serum alpha-fetoprotein</td>
<td>2.0 (1.0-3.0)</td>
</tr>
</tbody>
</table>

Discussion: Clinical signs and haematological variables were most useful with maternal UA Doppler and biomarkers least useful. Addition of useful descriptors to an adapted APACHE II framework, including vital signs of systolic and diastolic blood pressure, temperature, respiratory and heart rate, may aid in the creation of a severity of preeclampsia score.

Reference
P1 Transthoracic echocardiography in patients with preecclampsia and pulmonary oedema

AT Dennis, RA Dyer*, M Gibbs*, L Nel*, JM Castro†, JL Swanevelder*
Anaesthesia, Royal Women’s Hospital, Melbourne, Australia,
*Anaesthesia, Groote Schuur Hospital & University of Cape Town, Cape Town, South Africa, †Cardiology, St Vincent’s Hospital, Melbourne, Australia

Introduction: Pulmonary oedema (PO) is a life-threatening complication of pre eclampsia (PE). In hypertensive PO assumptions are often made regarding cardiac function (CF) without appropriate investigations such as transthoracic echocardiography (TTE). TTE is recommended in PO but rarely used in the obstetric setting. We present three cases in which TTE performed at the time of confirmed diagnosis, assessed CF and assisted with management.

Case reports: TTE employed the Rapid Obstetric Screening Echocardiography (ROSE) scan method, focusing on parasternal and apical views, using M-mode, pulse wave and Tissue Doppler Imaging. At the time of PO Case 1 was hypertensive, 38.4 weeks pregnant receiving magnesium sulphate. Case 2 was hypertensive nine days after CS with a wound infection and acute 19% weight gain. Case 3 was hypertensive two days after CS for acute rise in blood pressure (BP) 175/105 mmHg with abruption, postpartum haemorrhage (PPH) and transfusion. No patient had mitral stenosis.

<table>
<thead>
<tr>
<th>Case</th>
<th>Age (years)</th>
<th>Booking weight (kg)</th>
<th>Booking Systolic BP (mmHg)</th>
<th>Booking Diastolic BP (mmHg)</th>
<th>Haemoglobin (g/dL)</th>
<th>Systolic BP (mmHg)</th>
<th>Diastolic BP (mmHg)</th>
<th>Fractional shortening (%)</th>
<th>Ejection fraction (EF) (%)</th>
<th>LV end diastolic diameter (cm)</th>
<th>Heart rate (beats/min)</th>
<th>Mitral valve E/ septal e’</th>
<th>Treatment after TTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>23</td>
<td>60</td>
<td>120</td>
<td>90</td>
<td>7.1</td>
<td>190</td>
<td>190</td>
<td>19</td>
<td>15</td>
<td>4.7</td>
<td>126</td>
<td>9.7</td>
<td>Hydralazine</td>
</tr>
<tr>
<td>2</td>
<td>30</td>
<td>54</td>
<td>90</td>
<td>68</td>
<td>8.9</td>
<td>150</td>
<td>100</td>
<td>25</td>
<td>45</td>
<td>5.3</td>
<td>70</td>
<td>8.7</td>
<td>Frusemide</td>
</tr>
<tr>
<td>3</td>
<td>41</td>
<td>52</td>
<td>88</td>
<td>50</td>
<td>9.3</td>
<td>150</td>
<td>100</td>
<td>28</td>
<td>45</td>
<td>5.5</td>
<td>80</td>
<td>12.2</td>
<td>Frusemide</td>
</tr>
</tbody>
</table>

Discussion: Precipitating factors and CF were different in each case. PO was either associated with a marked increase in afterload or fluid imbalance in the setting of normal responses to surgery, sepsis, or PPH. EF was preserved in Cases 2 and 3 (fluid imbalance), but reduced in Case 1 (increased afterload). In Case 1 afterload reduction rapidly improved LV function and in all cases LV function improved quickly over a short time course. None of the three women had a dilated ventricle. Elevated HR in hypertensive PO may indicate systolic dysfunction and a need to reduce blood pressure by vasodilatation. Hypertensive PO in the absence of tachycardia may indicate diastolic dysfunction and a need to reduce preload by diuresis. Redistribution of fluid from the lungs with ventilation strategies and frusemide is necessary in all cases. TTE defined mechanisms of CF in PO and guided therapy, including anaesthetic technique. Anaemia, acute weight gain, and poor fluid and BP control may be risk factors for PO.

Reference

P2 Point-of-view HD Video Assessment: Video Direct Observed Procedural Skills (VDOPS)

D Leslie, M Oliver, MR Stacey
Department of Anaesthesia, University Hospital of Wales , Cardiff, UK

Introduction: Junior doctor training in the UK has undergone significant changes, with reduced working hours. This necessitates novel assessment tools to provide more training opportunities. Workplace-based assessments, in their current form, are time consuming to arrange, and not treated uniformly by assessors. Video assessment is well established in general practice and sport, and we believe it could complement current anaesthetic training. We used high definition video sport glasses to record the anesthetists point of view whilst performing central neuraxial blockade for elective caesarean section.

Methods: The glasses have the sensor mounted above the nose piece. Modifications included rotating the sensor 90° (portrait wide-angle) and removing the lenses making them less intrusive. After patient and operator consent, tray preparation (opening pack till application of drape) and procedure attempts (application of drape till injection complete) were recorded by glasses worn by both the anaesthetist and by an observer giving two viewpoints. The videos were downloaded, synchronised and stored securely on an encrypted hard disk. A debrief and feedback session with the consultant followed after completion of the case. Video analysis using StudioCode software allowed labelling of events during procedures.

Results: 16 anaesthetists of various grades volunteered to take part, with only one trainee declining participation. The glasses reliably gave excellent views of operators hands, needle, tray and patient position. The non-intrusive recording enabled trainees to perform as they usually would. The ability to discuss performance whilst reviewing the procedure was very positively received by all operators. StudioCode allowed simple data collection such as time taken for procedure, as well as more complex data such as glitches and ergonomics.

Table: Time taken for tray preparation and procedure attempt

<table>
<thead>
<tr>
<th>Event Recorded</th>
<th>Number</th>
<th>Time taken (Min/Median/Max)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tray Preparation</td>
<td>16</td>
<td>2:19 / 3:13 / 5:25</td>
</tr>
<tr>
<td>Procedure Attempt</td>
<td>23</td>
<td>1:12 / 2:33 / 3:41</td>
</tr>
</tbody>
</table>

Discussion: The quality of an assessment tool is dictated by its reliability, validity, educational benefit, and cost. Our experience so far suggests it is relatively simple to implement, and well received by both patients and anaesthetists alike. The video produced by these glasses represents excellent value, with negligible running costs. Regular use could allow trainees to develop a portfolio of procedures; demonstrate consistent levels of performance, and therefore competence. We believe that video analysis of practical procedures using recordable video sport glasses will be a valid, reliable, non-intrusive and educationally beneficial way of improving assessment, and therefore training.

References
P3 An analysis of the workflow impact of changing scheduled elective cesarean deliveries from 37 to 39 weeks
B Carvalho, Y Cho, A Butwick, Y Blumenfeld, E Riley
Anesthesiology, Stanford University, Stanford, USA
Introduction: Delivery of infants before 39 weeks of gestation increases the risk of adverse neonatal outcomes, including increased mechanical ventilation and admission to NICU. However, scheduling cesarean delivery (CD) at ≥39 weeks (compared to ≥37 weeks) may increase unscheduled and after-hours CDs, requiring delivery before their scheduled CD. The aim of this study was to determine the impact of waiting until 39 weeks gestation on the timing of CD.
Methods: After ethical approval, we conducted a retrospective, single center study of all women who underwent CD between January 2010 and September 2013. On April 1, 2011, an institutional policy was implemented to eliminate non-medically indicated deliveries before 39 weeks gestation. The timing of CD before (01/01/2010 to 03/30/2011) and after (06/01/2011 to 09/30/2013) the policy change was determined; April and May 2011 were omitted to account for an adjustment period. Data were extracted from an institutional database. Extracted data included date and time of admission and type of delivery. Shifts were divided into daytime shifts (7am-5pm) and nighttime shifts (5pm-7am) in accordance with our institution’s current anesthesia shift times.
Results: On average 4214 deliveries per year occurred at our hospital during the study period. The overall CD rate changed slightly between the two study periods (41.5% pre vs. 39.4%; post change, \(P=0.012\)). The Figure shows the average percentage of CDs that occurred each hour before and after the policy change. There was a very slight increase in the percentage of CDs performed in the daytime shifts (55.4% pre vs. 58.7% post change, \(P=0.014\)). There was also a small increase in the CD percentage occurring during the weekend shifts (17.6% pre vs. 21.6% post change, \(P=0.002\)).

Figure: Percentage of caesarean deliveries by each hour of the day

Discussion: Our analysis suggests that scheduling CD at ≥39 weeks compared to ≥37 weeks does not impact the temporal pattern of CDs. The most significant change was an increase in CDs during weekend shifts. This change amounted to one extra CD during the weekend shift on average, which does not impact the workflow enough to warrant a change in staffing patterns.

References

P4 Chronic pain after caesarean section
CE Warnaby, NJ Beale, R Russell, O Kciuk, L Buck, A Koelewijn, J Quinlan
Nuffield Division of Anaesthesia, University of Oxford, John Radcliffe Hospital, Oxford, UK
Introduction: Chronic pain lasting >3 months after caesarean section occurs in up to 18% of women. The mechanism by which acute postoperative pain converts to chronic postsurgical pain (CPSP) is incompletely understood. Various factors including pain perception, surgical and anaesthetic technique, acute postoperative pain management and caring for the baby may affect the rate of conversion. The aim of this on-going observational study is to determine the incidence of CPSP and identify predictive factors for its development.
Methods: Following ethics committee approval and informed consent, 650 women have currently been recruited into the study investigating pain after caesarean section. Verbal and numerical pain scores at rest and movement were recorded at 6 hours and 2, 7, and 30 days and 4 and 12 months after surgery.
Results: Of the 650 women consented, 85% had elective caesarean sections. Of these, data collection rates were 84% at 6 hours, 86% at 2 days, 78% at 7 days, 66% at 30 days, 70% at 4 months and 65% at 12 months. When asked if they "suffer pain relating to their caesarean section", the incidence of pain reduced from 22.8% at 4 months to 12.8% at 12 months. Furthermore, the incidence of pain reported on movement reduced from 27.6% to 15.2% over the same time period but the incidence of pain at rest was consistent at 8%.

Figure: Incidence of persistent pain after caesarean section

Discussion: In the largest UK study to date, the rate of conversion to CPSP after caesarean section based on the patients who report “suffering from pain” is 23% at 4 months and 13% at 12 months. This incidence of CPSP after caesarean section is higher at 4 months when compared to previous retrospective studies. However, there does appear to be resolution of pain over time as only half of these patients suffer from pain at 12 months post-surgery. This incidence of CPSP is largely driven by the pain reported on movement rather than that at rest, which we found to be consistent at 8% at both time periods. It is therefore important not simply to assess pain at one time point but study its features and progression. Further assessment of predictive factors for the development of CPSP will be performed to identify those women at increased risk.

References
P5 Hypnotic agents for induction of general anaesthesia in caesarean section patients: systemic review and meta-analysis of randomized trials

K Houthoff Khemlani, J Jokinen*, P Kranke*, J U Schreiber
Anaesthesiology, Maastricht University Medical Center, Maastricht, Netherlands, *Anaesthesiology, Würzburg University Hospital, Würzburg, Germany

Introduction: The ideal induction drug for caesarean section under general anesthesia should have a quick onset inducing maternal unconsciousness rapidly with a minimum of unwanted side effects such as awareness, haemodynamic compromise and neonatal depression. Currently, thiopental is frequently used to this aim but it is not clear if there would be a best evidence choice of a dedicated hypnotic agent to use for caesarean section.

Methods: Systematic review and meta-analysis of randomized controlled trials according to PRISMA recommendations. Trials were considered for quantitative analysis if they reported at least one of the following variables: maternal or neonatal arterial and or umbilical vein blood samples (pH, pCO2, pO2), maternal systolic blood pressure (SBP) or Apgar score. Methodological quality of the included studies was assessed using the Oxford quality score.

Results: Data from 16 trials matched the criteria and were suitable for quantitative analysis (664 participants). Thiopental, ketamine or propofol were used for induction. The average score of the methodological quality was 2. Induction with propofol resulted in a significantly higher umbilical arterial pO2 and less increase in SBP post intubation (mean difference 12 mmHg) when compared to thiopental. Significantly more neonates in the propofol group had an Apgar <7 at 1 minute but not at 5 minutes after delivery. In comparison to ketamine, fewer neonates in the thiopental group suffered from an Apgar <7 at 1 and 5 minutes after delivery.

Discussion: Based on the sparse data and limited evidence with short-term outcomes only, propofol and thiopental seem to be equally suited whereas the use of ketamine as induction agent resulted in lower Apgar scores at 1 and 5 minutes post delivery. However, better data would be needed to make a firm recommendation.

References

P6 Too fast? Ketonuria as a marker of prolonged fasting in elective caesarean section

A Clark, R Agaram
Anaesthetic Department, Princess Royal Maternity Hospital, Glasgow, UK

Introduction: Fasting from midnight before elective caesarean section is a common preoperative instruction to ensure adequate gastric emptying. We hypothesised that this can lead to prolonged periods of fasting, well beyond the recommended minimum of 6 h, the result of which could result in a potentially detrimental catabolic state before surgery.

Methods: Ethics approval was waived by the chair of the local ethics committee. Over a calendar month, on arrival in theatre, parturients were asked when they last ate food and drank clear fluids. Following catheterisation, the presence of ketonuria was tested for using a urine dipstick (ketostix, Bayer). All diabetic patients were excluded.

Results: Fifty-three women, were recruited in November 2013. The mean fasting time from food was 15 h (range 10-21 h), and mean time from clear fluids 10.5 h (range 2-22 h). Twenty-seven patients (51%) had ketonuria. Of the 29 who had fasted up to 15 h, six (20%) were ketotic compared to 21 (84%) of the 25 patients who had fasted for longer than 15 h. The mean fasting time in the ketotic group was 16.4 h (range 12-21 h) compared to 13.5 h (range 10-18 h) in the non-ketotic group. The incidence of ketonuria over the course of the day is illustrated in the Figure.

Figure: Incidence of ketonuria over the duration of the operative day.

Discussion: We have demonstrated that parturients are fasting for prolonged periods before elective caesarean section. Moreover, greater than half were ketotic at the start of surgery. Enhanced recovery in obstetric surgery is now emerging and we believe these data support the need to improve preoperative fasting management to limit unnecessary catabolic stress. Potentially, this could include the introduction of a timely enhanced recovery style carbohydrate drink taken on the day of surgery.

References
P7 Evaluation of FIBTEM A5 guided fibrinogen concentrate administration in massive obstetric haemorrhage

I D Harrod, A Bhalla, C Chevannes, P Barclay, S Malliah
Anaesthesia, Liverpool Women's Hospital, Liverpool, UK

Introduction: Coagulopathy associated with major obstetric haemorrhage (MOH) can be rapidly diagnosed using ROTEM. A FIBTEM value of <12 mm at 5 min (A5) corresponds to a fibrinogen concentration of approximately 2 g/L and indicates significant defibrination. In 2011 our MOH algorithm advocated the use of shock packs, giving FFP and cryoprecipitate. These frozen products require defrosting and cross-matching time, involving a delay of approximately 60 min. Fibrinogen concentrate (Riapstap, CSL Behring) is a pasteurised, freeze-dried product available without these disadvantages and unlikely to transmit pathogens. In July 2012, we amended our algorithm to incorporate fibrinogen 3 g for patients with haemorrhage associated hypofibrinogenaemia, repeated as necessary. The primary aim of this study was to evaluate whether this change produced a reduction in the number of transfused blood products.

Methods: Data were collected for 12 months from MOH patients with FIBTEM A5<12 using the shock pack algorithm. This was compared with data collected for 12 months following the introduction of fibrinogen concentrate.

Results: The two groups were comparable for age, estimated blood loss, obstetric diagnosis and surgical management.

<table>
<thead>
<tr>
<th></th>
<th>Shock Pack</th>
<th>Fibrinogen Concentrate Group</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of blood products transfused (units)</td>
<td>8 [3-14.5]</td>
<td>3 [2-4.75]</td>
<td>0.0004</td>
</tr>
<tr>
<td>Fibrinogen mass* (g)</td>
<td>3.9 [0-9.2]</td>
<td>0 [0-3]</td>
<td>0.0003</td>
</tr>
<tr>
<td>FFP (units)</td>
<td>4.0 [0-4.5]</td>
<td>0 [0-0]</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Cryoprecipitate (units)</td>
<td>0 [0-2.0]</td>
<td>0 [0-0]</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Platelets (units)</td>
<td>0 [0-1]</td>
<td>0 [0-0]</td>
<td>0.0061</td>
</tr>
<tr>
<td>Red blood cells (units)</td>
<td>4 [2-6.25]</td>
<td>3 [2-4]</td>
<td>ns</td>
</tr>
<tr>
<td>% requiring &gt; 6 units</td>
<td>24%</td>
<td>8%</td>
<td>0.0443</td>
</tr>
<tr>
<td>% TACO</td>
<td>9%</td>
<td>0%</td>
<td>0.0367</td>
</tr>
<tr>
<td>% ICU admission</td>
<td>9%</td>
<td>2%</td>
<td>ns</td>
</tr>
</tbody>
</table>

Data are median [IQR] or %. P values are from Mann Whitney U test or Fisher's exact test. *Fibrinogen mass calculation is based on an average fibrinogen content of 2.15 g per pooled bag of cryoprecipitate and 0.95 g per unit of FFP (mid-point of 95% CI 0.554 to 1.395).3

Discussion: Our new algorithm allows the rapid correction of hypofibrinogenaemia with a significant reduction in the total number of allogenic blood products required, the total mass of fibrinogen and the number of patients receiving >6 units of red blood cells. Avoiding large volumes of FFP may have also reduced the risk of transfusion associated cardiac overload (TACO) and need for intensive care admission.

References

P8 Recovering post-operative obstetric patients: Are we meeting standards?

RA Asghar, A Quinn
Anaesthesia, Leeds General Infirmary, Leeds, UK

Introduction: In 2013 the Association of Anaesthetists of Great Britain and Ireland (AAGBI) and the Obstetric Anaesthetists’ Association (OAA) released safety guidelines for post-anaesthesia recovery,1 core competencies for recovery staff2 and obstetric anaesthetic services.3 These guidelines set recommended standards for post anaesthesia care units (PACU’s) and PACU staff which may not be met by all UK obstetric units thus exposing patients to increased risk.

Methods: We conducted an OAA approved electronic national survey which was sent to 197 UK lead obstetric anaesthetists. This survey was designed to elicit if obstetric units are currently meeting the AAGBI/ OAA recovery guidelines.

Results: 146 responses were received (74.1% response rate). 85.9% of respondents report that postoperative obstetric patients are recovered separately from non-obstetric patients and remotely from the main PACU. Approximately 80% of obstetric PACU’s are equipped with emergency drugs and an emergency alarm, 58.2% of units have difficult airway equipment immediately available and 37.7% have end-tidal carbon dioxide monitoring. 100% of units are recording non invasive blood pressure, 98.7% are consistently using pulse oximetry and >90% record temperature and respiratory rate. However, only 56.2% are monitoring the ECG and only 46.9% of hospitals are currently providing trained and registered PACU staff to recover obstetric patients. The remainder are recovered by midwives, 19% of whom were deemed appropriately trained in recovery. 36% of respondents felt that recovery staff are not appropriately trained in recognition and management of local anaesthetic toxicity. Qualitative comments revealed some recurrent themes. Some units differentiate between general (GA) and regional anaesthesia (RA); GA patients being recovered by PACU staff and RA patients being recovered by midwives, with some RA patients being recovered in individual delivery rooms. Interestingly some anaesthetists report that PACU staff are available for obstetric recovery during the day but midwives adopt this role out of hours. Some comment that they are gradually adopting the new guidelines, others have expressed concern regarding funding for trained PACU staff.

Discussion: This survey indicates that some units are providing superior care for GA patients or those operated on during the day. It would be interesting to compare the result of this survey to post-operative care in non obstetric surgical patients, the majority of whom will be recovered in a purpose built, fully equipped PACU by recovery trained personnel. Implementing the 2013 post anaesthesia recovery guidelines will be a slow process, in the meantime anaesthetists should provide ample support to all staff involved in recovering patients, particularly complex obstetric patients.

References
References

5.5% diclofenac only and 2% over-the-counter co-codamol. only, 15% paracetamol and diclofenac, 5.5% ibuprofen only, had been taking paracetamol and ibuprofen, 22% paracetamol category 4. 57% were discharged within 48 h of delivery. 50% category 1 CS, 26% category 2, 20% category 3 and 35% category and indication for CS, number of previous CS and August 2013. Data were collected at delivery to record the category and indication for CS, number of previous CS and length of labour before emergency CS. Telephone numbers and written consent to contact by telephone were obtained at the day 1 follow-up ward round by the anaesthetist. Women who gave consent were telephoned 7-10 days post delivery by the same consultant anaesthetist, using a set questionnaire, to ask which drugs they had been taking at home and if this had provided sufficient analgesia. Women were also asked if they had sought help from their GP to obtain extra analgesia.

Methods: We undertook a telephone survey, approved by our Trust’s Patient Satisfaction Department, of women who underwent CS over a four-week period commencing mid-August 2013. Data were collected at delivery to record the category and indication for CS, number of previous CS and length of labour before emergency CS. Telephone numbers and written consent to contact by telephone were obtained at the day 1 follow-up ward round by the anaesthetist. Women who gave consent were telephoned 7-10 days post delivery by the same consultant anaesthetist, using a set questionnaire, to ask which drugs they had been taking at home and if this had provided sufficient analgesia. Women were also asked if they had sought help from their GP to obtain extra analgesia.

Results: 93 women consented to telephone follow-up and 54 were successfully contacted. Of those contacted, 19% had had category 1 CS, 26% category 2, 20% category 3 and 35% category 4. 57% were discharged within 48 h of delivery. 50% had been taking paracetamol and ibuprofen, 22% paracetamol only, 15% paracetamol and diclofenac, 5.5% ibuprofen only, 5.5% diclofenac only and 2% over-the-counter co-codamol. 48/54 (89%) women felt that their pain relief was sufficient following discharge. One woman (2%) felt her pain relief was only just sufficient but had not sought extra help. Five (9%) women felt their pain relief was not sufficient, four of whom had been taking paracetamol and ibuprofen; the fifth did not initially have a supply of ibuprofen at home, but felt better once she did. All five had had regional anaesthesia with intrathecal or epidural diamorphine. Two of the five women had required multiple doses of supplemental oral morphine while in hospital, one of whom had a fourth CS, whilst the other had a sterilisation during CS. Of the five women with insufficient analgesia, two had contacted their GP and three had considered contacting the GP. One woman, despite adequate analgesia, had contacted her GP to seek advice about the safety of ibuprofen in breast feeding.

Discussion: The majority of women (89%) find that regular paracetamol and ibuprofen provide sufficient analgesia following hospital discharge after CS. Inadequate analgesia in several women could have been prevented by improving the clarity and consistency of advice given on discharge from the postnatal ward, e.g. confirmation that paracetamol and ibuprofen are safe in breastfeeding and to have a suitable supply of analgesia at home. We propose that clear written advice should be provided to women prior to delivery. Women who require multiple doses of opiate analgesia while in hospital may need supplemental analgesia on discharge.

Reference

P11 A comparison of the ease of performing spinal anaesthesia with ultrasound guidance versus landmark palpation in women with poor quality back surface landmarks undergoing elective caesarean section

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Department of Peri-operative Medicine, Coombe Women & Infants University Hospital, Dublin, Ireland

Introduction: Spinal anaesthesia is the most common technique performed for elective caesarean section. Recent studies have shown that ultrasound can facilitate neuraxial blockade in obese patients with poor quality back surface landmarks and impalpable spinous processes. However, there are no comparison studies to show that an ultrasound guided technique is superior to the traditional landmark palpation technique when performing spinal anaesthesia. The objective of this study is to determine if pre-procedural lumbar ultrasound scanning compared to conventional landmark palpation to locate the needle insertion point would reduce the number of needle passes, and time taken to perform spinal anaesthesia in women with poor quality back surface landmarks undergoing elective caesarean section.

Methods: After institutional ethics committee approval, 20 women with BMI > 30 kg/m², and poor quality back surface landmarks presenting for elective caesarean section were recruited. Patients were randomised to have their needle insertion point located by conventional landmark palpation (group PP) or ultrasound scanning (group US). The primary outcome of the study was the number of needle passes at lumbar puncture with a successful attempt resulting in identification of CSF. Normally distributed data were presented as mean ± SD, and non normally distributed data were presented as median (IQR).

Results: There was no difference in the mean BMI of both groups (group PP, 38.3 ± 3.8 kg/m² vs. group US, 39.1 ± 5.0 kg/m²). There were significantly more needle passes at lumbar puncture in group PP compared to group US (group PP, 6(3-7) vs. group US, 3(2-3), P = 0.03). More time was required to locate, and mark the needle insertion point in group US (group PP, 32.6 ± 11.4 s vs. group US, 91.8 ± 30.7 s, P = 0.001). There was no difference in the total procedural time between the two groups which consisted of time to mark insertion point and time to perform spinal anaesthesia (group PP, 192 ± 111 s vs. group US 191.8 ± 49 s, P = 0.99).

Discussion: Ultrasound scanning to locate the needle insertion point reduced the number of needle passes in obese women with poor quality back surface landmarks undergoing elective caesarean section under spinal anaesthesia. Although it took more time to locate the needle insertion point with ultrasound, this did not add to the total procedural time.

References

P12 Designing a care pathway to improve decision to delivery interval in category 1 caesarean section

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Dept. of Anaesthesia, Royal Bolton Hospital, Bolton, UK

Introduction: Category 1 caesarean section (CS) is an obstetric emergency and decision-to-delivery interval (DDI) should not exceed 30 minutes. Achieving this requires coordinated and timely responses from midwifery, obstetric, anaesthetic, paediatric and theatre teams. Regional anaesthesia is the safest mode of anaesthesia in most instances, however, this can be difficult to achieve due to systematic constraints. The aim of this project was to analyse the processes involved in category 1 CS and develop a multidisciplinary emergency pathway to improve efficiency.

Methods: As this was a quality improvement project ethical approval was not required. Data were collected from an initial audit over four months and root cause analyses were performed on cases which exceeded 30 minutes. We reviewed our current pathways through process mapping, simulated drills, direct observation of the process, semi-structured interviews and focus groups with staff. We then developed a set of recommendations and re-audited over a further four months.

Results: Each CS involved a minimum of nine staff members and more than 70 separate tasks. Staff found the work stressful and the environment to be chaotic. The two main delays were delay in contacting the anaesthetist and delay in arriving in theatre. We also found duplication in paperwork, unnecessary tasks and a general unawareness of other team members’ priorities and tasks. Our new pathway streamlined processes by introducing a group paging system, a new grab bag containing essential items, a single six-point checklist for the delivery room, improved communication and task sharing.

Figure: Category 1 caesarean section emergency pathway

Audits showed an improvement in DDI intervals of <30 minutes from 82.8% (144 out of 174 cases) to 89.6% (138 out of 154 cases), P<0.08.

Discussion: Making changes to processes on a busy delivery unit is difficult. Our unit has more than 180 staff so education and consultation are important. One of our key education tools was the production of a DVD showing best practice which is used in staff training. Further improvements are anticipated to continue as the new process embeds into practice.

References
P13 Trainee choice of induction agent for rapid sequence induction in obstetric general anaesthesia

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Introduction: Thiopental has been used for induction of anaesthesia in obstetric practice since 1936 due to its long safety record. At a 2003 OAA Cases and Controversies in Obstetric Anaesthesia meeting, 25% of anaesthetists supported a change from thiopental to propofol for obstetric rapid sequence induction (RSI). However, a 2013 national survey of consultant obstetric anaesthetists stated 58% would now support a change to propofol for obstetric RSI.1 A 2009 survey of trainees found that whilst 60% used thiopental for general theatre RSI, 97% were using thiopental for obstetric general anaesthesia (GA).2

Methods: In the Peninsular Deanery we surveyed trainee’s choice of induction agents for obstetric and non-obstetric RSI. We questioned choice of induction agent, experience of using thiopental before starting obstetric anaesthetics training, and whether trainees favoured a change to propofol for obstetric GA.

Results: We had a response rate of 79% (92 trainees). Of the 90% who had attained initial competencies in obstetric anaesthesia, 89% used thiopental for obstetric RSI. A third of trainees had used thiopental five times before training in obstetric anaesthesia. Overall, only 21% used thiopental for non-obstetric RSI, but several senior trainees would modify their choice of induction agent depending on clinical scenario.

Discussion: This survey showed that for non-obstetric anaesthesia propofol has overtaken thiopental as the induction agent of choice. In obstetric GA thiopental is still the primary induction agent. As regional anaesthesia is predominantly used for caesarean section, training opportunities for consultant supervised GA caesarean section cases have markedly decreased.3 We should now consider using propofol for obstetric RSI due to its increased familiarity. Although a third of our trainees actively supported a change to propofol, nearly half reported no preference and were influenced solely by departmental guidelines. Propofol is an acceptable alternative to thiopental and is used worldwide in obstetric anaesthesia without reports of harm.4 However, a change to propofol risks junior anaesthetists completing their training familiar with only one induction agent irrespective of the clinical situation.

References

P14 Management of failed intubation and difficult airways in UK Obstetric Units: an OAA survey

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Introduction: The OAA and DAS have formed a working group to formulate national guidelines for the management of difficult airways and failed intubation specifically in obstetric practice. In addition to available evidence from studies and case reports, a knowledge of current UK practice was felt to be useful to help direct guideline development.

Methods: An OAA approved questionnaire was sent to UK lead obstetric anaesthetists (n=205). Questions were asked about the number of failed intubations occurring within the last year with details of the management of the case(s). We asked about availability and use of difficult airway equipment and training of anaesthetists in obstetric anaesthesia.

Results: The response rate is currently 58% (n=119) although ongoing. Less than 10% of units responding have prospective audit data detailing failed intubations as recommended by RCoA. There were 45 failed intubations reported with 27% of units reporting one failed intubation in the last year and four units reporting more. Four lead anaesthetists did not know if there had been any failed intubations in their unit. The lead anaesthetist was able to provide some details of the failed intubation in 31 units and most details in a further 26 units. Trainees were present in 21/31 cases and NCGC in 10/31. Consultants were present in four cases but arrived quickly during a further five. In only 7/26 cases was the mother woken up after a failed intubation. In the remaining 19, the decision was made to continue with the procedure. Bag and mask ventilation was employed in most cases. Where an LMA was used as a rescue device, a 2nd generation device was used in half the cases. Surgery proceeded with seven breathing spontaneously whilst 12 were ventilated. In one case TIVA was employed. Cricoid pressure was continued throughout in all but six cases. No serious sequelae were reported. In 80% of units staff are able to use 2nd generation LMAs in routine practice. Over 90% of units have a videolaryngoscope available: most common was the Airtraq (62 units) followed by the Glidescope (33 units). One third of units routinely use short-handled laryngoscopes. Polio blades are used regularly in only 8% of units and are no longer used in 11%; in another 15% the polio blade is on the difficult airway trolley but rarely, if ever, used. 80% of units do not use orogastric tubes: 7% of units use them regularly for GAs with a further 10% only using them only if the patient has recently eaten. Of the units who responded, over half do not require trainees to have performed a GA caesarean section before independent working but two thirds of these require simulation practice. Many smaller units comment that with low numbers it is impossible to give GA experience.

Discussion: Traditional management for failed intubation in obstetrics is evolving along with new technology. In the majority of cases anaesthesia was continued by trainee anaesthetists without tracheal intubation. Equipment use has changed with few units using polio blades but 2nd generation LMAs and videolaryngoscopes are commonly available.
P15 The introduction of an emergency bleep system for category 1 caesarean section is associated with improved umbilical cord gases

YM Liu, WY Mon, A Stewart, R Fernando, M Columb* Anaesthetics, University College London Hospital, London, UK, *Intensive Care Unit, University Hospital of South Manchester, Manchester, UK

Introduction: An emergency bleep system was introduced in November 2012 to inform all team members simultaneously that a category 1 caesarean section (CS) was about to occur. Before this, each team member had to be contacted individually. We wanted to review the impact this bleep had on decision making and neonatal well-being.

Methods: Caldicott Guardian and ethical approvals were waived. A 22 month (11 months pre-bleep and 11 months post-bleep) retrospective review of women undergoing a category 1 CS under general anaesthesia (GA) was performed. Information collected included the grade of the most senior anaesthetist present, decision-to-delivery interval (DDI) as per national audit standards and umbilical cord gases. We excluded any failed spinals and epidural top-ups as these themselves would delay the DDI, and also any parturients given a primary regional technique as the true urgency of the CS may be called into question. Statistical analysis included Mann-Whitney U and Student t tests.

Results: 51 cases were identified and analysed. There was a significant increase in the attendance of senior anaesthetists (ST5 or above) after the introduction of the bleep (P=0.014), especially out of hours. Although there was a non-significant reduction in the DDI, there was a significant improvement in umbilical artery (UA) pH. Apgar scores at 1 and 5 minutes remained unchanged.

<table>
<thead>
<tr>
<th></th>
<th>Pre Bleep (n=24)</th>
<th>Post Bleep (n=27)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDI (mins)</td>
<td>19 [15.25-23.5]</td>
<td>18 [15-21]</td>
<td>0.65</td>
</tr>
<tr>
<td>UApH</td>
<td>7.08±0.12</td>
<td>7.20±0.08</td>
<td>0.001</td>
</tr>
<tr>
<td>UABE</td>
<td>-9.02±5.08</td>
<td>-6.18±2.68</td>
<td>0.06</td>
</tr>
<tr>
<td>UVpH</td>
<td>7.18±0.13</td>
<td>7.22±0.08</td>
<td>0.22</td>
</tr>
<tr>
<td>UVBE</td>
<td>-7.77±5.25</td>
<td>-5.98±3.36</td>
<td>0.24</td>
</tr>
</tbody>
</table>

Data are mean ± SD, except DDI which are median [IQR]. UV: umbilical vein; BE: base excess

Discussion: We believe that the emergency bleep system produced a better coordinated response to category 1 CS. This led to the reduction in DDI, and therefore, the significant improvement in UApH. Improved communication amongst multidisciplinary team members secondary to the bleep system resulted in more senior anaesthetists being present. This too may have contributed to the reduction in DDI and improved neonatal outcomes. The impact of other confounding variables such as changes in obstetric practice and the presence of a consultant obstetrician was not analysed in this study.

Reference

P16 Assessing spinal block for caesarean section: a review of the literature

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Introduction: Assessing the adequacy of block before caesarean section (CS) is an essential but complex component of obstetric anaesthesia. Surveys of practice have suggested reduced use of pinprick/cold in favour of touch, and an increased height of block deemed ‘acceptable’; however, the response rate has been poor. We looked at assessment methods reported in clinical trials over the last 30 years.

Methods: We searched PubMed in Dec. 2013 for English-language randomised controlled trials (RCTs) indexed with CS and spinal anaesthesia as major topics, and recorded the methods of block assessment.

Results: 265 papers were identified, of which 20 could not be obtained in full text, four had been retracted and one was not a RCT. Thirty-nine papers made no mention of assessment of block. Of the remaining 201, 130 (65%) assessed sensory block only and 71 (35%) both sensory and motor block of which 65 (92%) used the Bromage scale. Assessment of sensory block is shown in the Figure. Block heights aimed for ranged from T10 to T3; the most common was T4 (25% in 1980-89, 41% 1990-99, 21% 2000-09 and 23% 2010-13). The use of T5 increased in frequency from 0% in 1980-89 to 18% in 2010-13. Only four studies defined the dermatome used.

![Figure](image)

Discussion: Change in method of sensory assessment by decade

Discussion: Similar trends were seen to those from surveys. The method of testing sensory block remains as confused as ever.

References
P17 The effect of the Oxford Head Elevating Laryngoscopy Pillow (O/HELP) on subarachnoid local anaesthetic spread in elective caesarean section: a randomized controlled trial

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Introduction: The Oxford Head Elevating Laryngoscopy Pillow (O/HELP) places a patient in a ramped posture, which maximizes the view of the larynx during laryngoscopy. In our institution the O/HELP is used preemptively for regional anaesthesia in parturients with BMI > 30 kg/m². In our study we aimed to investigate the effect of the O/HELP on the spread of local anaesthetic injected during subarachnoid anaesthesia. We hypothesized that the O/HELP impairs the cephalad spread of local anaesthetic resulting in an inadequate block for caesarean section.

Methods: 100 parturients presenting for elective caesarean section under combined spinal-epidural anaesthesia were prospectively randomised. They were placed in either the standard supine position with lateral displacement (control group) or in the supine position on the O/HELP (intervention group). Both groups received intrathecal hyperbaric bupivacaine 11 mg with morphine 100 µg and fentanyl 15 µg. Patients were assessed for adequacy of sensory block (T6 or higher) at 10 min and the need for the epidural top-up or conversion to general anaesthesia.

Results: Satisfactory sensory blockade was achieved in 65.9% of parturients in the intervention group vs 95.7% in the control group (P<0.05). The requirements for epidural top-up or conversion to general anaesthesia due to discomfort were higher in the intervention group.

Discussion: The use of the Oxford Head Elevating Laryngoscopy Pillow in parturients undergoing elective caesarean section was associated with a more failure of subarachnoid anaesthesia requiring epidural top-up or conversion to general anaesthesia.

Reference

P18 Obstetric failed intubation case series: avoiding the chaos of an emergency caesarean section under general anaesthesia: are you “H.A.P.P.E”?

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Introduction: Failed tracheal intubation remains an important cause of maternal morbidity and mortality. A recent national study found the incidence in the obstetric population to be 1:224. The purpose of this service evaluation was to determine the local incidence of failed intubation in a tertiary referral centre and to identify common themes between cases. The findings have been used to make changes to local practice and help prevent further cases.

Methods: Cases were identified by searching for critical incident reports and staff recollection. Case notes were reviewed from Jan 2009-July 2013. Obstetric and anaesthetic information was also gained from the local obstetric database.

Results: There were 10 cases of failed intubation, giving a local incidence of 1:119. There were no maternal deaths and no neurological sequelae. All cases involved a trainee anaesthetist, occurred out-of-hours and were emergency caesarean sections. Only one patient was woken up. Previously recognised risk factors were identified, including BMI >30 kg/m² (n=5), age>30 years (n=6) and Mallampati class>1 (n=6). Other emerging themes were non-UK ethnicity (n=6), failure of regional anaesthesia (n=4) and deviation from Difficult Airway Society (DAS) guidelines for rapid sequence induction (RSI).

Table: Deviation from Difficult Airway Society Guidelines

<table>
<thead>
<tr>
<th>No. cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cricoid not released or adjusted</td>
</tr>
<tr>
<td>Alternative laryngoscope not tried</td>
</tr>
<tr>
<td>&gt;3 intubation attempts</td>
</tr>
<tr>
<td>&gt; 1 dose of suxamethonium</td>
</tr>
<tr>
<td>2nd generation LMA not utilised when cLMA failed</td>
</tr>
<tr>
<td>Rescue COETT despite declaration of “failed intubation”</td>
</tr>
</tbody>
</table>

Discussion: This case series highlights important situational factors that may contribute to an increased risk of failed obstetric intubation. These factors, which include urgency of delivery, trainees working out-of-hours under distant supervision and failed regional anaesthesia create additional stress in an already demanding environment. Under such circumstances, the anaesthetist may become distracted from normal practice, including adequate pre-induction preparation. To help create and maintain focus, a verbal pre-induction check list between the anaesthetist and operating department practitioner has been introduced. This uses the acronym “H.A.P.P.E” (History and Help, Airway assessment, Positioning, Pre-oxygenation, Equipment and drugs). Increased situational pressure may also have lead to the divergence from DAS failed intubation guidelines seen in this case series. New departmental guidelines for the management of obstetric failed intubation have been produced whilst awaiting further guidance from the OAA/DAS.

References
P19 A completed audit loop after a change in practice: preoperative fasting times for elective caesarean section

V Nalawade, RCC Thompson
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Introduction: Our initial audit identified an area for improvement in our practice by demonstrating that many patients were excessively fasted compared to our audit standards. This is both clinically unnecessary and has a negative impact on patient experience. Prolonged fasting is distressing to patients and leads to headache, hunger, thirst, nausea and increased anxiety levels. After presentation of audit results at obstetric risk management committee, a new preoperative fasting policy for elective caesarean section was designed and implemented. This included guidance for clear fluid intake up to 2 h preoperatively. The new guidance was incorporated into patient information leaflets and the changes were highlighted to midwifery, healthcare, obstetric and anaesthetic staff. We re-audited the fasting times and thirst scores after instituting new fasting guidelines.

Methods: This audit was registered with and approved by the hospital audit committee. The first data set was collected prospectively from 50 patients between March and May 2012. Re-audit data were collected between Jan and March 2013. Data were collected using a standard questionnaire by the anaesthetist or anaesthetic nurse from patients scheduled for elective caesarean section immediately before commencing anaesthesia.

Results: The re-audit demonstrated fall in mean fasting time for clear fluids from 13.6 h to 5.6 h (audit standard 2-4 h). The mean fasting time for solids was unchanged at 14.7 h in re-audit compared to 15 h in the initial audit (audit standard 6-10 h). The mean thirst score fell from 6.6 to 6.1 (scale 1-10).

Figure: Clear fluid fasting time for initial and re-audit

Discussion: Changing the fasting guidelines for elective CS has reduced both the incidence and duration of excessive preoperative fluid fasting in our patients. There was little change in thirst scores. We expect fluid fasting times to reduce further towards the audit standard (2-4 h) as one of our original recommendations, a dedicated elective caesarean section list, has since been implemented at our hospital.

Reference

P20 Clinical impact of loss of preservative-free bicarbonate when extending epidural blockade for caesarean section

HI Wordsworth, S Shah, R Parbhoo, J Allam
Magill Department of Anaesthesia, Chelsea and Westminster Hospital, London, UK

Introduction: Recent drug shortages in 2013 have included preservative-free sodium bicarbonate, as the manufacturer was developing a new design of Minijet. Our standard epidural top-up has been a lidocaine/adrenaline/preservative-free bicarbonate mixture. We assessed the impact of its loss on both our practice and outcomes, and compared findings with previous departmental research in 2008 and audit in 2009.

Methods: We retrospectively identified 50 consecutive cases requiring epidural top-up for emergency caesarean section (category 1-3) in both June 2012 and 2013 (preservative-free bicarbonate unavailable for the latter). Prism® software was used for statistical testing with Mann-Whitney and unpaired Student’s t-tests; P<0.05 denoting statistical significance.

Results: There were no differences between maternal demographics or fetal outcomes. In 2013, lidocaine was used as the sole local anaesthetic in 82% of cases compared with 96% in 2012. Median (IQR[range]) lidocaine volume used in 2013 was 20 mL (15-20[13-20]) vs. 15 mL (15-18[10-30]), P=0.008. In 2013, only 2% of patients received bicarbonate for top-up compared with 94% in 2012. In 2013, 22% required intraoperative analgesic supplementation and/or conversion to spinal anaesthesia compared with 10% in 2012 (P<0.05).

Table Onset times after top-up

<table>
<thead>
<tr>
<th>Time to Ready (min)</th>
<th>2012 (n=46)</th>
<th>2013 (n=45)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to Knife to Skin (min)</td>
<td>17 (13-22 [1-41])</td>
<td>23 (17-29 [4-58])</td>
<td>0.0038</td>
</tr>
<tr>
<td>Time to Delivery (min)</td>
<td>22 (16-30 [6-45])</td>
<td>28 (22-36 [5-62])</td>
<td>0.0061</td>
</tr>
</tbody>
</table>

Discussion: When preservative-free bicarbonate was unavailable in 2013, significant delay in readiness for surgery and delivery occurred, with a suggestion of a greater need for supplementation. Our unit opted to use lidocaine/adrenaline alone, rather than use preservative-containing bicarbonate or change to levobupivacaine: first, because the safety of excipient/preservative-containing solutions is unclear and second, because our previous work revealed that readiness for surgery with levobupivacaine takes twice as long. Our median time to readiness with bicarbonate of 9 min is similar to our 2009 audit (10 min), which also significantly differs from 2013 findings. Following invited response, some units have opted similarly to omit bicarbonate, but anecdotally NOT noted delays, whilst others have moved over to ropivacaine or continued with preservative-containing bicarbonate.

References
P21 Epidural blood patch and new onset lower back pain
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Introduction: Back pain costs the NHS an estimated £650–12300 million, 22% of the total health care expenditure.1 A Cochrane review in 2009 concluded that use of epidural analgesia in labour had no statistically significant impact on the risk of long-term back pain. A literature search of low back analgesia in labour had no statistically significant impact on the risk of back pain.2

Methods: We surveyed all patients who had epidural blood patches performed between 2004 and 2013 at a district general hospital. All epidurals were recorded on a database. Patients were regularly followed-up over a 4-year period post delivery. Questions examined whether patients had pain; the severity of pain and the impact on their quality of life.

Results: 106 epidural blood patches were performed between 2004 and 2013. 73 patients were successfully followed up, (69% response rate). 60% of patients had developed new lower back pain. Of these, 66% described their pain as moderate to severe. 68% of patients with pain required regular analgesia to manage their pain, whilst 39% required additional physiotherapy. Quality of life was impaired in 38% whilst impact on activities of daily living was impaired in 64%. The majority of patients (63%) had pain lasting >12 months, with 16% lasting >4 years. Low back pain was not associated with changes in epidural patch blood volume, but appeared to be more prevalent in those who required repeat procedure (61%).

Discussion: Firstly, there is a lack of published follow up of patients who have had epidural blood patch. Secondly, there is no recent data relating epidural blood patch and the incidence of low back pain. The quoted incidence of epidural blood patch associated lower back pain may be grossly underestimated and this obviously has implications financially and for consent.

References

P22 Enhanced recovery in elective caesarean section: experience suggests reduced length of stay
N Aldamluji, K MacLennan, C Tower*
Department of Anaesthesia, St. Mary's Hospital, Manchester, UK, *Department of Obstetrics and Gynaecology, St. Mary's Hospital, Manchester, UK

Introduction: Enhanced recovery (ER) after surgery is an integrated care pathway based on the principles of best perioperative care.1 Evidence from other specialties demonstrates that ER pathways are associated with fewer complications, better clinical outcomes, improved patient experience and cost savings.2 This study looked at potential benefits of introducing an enhanced recovery pathway for uncomplicated elective caesarean section (CS).

Methods: ER was introduced for 52 selected women undergoing elective CS from Aug-Nov 2013. Women without coexisting medical problems were selected if uncomplicated surgery was expected. Women were advised to consume a high carbohydrate meal the evening before surgery, prescribed 400 mL of a preoperative drink (containing slow release carbohydrate) up to 2 h before surgery, had early removal of urinary catheter (at approximately 6 h), early feeding and mobilisation postoperatively. Postoperatively they were cared for in a dedicated ER area. Data were collected prospectively and women were contacted by telephone the day following discharge.

Results: 52 women underwent the ER programme. 32/52 (61.5%) were discharged the day following surgery. The median length of stay was 31.2 h (range: 25-120 h). Nine discharges (17%) were delayed due to neonatal reasons, four (7.6%) due to social factors and seven (13.4%) due to medical reasons. Telephone follow-up in 46 women found 13/46 (28%) reported moderate pain on discharge. Nine (19.5%) reported concern about early discharge: four had pain concerns, four had surgical concerns and one was unsure how to self administer heparin. 3/52 (5.7%) women required re-catheterisation and 2/52 (3.8%) required re-admission (hypertension and mastitis). 36/52 (69%) expressed a preference for discharge on the day following surgery.

Table: Satisfaction scores for the pathway.

| Patient satisfaction with the CS pathway | |
|-----------------------------------------|
| Very satisfied | 29/46 (63%) |
| Satisfied | 15/46 (32.6%) |
| Dissatisfied | 2/46 (4.3%) |

Discussion: This pilot demonstrated the ER pathway is acceptable to women, achieving discharge in the majority on the day after surgery (61.5%). In a further 13 women (25%) discharge was medically possible, but either social or neonatal factors delayed discharge. Positive patient feedback and good clinical results have lead us to roll out the programme more comprehensively to include all elective CS while we continue to assess its effects in more widespread practice.

References
P23 One night only - is enhanced recovery in obstetric surgery working for our patients?

KJ Blightman, J Modha, Z Khan-Orakzai, N Patel
Department of Anaesthesia, University College London Hospitals NHS Foundation, London, UK

Introduction: Enhanced Recovery in Obstetric Surgery (EROS) is becoming popular in the UK in line with other national enhanced recovery programmes.1 Advantages for the patient include earlier return of normal function and increased patient satisfaction. With reduced length of stay there is also scope for substantial cost savings for the NHS. Appropriate selection of uncomplicated low-risk patients as well as pre-optimisation and patient education are cornerstone to successful implementation. Our aim was to assess how well enhanced recovery was working in our unit.

Methods: With approval from our local audit department we carried out a survey of all patients having an elective caesarean section (CS) over a 30 day period in June/July 2013. Patients were asked to complete a short feedback questionnaire at anaesthetic follow-up. Further information was obtained from the maternity electronic database and delivery register.

Results: During the study period 69 elective CS were performed. The most frequent indications were previous CS 24/69 (35%), breech/transverse lie 11/69 (16%), maternal request 7/69 (10%). Mean length of stay was 43.4 h and 24/69 (34%) stayed for one night. Feedback questionnaires were completed by 37/69 (54%). The table below summarises the responses from the feedback questionnaire.

<table>
<thead>
<tr>
<th>Responses from the feedback questionnaire (n = 37)</th>
<th>Pre-operative information given regarding CS</th>
<th>Pre-operative information given regarding a 24 h stay</th>
<th>Happy to be discharged at 24 h</th>
<th>Those specifically asked at 24 h if they wanted to be discharged</th>
<th>- Those who actually went home at 24 h after being asked</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-operative information given regarding CS</td>
<td>37/37 (100%)</td>
<td>15/37 (41%)</td>
<td>16/37 (43%)</td>
<td>18/37 (49%)</td>
<td>11/18 (61%)</td>
</tr>
</tbody>
</table>

Discussion: Over the month study period, one-third of patients having an elective CS went home after a one night stay in our unit. Our survey data suggest that <half of our respondents would be happy to go home at 24 h, reflecting the similar number specifically given information about EROS pre-operatively. Only half the respondents were specifically asked at 24 h if they would like to be discharged and less than two-thirds of those actually went home. Factors affecting discharge after elective CS are multifactorial and depend on maternal health, operative events, postoperative recovery and neonatal well-being. Our study highlights that EROS needs to be discussed with patients planning for elective procedures in advance, particularly in all low risk pregnancies. Staff education may play a vital role and mothers need explanation and reassurance.

Reference


P24 Changes in analgesia requirements after withholding codeine from breastfeeding mothers following caesarean section

N M Courtenay-Evans, R G W Stacey
Department of Anaesthetics, Kingston Hospital NHS Trust, Kingston upon Thames, UK

Introduction: Delivery by caesarean section requires a multimodal analgesia regimen to manage post-operative pain. In our hospital, this previously consisted of regular codamol 30/500 mg (or rarely paracetamol alone) and diclofenac. Oral and parenteral morphine were prescribed for breakthrough pain as required. In June 2013, the Medicines and Healthcare products Regulatory Agency (MHRA) issued a drug safety update, which advised that codeine should not be used by breastfeeding mothers, due to the potential of harm to the child.1 Following this, a decision was made to stop prescribing codeine for post-caesarean analgesia. We evaluated the impact this recommendation has had on the use of oral and parenteral morphine post-caesarean section.

Methods: All caesarean section patients are visited by an anaesthetist within 48 h of surgery to assess pain control, analgesic consumption, patient satisfaction and to screen for complications. This information is recorded on an audit database. Using this database, we retrospectively compared morphine usage for the 3-month period August-October 2012 with the corresponding 3-month period following the MHRA alert, August-October 2013, when codeine use was stopped.

Results: From our database, we found complete data for 429 and 430 patients in the 2012 and 2013 groups respectively. The use of different analgesics are summarised in the table below, with 95% CI in brackets.

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of CS performed</td>
<td>443</td>
</tr>
<tr>
<td>Number with complete data</td>
<td>429</td>
</tr>
<tr>
<td>% requiring additional morphine</td>
<td>7.23 (5-10)%</td>
</tr>
<tr>
<td>- Oral morphine</td>
<td>5.13 (3-7)%</td>
</tr>
<tr>
<td>- Intramuscular morphine</td>
<td>1.40 (0-3)%</td>
</tr>
<tr>
<td>- PCA Morphine</td>
<td>0.70 (0-1)%</td>
</tr>
</tbody>
</table>

Discussion: Since the withdrawal of codeine from post-caesarean section use, three times the number of patients are now receiving oral morphine for breakthrough analgesia. This increase from 5.13% to 16.0% is statistically significant. There may, however, be a reciprocal reduction in intramuscular morphine administration. These consequences represent a notable increase in the frequency of women developing significant post-caesarean pain, which is inadequately controlled on regularly prescribed analgesics. This illustrates a less acceptable system for pain control, as set out in our OAA/AAGBI Guidelines,2 than we previously provided in our hospital. It may also represent an increased workload for midwives, patients waiting longer for pain relief and a subsequent fall in patient satisfaction. This will be assessed in future audits.

References

1. MHRA Drug Safety Update June 2013 vol 6, issue 11: S1
P25 Cost reduction and increased patient satisfaction with enhanced recovery for elective caesarean section

S Haldar, C Onwere*, N Singh*, M Cox, SM Yentis
Magill Department of Anaesthesia, Chelsea and Westminster Hospital, London, UK. *Obstetric Department, Chelsea and Westminster Hospital, London, UK

Introduction: Enhanced recovery (ER) for elective caesarean sections (CS) has become an area of increasing interest. ER pathways provide evidence based approach postoperatively to allow return to normal function. This is important in the postoperative period as adequate patient recovery ensures patient safety, and ensures that patients can be discharged from hospital earlier thereby reducing cost, while most importantly increasing patient satisfaction.

Methods: In February 2013 we assessed 30 patients following low-risk elective CS; reviewing time of starvation, intravenous cannula and urinary catheter removal and hospital discharge. Patient satisfaction was also assessed. We introduced the ER pathway in May 2013 and reviewed data from 30 patients on the pathway. Timing data were analysed using Mann-Whitney U tests and satisfaction data using chi-squared tests.

Results: Reductions in fluid starvation and intravenous cannula and urinary catheter removal times were noted following ER pathway introduction. Hospital discharge time reduced with 12/30 patients discharged approximately 24 h after their procedure. Overall patient satisfaction with hospital admission was also improved.

Table: Outcome data pre- and post-introduction of ER pathway

<table>
<thead>
<tr>
<th>Timing</th>
<th>Pre-ER</th>
<th>Post-ER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid starvation (h)</td>
<td>5.5 (3-8[2-16])</td>
<td>3 (2-3[2-6])*</td>
</tr>
<tr>
<td>Food starvation (h)</td>
<td>13 (12-14[9-18.5])</td>
<td>11 (9-14[9-17])</td>
</tr>
<tr>
<td>Cannula removal (h)</td>
<td>27 (24-29[14-48])</td>
<td>6 (6-15[4-23])*</td>
</tr>
<tr>
<td>Catheter removal (h)</td>
<td>22 (20-22[18-27])</td>
<td>6 (6-10[2-20])*</td>
</tr>
<tr>
<td>Hospital discharge (d)</td>
<td>3 (3-3[3-4])</td>
<td>2 (1-2[1-3])*</td>
</tr>
</tbody>
</table>

Satisfaction data

| Cannula removal          | 9/30 (30%)      | 29/30 (96.7%)*  |
| Catheter removal         | 11/30 (36.7%)   | 30/30 (100%)*   |
| Hospital admission       | 23/30 (76.7%)   | 29/30 (96.7%)*  |

Data are median (IQR[range]) or number (%). *P<0.05 vs pre-ER

Discussion: Following ER pathway introduction, median length of hospital admission reduced by 1 day. In 2012 there were 5913 deliveries in our trust; 612 were low-risk elective CS. The estimated saving per postnatal day in our maternity unit is estimated at £300. Therefore a potential yearly saving from the ER pathway could be around £183,600. We conclude that the introduction of the ER pathway for elective CS has been effective in our department to decrease hospital admission times, thereby reducing cost, while most importantly increasing patient satisfaction.

References

P26 Enhanced recovery for elective caesarean section: neonatal issues an important cause of delayed discharge

R Pothireddy, V Karthikeyan, S Aluri, D Gopinath, I Wrench
Obstetric Anaesthesia, Royal Hallamshire Hospital, Sheffield, UK

Introduction: Following the success of enhanced recovery in other surgical specialties, we have recently introduced an enhanced recovery programme for elective caesarean section. The new interventions included perioperative information for patients and staff, a high calorie preoperative drink (non-fizzy Lucozade Sports), active warming in theatre (under-patient Bair Hugger), skin-to-skin contact between the mother and neonate and delayed cord clamping. We performed a service evaluation to assess how well these changes were being applied and to see if there were any identifiable barriers to earlier discharge.

Methods: Following approval from the Trust clinical effectiveness unit we collected data over a six week period for 60 patients undergoing elective caesarean section.

Results: The proportion of patients discharged after a single night in hospital was 20% (12 patients) with 50% going home after two nights. All patients were given patient information leaflets, and energy drinks were provided for all non-diabetic patients. Intraoperatively active warming was used for all patients but only 73% had skin-to-skin contact with the neonate and delayed cord clamping was practiced in only 40% cases.

Table: Causes of delayed discharge.

<table>
<thead>
<tr>
<th>Factors causing delayed discharge</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neonatal issues</td>
<td>15/60 (25)</td>
</tr>
<tr>
<td>Maternal medical problems</td>
<td>9/60 (15)</td>
</tr>
<tr>
<td>Surgical complications</td>
<td>9/60 (15)</td>
</tr>
<tr>
<td>Social factors</td>
<td>3/60 (5)</td>
</tr>
<tr>
<td>Anaesthetic/pain problems</td>
<td>2/60 (3.3)</td>
</tr>
</tbody>
</table>

The principle identifiable cause of delay in discharge was a problem with the baby. However, blood loss (mean ± SD) for patients discharged on day 2 (623 ± 243 mL) was significantly higher than those staying for a single night (471 ± 105 mL) (P=0.04). Telephone follow-up did not identify any major problems leading to readmission.

Discussion: Whilst we have successfully introduced enhanced recovery to our unit there is still room for improvement. Neonatal issues are a major cause of delay, thus increased uptake of skin-to-skin contact and delayed cord clamping may be beneficial. Increased blood loss in theatre may also be an important factor.

References
P27 Transversus abdominis plane (TAP) block for analgesia following caesarean section: a survey of practice in the West of Scotland

S Halliday, EML Beattie*, K Lake*, HM du Plessis*
Anaesthesia, Western Infirmary, Glasgow, UK, *Anaesthesia, Glasgow Royal Infirmary, Glasgow, UK

Introduction: Bilateral TAP blocks can anaesthetise the abdominal wall neural afferents and provide analgesia after caesarean section (CS) as part of a multimodal regimen. There are no guidelines for performing these blocks within the West of Scotland. We sought to determine current TAP block practices in our region to assess the need for formal guidance.

Methods: A survey was sent to all anaesthetists within the West of Scotland regarding their practices when performing TAP blocks.

Results: Fifty-seven anaesthetists completed the survey. Twenty-seven anaesthetists perform TAP blocks for elective general anaesthetic (GA) CS and 26 for emergency GA CS and 26 never perform them for CS. Eighteen (38.3%) anaesthetists always consent patients for TAP blocks, another 18 (38.3%) never specifically consent if time allows and 11 (23.4%) never specifically consent for TAP blocks. Another 18 (38.3%) anaesthetists never perform them for CS. Eighteen (38.3%) anaesthetists stated they would calculate the maximum dose of local anaesthetic for the patient.

Table: Aseptic precautions routinely taken.

<table>
<thead>
<tr>
<th>Aseptic Precaution</th>
<th>Number of respondents (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorhexidine skin preparation</td>
<td>30 (81.1)</td>
</tr>
<tr>
<td>Betadine skin preparation</td>
<td>2 (5.4)</td>
</tr>
<tr>
<td>Sterile drapes</td>
<td>10 (27.0)</td>
</tr>
<tr>
<td>Small procedures pack</td>
<td>25 (67.6)</td>
</tr>
<tr>
<td>Surgical scrub</td>
<td>7 (18.9)</td>
</tr>
<tr>
<td>Hand disinfectant</td>
<td>21 (56.7)</td>
</tr>
<tr>
<td>Routine wash</td>
<td>10 (27.0)</td>
</tr>
<tr>
<td>Sterile gloves</td>
<td>33 (89.2)</td>
</tr>
<tr>
<td>Hat</td>
<td>22 (59.5)</td>
</tr>
<tr>
<td>Mask and gown</td>
<td>5 (13.5)</td>
</tr>
</tbody>
</table>

Discussion: A large percentage of anaesthetists in our region do not routinely perform TAP blocks which may reflect conflicting evidence on their efficacy. Amongst those performing TAP blocks there is wide variation in aseptic technique and guidance methods. Also a significant number of anaesthetists never obtain consent which is concerning. Introduction of a guideline should encourage utilization of the TAP block, improve consent and reduce variability in practice, overall improving patient care and safety.

References

P28 Introduction of enhanced recovery after obstetric surgery: a tertiary centre experience

S Aluri, I Wrench
Anaesthesia, Sheffield Teaching Hospitals NHS Foundation Trust, Sheffield, UK

Introduction: The widespread adoption of enhanced recovery programmes in various surgical specialties has resulted in such benefits as reduced morbidity, reduced length of stay and an earlier return to normal activities for patients. This evidence along with the increased financial pressures in the NHS has led many units to consider introducing such a programme for obstetric surgery. We now report a service evaluation of our experience in setting up enhanced recovery for elective caesarean section in our unit.

Methods: A multidisciplinary team was convened consisting of anaesthetists, obstetricians, hospital and community midwives, the breast feeding team, a patient representative and a pharmacist. Over a course of six months, they designed an enhanced recovery pathway which included new perioperative information, high calorie preoperative drink (non-fizzy Lucozade TM), active warming, early skin-to-skin contact, delayed cord clamping, minimal interruption of oral intake and multi modal analgesia.

Results: Over a two-year period, the proportion of patients discharged on day one increased from around 1% to over 20%. There was no change in the readmission rate and a telephone survey revealed high levels of satisfaction irrespective of the day of discharge.

Figure: Percentage discharged following a one night stay.

Discussion: We have successfully introduced an enhanced recovery programme into our unit. Many of the interventions were straightforward and could easily be adopted elsewhere.

References
P29 Poor correlation between visual analogue score, subjective pain relief and patient satisfaction after caesarean section yet still achieving new audit standard

M Pachucki, P Ricci, S Grier, L Herbert, T Knight, S Moxham, N Wharton
Anaesthesia, University Hospitals Bristol, Bristol, UK

Introduction: Pain relief post caesarean section (CS) is paramount in improving patient experience and reducing morbidity. In 2009, when last audited, our department failed the standard of post CS pain relief defined at that time as pain scores on the visual analogue scale (VAS) of <3 for >90% women. Since then, and following debate in the literature, a new standard has been established by the Royal College of Anaesthetists recommending >95% women to be satisfied with analgesia on day one post CS with no mention of pain scores. If not contraindicated, 100% must also receive intrathecal opioid and NSAIDs.

Methods: In July 2013 we undertook a prospective re-audit of post CS pain relief and patients satisfaction in our institution with the data collection and patient follow-up over two days. The total number of CS performed during the audit period was 86 with 100% capture on day one and 63% on day two. We reviewed the anaesthetic record, drug chart and questioned mothers on pain, side effects and satisfaction using a standardized data collection proforma.

Results: All women having a spinal anaesthetic received intrathecal opioids and all were prescribed and given a NSAIDs regularly (unless contraindicated). Antiemetics (100%) and antipruritics (97%) were more widely prescribed than in 2009 audit (41% and 33%, respectively) but pruritus complaints were more prevalent (51% vs. 33% of respondents in 2013 and 2009 audits). Fortunately, incidence of pruritus, nausea and vomiting was significantly reduced by day two in our sample (10%, 4% and 0%, respectively). We reached the recommended satisfaction standard on both days (>95% respondents satisfied or more than satisfied) despite the fact that the majority assessed their pain as above 3 on VAS and the percentage of women who described their pain as mild was only 58% and 56% on day one and two, respectively (similar to previous audit findings). A large number of women (51%) suffered from pruritus on day one but did not receive any treatment despite appropriate prescription.

Discussion: Audit recommendations have changed since 2006 with emphasis on satisfaction with analgesia rather than pain score on VAS. Satisfaction with analgesia and assessment of pain with VAS score do not seem to go hand in hand as in our sample 33% patients with mild pain gave a score above 3 on VAS. Since our re-audit, a naloxone prescription sticker has been routinely attached to patients’ drug chart acting as a reminder and encouraging the ward staff to use it for pruritus treatment.

References

P30 Enhanced recovery for obstetric surgery: a UK-wide survey of practice

S Aluri, I Wrench
Anaesthesia, Sheffield Teaching Hospitals NHS Foundation Trust, Sheffield, UK

Introduction: Earlier discharge of patients following elective caesarean section in the UK would require that more patients are discharged the day after surgery. The introduction of enhanced recovery in other specialities has resulted in shorter postoperative stay.1,2 We surveyed current UK practice to find whether this was consistent with enhanced recovery and what changes units would need to introduce to establish such a programme.

Methods: We conducted an Obstetric Anaesthetists’ Association (OAA) approved electronic survey (survey number 139) of all the UK lead obstetric anaesthetists between March - June 2013.

Results: A response rate of 80.6% was achieved with 95.6% of lead clinicians in favour of enhanced recovery. Three units reported that they have an enhanced recovery programme in place and seven units were in the process of doing so. Only 3.7% of units routinely discharged their patients on day one. There were a number of practices consistent with enhanced recovery.

Table: Responses to survey questions

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perioperative analgesia</td>
<td></td>
</tr>
<tr>
<td>Long acting intrathecal opioids</td>
<td>153 (95%)</td>
</tr>
<tr>
<td>Regular NSAIDS</td>
<td>161 (100%)</td>
</tr>
<tr>
<td>Postoperative oral opioids</td>
<td>109 (67.7%)</td>
</tr>
<tr>
<td>Perioperative oral intake</td>
<td></td>
</tr>
<tr>
<td>Clear fluids up to 2 h preop</td>
<td>125 (77.6%)</td>
</tr>
<tr>
<td>Water within 1 h postop</td>
<td>115 (71.4%)</td>
</tr>
<tr>
<td>Food within 6 h postop</td>
<td>113 (70.1%)</td>
</tr>
<tr>
<td>Warming in theatre</td>
<td></td>
</tr>
<tr>
<td>Intravenous fluids via warmer</td>
<td>67 (41.6%)</td>
</tr>
<tr>
<td>Warmed fluids from cabinet</td>
<td>52 (32.3%)</td>
</tr>
<tr>
<td>Active patient warming</td>
<td>29 (18%)</td>
</tr>
<tr>
<td>Recovery of the baby</td>
<td></td>
</tr>
<tr>
<td>Skin-to-skin contact in theatre</td>
<td>84 (53.2%)</td>
</tr>
<tr>
<td>Delayed cord clamping</td>
<td>36 (22.5%)</td>
</tr>
<tr>
<td>Postoperative mobilisation of patients</td>
<td></td>
</tr>
<tr>
<td>Within 12 h of end of surgery or when block worn off</td>
<td>113 (71.5%)</td>
</tr>
<tr>
<td>Postoperative urinary catheter removal</td>
<td></td>
</tr>
<tr>
<td>Within 12 h of end of surgery or when block worn off</td>
<td>43 (28%)</td>
</tr>
</tbody>
</table>

Discussion: Though very few units are currently practising enhanced recovery for obstetric surgery, there is a wide spread interest for it. We believe that most obstetric units could introduce an enhanced recovery programme for elective surgery with relatively small adjustments in patient care.

References
P31 Remifentanil PCA: improving maternal safety
H Gillespie, H Murray, P Hodgkinson, D Hughes
Anaesthetics Department, Ulster Hospital, Dundonald, Belfast, UK

Introduction: Remifentanil is a potent synthetic selective mu opioid agonist, with rapid onset, metabolism and clearance. Remifentanil PCA has been a well established form of labour analgesia in our institution since 2004. The dosing regime is a fixed bolus of 40 µg with a 2-min lockout, and supervision is by trained midwives who give one-to-one care. Continuous monitoring and regular audit of the use of remifentanil PCA allows assessment of its safety profile, efficacy and identifies any potential areas for service improvement. We present the results and subsequent development of our service through data assessment across a four-year interval.

Methods: Data were gathered from our institution’s standard remifentanil PCA survey sheet, for the same five-month period in both 2009 and 2013 comprising representative samples of 225 and 221 patients respectively. For each patient receiving remifentanil PCA, a survey sheet is completed by the midwife in conjunction with the patient. The sheet includes parity, type of labour, patient satisfaction and pain scores, and information on the incidence of any maternal adverse effects, neonatal Apgar scores and any requirement for neonatal resuscitation.

Results: There were similar patterns of patient parity and type of labour in both years, with most women experiencing only mild to moderate pain, and >80% of cases being satisfied or very satisfied overall with remifentanil PCA. Adverse effects including nausea, itch and sedation affected a similar proportion of patients in both years. The most marked difference between each group was a greater proportion of patients receiving supplemental oxygen therapy, from 21% in 2009 to 56% in 2013. The incidence of remifentanil being discontinued for desaturation remained low in both years; at 0.9% in 2009 and 0.78% in 2013, with the majority of PCAs being discontinued to facilitate maternal pushing.

Discussion: Our survey results reveal a current trend towards higher use of supplemental oxygen. In 2009 following an interim audit, there was departmental consensus to raise the threshold for intervention with oxygen therapy to a saturation level of SpO2<94%, from SpO2<90%. Subsequently, service developments gathered from regular audits, including the importance of continuous monitoring and earlier intervention with oxygen, were echoed in several case reports. Desaturation is a common but transient adverse effect, easily treated with oxygen via nasal specs in all but two cases in our study groups.

References

P32 Anaesthesia for postpartum perineal repair: an observational study
SW Coleman, D Hallsworth, R Russell
Nuffield Department of Anaesthesia, John Radcliffe Hospital, Oxford, UK

Introduction: Perineal injury requiring repair under neuraxial anaesthesia complicates up to 5.9% of deliveries. Little has been published regarding anaesthetic management, therefore we performed an evaluation of techniques used and these affected how postpartum recovery.

Methods: A prospective observational study was conducted to include 50 patients over a six-month period. Women were included when the primary indication for anaesthetic intervention was perineal repair. Data were collected regarding anaesthetic technique and drugs used, surgical time, time to subjective block regression, mobilisation, urinary catheter removal and hospital discharge.

Results: 39 women received spinal anaesthesia, 11 had labour epidurals topped-up and one spinal anaesthetic was converted to general anaesthesia due to massive ongoing haemorrhage. There were a wide range of drugs and doses used. Spinal anaesthetics were performed with bupivacaine alone or in combination with fentanyl or diamorphine and epidurals were topped up with bupivacaine 0.5% or lidocaine 2%, either alone or combination with an opioid. 34/50 women received intrathecal or epidural opioids. Maximum block height varied between T4 and T12. Median time to block regression was shorter in the absence of opioids (h:min 3:30:00-4:20) without opioids vs. 4:45:3:40-4:5:45 with opioids), but the time to discharge home was longer in the women who had not received opioids (h:min 56:09:36:58-63:33) without opioids vs. 46:21:34:15-57:30 with opioids).

Table: Timings associated with anaesthesia for perineal repair

<table>
<thead>
<tr>
<th>Block regression</th>
<th>First mobilised</th>
<th>Urinary catheter removed</th>
<th>Discharged home</th>
</tr>
</thead>
</table>

Times are median [IQR] h:min

Discussion: This small study suggests that anaesthetic technique and the use of neuraxial opioids may affect the speed of postoperative recovery and discharge after perineal repair. There is currently no evidence to guide optimal management. In this study, we did not collect postoperative pain scores and analgesia requirements which would provide more information about the relative benefit of opioids. The average length of stay post operatively was over 48 h, implying that perineal repair places a significant impact on bed availability. Steps that can reduce the length of hospital stay of those requiring perineal repair need to be established.

Reference
P33 The influence of antenatal class attendance on epidural uptake during labour

J Dolan, S Young, J Kinsella*

Department of Anaesthesia, Glasgow Royal Infirmary, Glasgow, UK, *Department of Anaesthesia, Glasgow University, Glasgow, UK

Introduction: Helping women to prepare for managing pain during labour is an important aspect of antenatal education. Women who participate in antenatal classes may feel less pain and utilise fewer analgesics.1 The aim of this study was to determine if antenatal class attendance influenced epidural uptake by nulliparous patients undergoing induction of labour.

Methods: After obtaining local research ethics approval, 299 primiparous patients who had undergone induction of labour and subsequent delivery were asked about their antenatal class attendance. The incidence of epidural uptake was recorded in those patients who attended all or none of their scheduled antenatal classes. Data were analysed using the Pearson chi-squared test.

Results: 140 (46.8%) parturients attended all their antenatal classes while 81 (36.6%) failed to attend any. The epidural uptake rate was 78/140 (55.7%) and 48/81 (59.2%) in those attending all or none of their antenatal classes, respectively (P = 0.608).

Antenatal Class Attendance

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>None</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>78</td>
<td>48</td>
<td>126</td>
</tr>
<tr>
<td>No</td>
<td>62</td>
<td>33</td>
<td>95</td>
</tr>
<tr>
<td>Total</td>
<td>140</td>
<td>81</td>
<td>221</td>
</tr>
</tbody>
</table>

Discussion: We have observed that antenatal class attendance did not influence the epidural uptake by nulliparous women undergoing induction of labour. The results of this study suggest that perceived pain and subsequent choice of labour analgesia by nulliparous parturients undergoing induction of labour are unrelated to antenatal class attendance.

Reference

P34 An intermittent pneumatic compression system in lower extremities reduces vasoconstrictor requirements during elective caesarean section under spinal anaesthesia: preliminary study

J Gonzalez, A Marti*, E Moret*, S Manrique†, M Suéscun†, J Trillo

Anaesthesiology & Intensive Care, Parc de Salut Mar, Barcelona, Spain, *Anaesthesiology & Intensive Care, University Hospital Germans Trias i Pujol, Badalona, Spain, †Anaesthesiology & Intensive Care, University Hospital Vall d’Hebron, Barcelona, Spain

Introduction: Hypotension after regional anaesthesia for caesarean section (CS) remains a common clinical problem. The aim of this study was to evaluate the vasoconstrictor requirements for preventing maternal hypotension after spinal anaesthesia (SA) during elective CS by using an intermittent pneumatic compression system (IPCS) applied to the legs.

Methods: Following ethics committee’s approval and signed informed consent patients scheduled for elective CS during a three-month period were randomised to have an IPCS on their legs before SA (G2) or not (G1: control). Exclusion criteria were age <18 years, non-elective CS, BMI > 40 kg/m², hypertension, multiple pregnancy, high-risk patients, sepsis, insulin-dependent diabetes mellitus, spinal block level >T5, ongoing epidural anaesthesia. Crystalloid cohydration with 0.9% saline 500 mL was given. SA was performed with a 25G needle at L2-L3 in the left-lateral decubitus position with 0.5% hyperbaric bupivacaine adjusted to maternal height. Hypotension was defined as a 30% decrease from initial systolic arterial pressure (SAP) or SAP <90 mmHg. A prophylactic variable rate regimen of phenylephrine (PE) infusion was titrated and rescue boluses were administered for maintenance of SAP using local guidelines. Pre-delivery we recorded patient characteristics, oxygen saturation (SpO2), heart rate and basal blood pressure and post-SA (systolic, mean and diastolic arterial pressure) every 2 min, umbilical cord blood gas values (UCBGV), Apgar scores at 1 and 5 min, PE boluses and total dose and postoperative haemoglobin. Data are presented as percentages, mean values ± SD.

Results: A total of 26 patients were included (G1: 16, G2: 10). Demographics, heart rates, UCBGV, Apgar scores, neonatal outcomes and haemoglobin values were not different between groups. Total PE consumption was 0.45±1.8 µg/kg/min in G1 and 0.37±0.1 µg/kg/min in G2 (P=0.241). 43.8% of the patients in G1 needed rescue boluses vs. 40% in G2 (P=0.588). Mean arterial pressure after SA was 85.8±13.9 mmHg in G1 vs. 90.6±13.6 mmHg in G2 (P=0.404). IPCS was well tolerated.

Discussion: An IPCS on the legs is an easy, non-invasive and non-pharmacological prophylactic method for preventing maternal hypotension after spinal anaesthesia for elective caesarean section. Our preliminary results reveal a trend towards a reduction of vasoconstrictor requirements without side-effects. A larger sample size may show a statistical significance between groups.

Reference
P35 Intravenous fluids in labour: an improvement in practice
R Barr, C Curry, G Fitzpatrick, M Molloy
Anaesthetics, Royal Victoria Hospital, Belfast, UK

Introduction: Following presentation of osmotic demyelination syndrome in a healthy primigravida post delivery, we initiated an audit of fluid management during labour in our unit. The audit highlighted that pregnant women admitted for induction of labour received on average 2.1 L (range 0.5 - 4.5 L) of intravenous (iv.) fluid during the course of labour. We noted poor documentation of fluids and fluid balance. Subsequent recommendations included multidisciplinary education on iv fluids for midwives, aims to reduce the amount given during labour, and need to improve documentation on fluid balance charts. We also implemented the use of dedicated infusion pumps for all iv fluids, a change to a more concentrated oxytocin infusion and a review of guidelines for fluids administered with epidural analgesia. To assess the improvement in practice we re-audited in July 2013.

Methods: This was a retrospective re-audit during July 2013 of the first 50 women admitted for induction of labour who received iv fluids. The same audit design and proforma was used as in the initial audit. Data were collected on fluid administration during labour, indication for fluids and completion of fluid balance charts.

Results: The re-audit clearly demonstrated a reduction in the average volume of iv fluid received during labour by almost half (Table 1). This has been attributed to improved education on fluid management, the introduction of a more concentrated oxytocin infusion, the discontinuation of routine preload with epidural analgesia and the use of dedicated pumps for additional iv fluids. The implementation of a more concentrated oxytocin infusion has reduced the average amount of fluid received with oxytocin by 69%. Documentation of iv fluids and completion of fluid balance chart has improved from 72% to 95% and from 48% to 92% respectively in the re-audit. Indications for fluid are now well documented.

Table: Intravenous fluid received during labour

<table>
<thead>
<tr>
<th></th>
<th>Initial audit</th>
<th>Re-audit</th>
<th>Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>All fluids</td>
<td>2100 mL</td>
<td>1136 mL</td>
<td>46%</td>
</tr>
<tr>
<td>Fluids with oxytocin</td>
<td>730 mL</td>
<td>223 mL</td>
<td>69%</td>
</tr>
<tr>
<td>Fluids with epidural analgesia</td>
<td>1350 mL</td>
<td>609 mL</td>
<td>55%</td>
</tr>
<tr>
<td>Additional fluid received in labour</td>
<td>1180 mL</td>
<td>892 mL</td>
<td>24%</td>
</tr>
<tr>
<td>Fluids during operative delivery</td>
<td>1360 mL</td>
<td>1004 mL</td>
<td>26%</td>
</tr>
</tbody>
</table>

Data are mean and percentage

Discussion: Morbidity and mortality caused by excessive iv fluids is becoming an increasing area of concern in all patient groups. The potential for unrecognised iatrogenic hyponatraemia due to fluids during labour has been highlighted.1 Our unit has made significant improvements regarding multidisciplinary education on fluids and fluid management and have achieved a significant reduction in iv fluids received during labour. This is thanks to the great work of the intrapartum midwifery practitioners in response to the recommendations of our initial audit. This demonstrates good medical practice and delivery of safer care.

Reference
P37 Research funding in obstetric anaesthesia: US vs. UK

EJ Robson, MJ Malik, SM Yentis
Department of Anaesthesia, Chelsea and Westminster Hospital, London, UK

Introduction: Lack of funding is one reason for the noted reduction in obstetric anaesthetic research. Our aim was to identify any differences in research funding in obstetric anaesthesia in the US and UK.

Methods: An e-mail questionnaire was sent to obstetric anaesthesia research programme leads listed in the fellowship directories on the SOAP and OAA websites in Dec. 2012, with follow-up e-mails as required. 43 US leads and 11 UK leads were identified. We asked how much money they received as research grants in Aug 2011-Aug 2012, its source and the area of research.

Results: 15/43 US leads (35%) and 7/11 UK leads (64%) responded: six (40%) in the US and four (57%) in the UK had received funding (Fig). Apart from one US institution that had received $500 000, the grant amounts were similar in the US and the UK. In the US, the grants were from various sources including the department (n=6), the institution (n=2), pharmaceutical companies (n=2), industry (n=1), the National Institute of Health (n=1) and the Child Health Research Institute (n=1). In the UK, they came from the OAA (n=4) and the National Institute for Health Research (n=1). The US research was lab-based, clinical, translational, educational and simulation-based; the UK research was clinical in all cases.

One US institution received a rolling grant, the others being project-by-project.

Discussion: Our findings suggest that the amounts received by individual institutions are similar in the US and UK, apart from one outlier in the US, although the response rate - especially US - was low. We lack data from previous years for comparison but suggest that there is a need for a centralised, current and accessible source of information on the amount of research funding awarded for obstetric anaesthetic projects (in the UK at least), and their outcome(s). We suggest that the OAA might be the most appropriate body for this.

Reference

Figure.: Grants received per institution in the US and UK ($ converted to £ for comparison)

Discussion: Our findings suggest that the amounts received by individual institutions are similar in the US and UK, apart from one outlier in the US, although the response rate - especially US - was low. We lack data from previous years for comparison but suggest that there is a need for a centralised, current and accessible source of information on the amount of research funding awarded for obstetric anaesthetic projects (in the UK at least), and their outcome(s). We suggest that the OAA might be the most appropriate body for this.

Reference

P38 Implementing a maternal specific sepsis bundle

PHamers, NTailor, RECollin
Anaesthetics, University Hospital of Wales, Cardiff, UK

Introduction: Sepsis is the leading direct cause of maternal mortality and differentiating incipient sepsis from normal pregnancy remains challenging. After a 12-day audit of vital signs in all labouring women in our institution, we introduced a maternity specific sepsis bundle to improve identification and initiate treatment in cases of potential sepsis. This study was designed to monitor the pathway and assess its utility in this setting.

Methods: A sepsis bundle proforma was introduced in October 2013. The sepsis criteria were; temperature>37.5°C, respiratory rate>20, WBC count>20x10⁹/L, heart rate (HR)>100 and "looks unwell". The parameters were based on our previous audit. Two or more criteria triggered the pathway when the mother had a set of cultures, lactate and other bloods if not already taken and started on antibiotics within an hour. All women who had cultures performed (blood, vaginal swabs, urine, wound, placenta) were identified through the patient management system and case-notes were reviewed.

Results: In the 6-week audit period (from October 1st 2013) we had 834 deliveries and 59 women (7.1%) were started on the sepsis pathway: 7.5% antenatal, 48% intrapartum, 30% immediately postpartum and 14.5% postpartum readmissions. Twenty-two percent had one trigger, in all cases this was temperature, 78% overall had a raised temperature and 67% raised HR. No women had cultures who had not been put on the pathway. Lactate was >2 mmol/L in nine women and five had positive cultures. In total, 20 women (34%) had positive cultures but only two positive blood cultures. The most common organisms were Group-B Streptococcus and E.Coli. One woman had Candida in urine, high vaginal swab and placenta, another was started on the pathway and antibiotics, but developed severe intra-abdominal sepsis whilst on co-amoxiclav. Women who were re-admitted had not triggered the bundle at an earlier time. There was one admission to general HDU and no ICU admissions.

Discussion: Conventional Systemic Inflammatory Response Syndrome (SIRS) criteria may be a poor predictor and criteria based on Modified Early Obstetric Warning Score (MEOWS) charts are also poor. We have shown that adjusting the SIRS threshold and introducing "looks unwell" has produced a bundle where 34% had a positive culture and all women with potential sepsis were identified. Most women had a lactate performed which differentiated those in most need of care and all women had antibiotics in a timely fashion. Some women who were clinically most unwell had negative cultures from urine, blood and wound swabs but were positive for Group-B Streptococcus on high vaginal swabs and this is clearly important when screening unwell mothers. This audit is continuing so that a larger more meaningful data-set can be produced with the potential to refine the bundle.

References
P39 Workforce analysis of anaesthetic support staff
S Halder, AW Rivers, M Cox, SM Yentis
Magill Department of Anaesthesia, Chelsea and Westminster Hospital, London, UK

Introduction: Analysis of medicolegal reports and serious untoward incidents suggest that lack of staff, particularly out-of-hours, may contribute to these adverse outcomes on labour ward.1-3 We present a method for analysing labour ward operating theatre activity, particularly allocation of operating department practitioners (ODPs).

Methods: In our unit, two ODPs cover labour ward 07:00 – 17:00 h on weekdays (‘office hours’); outside of this, one ODP covers labour ward and one covers main theatres (and is sometimes available to open a second labour ward theatre depending on caseload). We reviewed the labour ward theatre ledgers during a four-week period in Sept 2010 and again in Sept 2013. These record the times a patient is in theatre and the ODP’s name, allowing us to identify when just one ODP was covering two theatres, a practice that we considered to be non-ideal. Results were compared with Fisher’s exact test.

Results: There did not appear to be a major change in theatre activity between these periods. In the 2010 study period, there were 204 theatre procedures (of varying duration) with only activity between these periods. In the 2013 study period, there were 208 theatre procedures; four (1.9%) occurred with non-ideal staffing levels, again, all out-of-hours.

Table: Activity in theatres

<table>
<thead>
<tr>
<th>Office-hrs</th>
<th>Out-of-hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>One theatre, one ODP</td>
<td>53</td>
</tr>
<tr>
<td>Two theatre, two ODPs</td>
<td>53</td>
</tr>
<tr>
<td>Two theatre, one ODP</td>
<td>0</td>
</tr>
</tbody>
</table>

Discussion: We believe our maternity ODP cover is currently adequate and stable, with only a small number of cases in which one ODP covers two theatres. We will re-audit to ensure that the changing workload in both maternity and main theatres does not impact ODP availability. With a variable and unpredictable workload, it is inevitable that optimal ‘safe’ levels of staffing are not always possible, however we are not aware of any guidance as to how often suboptimal levels should be considered acceptable.

References

P40 Bilateral greater occipital nerve block in the management of post dural puncture headache
V Girotra, K Katechia, A Kelkar, G Niraj
Department of Anaesthesia, Leicester General Hospital, Leicester, UK

Introduction: Post-dural puncture headache (PDPH) can lead to short term disability, and result in a prolonged hospital stay. At present, there is no treatment that can be universally offered to all patients who have failed conservative management. We used the Bezov review1 to modify our guidelines for management of PDPH and offered both epidural blood patch (EBP) and greater occipital nerve block (GONB) to patients who failed conservative management with simple analgesics for 24 h after the onset of headache.

Methods: After obtaining Hospital Audit Committee approval, we evaluated the management of PDPH using the modified guidelines at our centre. Over a six-month period, 20 obstetric patients presented with PDPH. Seventeen patients failed to respond to conservative management and were offered both EBP and GONB. Bilateral GONB was performed at the bedside using a mixture of lidocaine and dexamethasone.2 A total of 13.2 mg of dexamethasone was used.

Results: All seventeen patients who failed conservative management had a dural puncture with a 16G Tuohy needle. One patient chose EBP and was successfully treated. Sixteen patients chose GONB as the first option. Bilateral GONB was successful in complete resolution of PDPH and associated symptoms in 10 patients (63%). Six patients had an inadequate response and were subsequently treated with EBP. At six-week follow-up, patient satisfaction was excellent in 78% and no complications were reported.

Discussion: Our single centre experience reveals that GONB may be an option in patients who fail conservative management. The greater occipital nerve arises from the dorsal root of the second cervical nerve. Rationale for using GONB comes from the convergence of sensory input to trigeminal nucleus caudalis (TNC).3 The structures in the scalp receive innervation from both the trigeminal nerve and upper cervical nerves. Dural stretch induced by low CSF volume may activate the TNC causing increased activity in the trigeminal and greater occipital nerves. GONB could result in interruption of pain transmission via occipital nerves to the TNC. The temporary reduction inafferent input to the TNC may cause a “winding down” of the central sensitisation that propagates the headache. GONB is a simple, safe, minimally invasive, cost-effective procedure that can be performed at the bedside. We are not advocating GONB as an alternative to EBP, but as a superior form of conservative management for PDPH.

References
P41 E-learning: raising standards of epidural care

ATL Tay, M Dudley

Anaesthetics, Watford General Hospital, Hertfordshire, UK

Introduction: Midwives play a primary role in advising and supporting women in their choice of pain relief for labour. An e-learning module was chosen as the teaching tool of choice for its advantages of the flexibility it allowed midwives of choosing the time they undertook learning and circumventing difficulty of coordinating small group teaching. The MCQ at the end of the module encourages active learning, allows for assessment of understanding of the principles taught and recertification. This provides the basis to maintain high standards of patient care and continual improvement of the quality of trust service delivery.

Methods: We have audited the baseline knowledge of midwives within our Trust on labour analgesia. This audit revealed a difference in knowledge amongst midwives compared with current evidence, potentially leading to women being misinformed on labour analgesia. To address this, we created an e-learning module for midwives, based on the Obstetric Anaesthetists’ Association’s publication on labour analgesia.1 This e-learning module included slides with photos and video clips. The slides were written specifically for the target audience, based on the findings from the audit, to focus on relevant anatomy, pharmacology, side effects and troubleshooting. The video clips demonstrated the practical aspects of epidural preparation, care and testing of the block level. The MCQ focused on common misconceptions including: safety, mobility, drug confusion and back pain, and was linked directly to a trust-based log held by the education department. A further audit of midwives who completed it was performed by direct interview by an anaesthetic trainee using the same standardised questionnaire. Statistical analysis (Wilcoxon rank sum) was performed using Analyse-it on MS Excel.

Results: There was an increase in the proportion of midwives who perceived an epidural as the most effective pain relief in labour following e-learning (22 vs. 63%). Overall there was a significant increase (P=0.004) in awareness of the side effects of epidurals (hypotension following a bolus), failure, headache, increased risk of assisted delivery or caesarean section, temporary sensory loss and paralysis) and common misconceptions (long-term backache and dangerous effects on the baby).

Discussion: E-learning is becoming the learning tool of choice in the modern NHS. It provides an easily accessible, cost-effective and time-efficient aid in training and revalidation of medical professionals. It allows recordable assessment and recertification and can be utilised by the trust for mandatory training and Clinical Negligence Scheme for Trusts (CNST) evidence. It may be easily updated with new best practice guidelines to maintain high quality standards of knowledge and patient care. The tool will also facilitate standardisation of the care delivered by temporary or new staff into our unit. We have found it useful in the education and continuing professional development of midwives with regards to current best practice obstetric neuro-axial analgesia. We would like to re-audit the participating midwives for longer term knowledge retention.

Reference

P42 Epidural training among midwives: Are we following national guidance?

V Nalawade, G Rangaswamy, U Misra*

Anaesthetics, Sunderland Royal Hospital, Sunderland, UK, Anaesthetics, James Cook University Hospital, Middlesbrough, UK

Introduction: Serious untoward incidents resulting in patient deaths prompted the NPSA alert 21 which advocated that there should be formal training and regular updates for clinical staff responsible for administering and monitoring epidural injections and infusions.1 The RCOA guidelines for Obstetric Anaesthetic Services recommend that midwifery care of a parturient receiving epidural analgesia in labour should comply with local guidelines and the midwife must be trained to an agreed standard in regional analgesia and be aware of potential complications and their management. In most obstetric units, parturients with epidural analgesia are monitored by midwives and in some units top-ups are administered by midwives. The aim of our survey was to evaluate current epidural training and updates amongst midwives working at two teaching hospitals.

Methods: After gaining approval from the Trust audit committee, a questionnaire was given to 94 midwives at Sunderland Royal Hospital (SRH) and 73 midwives at James Cook University Hospital (JCUH). Questions were asked regarding training received post qualification to look after parturients receiving epidural analgesia, the nature of this training and whether regular updates are being provided.

Results: When performed there was no consistency in the method used for assessment of competencies. It varied from verbal questioning in some to practical demonstrations on parturients in others. There was an alarming lack of regular epidural updates in both institutions.

Table: Midwifery training in epidural analgesia

<table>
<thead>
<tr>
<th></th>
<th>SRH</th>
<th>JCUH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response rate</td>
<td>84%</td>
<td>87%</td>
</tr>
<tr>
<td>Average midwifery experience</td>
<td>13.7 y</td>
<td>11.6 y</td>
</tr>
<tr>
<td>Epidural training – Never</td>
<td>50.6%</td>
<td>30.1%</td>
</tr>
<tr>
<td>Training more than 10 y ago</td>
<td>69.2%</td>
<td>34.5%</td>
</tr>
<tr>
<td>Training for less than 2 h</td>
<td>61.5%</td>
<td>79.5%</td>
</tr>
<tr>
<td>Training given by anaesthetist</td>
<td>69.5%</td>
<td>90.9%</td>
</tr>
<tr>
<td>No Assessment of competencies</td>
<td>30.7%</td>
<td>63.4%</td>
</tr>
<tr>
<td>No regular updates</td>
<td>88.6%</td>
<td>57.1%</td>
</tr>
</tbody>
</table>

Discussion: Our findings demonstrate that we are not achieving the RCOA/OAA recommendations for providing safe labour epidural analgesia. Abolition of midwife-administered top-ups and introduction of patient-controlled epidural analgesia over the last 10 years could be a contributory factor. There needs to be a structured epidural training programme and regular mandatory updates for midwives who look after parturients receiving epidural analgesia. The results and recommendations were presented to the obstetric delivery suite forum at SRH. Epidural updates provided by the anaesthetist are now part of the midwives mandatory training day. We intend to repeat this survey at the end of 2014 to see if we have made improvements in our training.

Reference
P43 Educational enhancement exercise in obstetric anaesthesia
S Halder, R Patel, AW Rivers, MCox, JDURbridge, SM Yentis
Magill Department of Anaesthesia, Chelsea and Westminster Hospital, London, UK
Introduction: Postgraduate Medical Education Training Board (PMETB) surveys have highlighted that there are many ways in which the educational environment for anaesthetic trainees might be enhanced. The London Deanery provides a free service to assess teaching facilities, identify current standards and highlight areas of improvement.1 We contacted educators from the London Deanery and invited them to undertake an assessment of our department.2 The visitors met with trainees and consultants to assess current standards. They then observed clinical teaching on two separate days, in a “fly on the wall” manner. Following this they made recommendations for teaching enhancement.
Methods: Following the Deanery visit we conducted a survey of obstetric anaesthetic consultants in our department to see if their teaching styles had changed. We assessed teaching methods using the scale 0 = not useful to 10 = extremely useful. Data were analysed using Mann-Whitney U-tests.
Results: A response rate of 7/8 (87.5%) was obtained. After the Deanery visit, consultants are using a wider parameter of assessment, receiving assessor feedback and of mentoring trainees. All the consultants and the five trainees involved found the exercise a useful and stimulating one. Following this they made recommendations for teaching enhancement.
Table: Teaching techniques used by consultants pre- and post-Deanery feedback

<table>
<thead>
<tr>
<th>Pre-feedback</th>
<th>Post-feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syllabus topic discussions</td>
<td>6 (2-5[2-10])</td>
</tr>
<tr>
<td>Case based discussions</td>
<td>6 (5-9[5-10])</td>
</tr>
<tr>
<td>Assessment of learning needs</td>
<td>3 (2-4[0-5])</td>
</tr>
<tr>
<td>Encouragement of trainee self-assessment and self-reflection</td>
<td>4 (3-5[2-5])</td>
</tr>
<tr>
<td>Assessor feedback</td>
<td>1 (1-3[0-7])</td>
</tr>
<tr>
<td>Mentoring “through concerns”</td>
<td>2 (1-4[1-7])</td>
</tr>
<tr>
<td>Coaching using early debrief</td>
<td>7 (4-7[3-8])</td>
</tr>
</tbody>
</table>

Data are median (IQR [range]). * P<0.05 vs pre-Deanery feedback.

Discussion: We believe the educational assessment of our department was an extremely useful exercise that enhanced our teaching environment. We would thoroughly recommend other departments to take up this opportunity where it is available.

Acknowledgments: We would like to thank John Launer and Lisa Miller from the London Deanery for their educational development.

References

P44 Assessment and training on a new epidural simulator
VG Hamlyn, D Bruynseels, J Clark*, JE Hall*, RE Collis
Department of Anaesthetics, University Hospital of Wales, Cardiff, UK, *Academic Department of Anaesthesia, Cardiff University, Cardiff, UK
Introduction: Proficiency at neuraxial procedures, especially epidural placement, requires a great deal of training and can be difficult to teach.1 To date, training aids, although known to be useful,2 have not been widely used for this purpose partly because it has been difficult to design realistic models. A novel, low fidelity 5-layered silicon model in a box has been developed based on extensive local testing and expert opinion, with the aim of bringing a small, practical and durable product to delivery suite. The aim of this study was to assess the model for realism and as a teaching and training aid.
Methods: Development and testing had ethics and R&D approval. The model was set up in a delivery suite room and after giving verbal consent, anaesthetists with a range of experience performed an epidural using their usual technique. The insertion was video recorded from two angles. After each epidural, the video was reviewed with some discussion, and feedback was given. Participants were then asked to give their own feedback on realism and usefulness as a training device, using visual analogue scale (VAS) scores from 0-100mm.
Results: Thirteen operators from CT2 to consultant performed an epidural using the model. The table below shows the results of the VAS questionnaire.

<table>
<thead>
<tr>
<th>Performance on model reflects usual performance in clinical practice</th>
<th>Usefulness as an assessment tool</th>
<th>Usefulness as a training tool</th>
<th>Usefulness in identifying personal strengths &amp; weaknesses</th>
<th>Usefulness in assessing model overall</th>
<th>realism of model</th>
<th>realism of feel of soft tissues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median 60</td>
<td>48</td>
<td>85</td>
<td>88</td>
<td>64</td>
<td>74</td>
<td>60</td>
</tr>
<tr>
<td>IQR 50-68</td>
<td>38-61</td>
<td>69-92</td>
<td>76-97</td>
<td>46-90</td>
<td>64-88</td>
<td></td>
</tr>
</tbody>
</table>

Discussion: Overall, participants thought that the model provided a moderately realistic representation of the soft tissues encountered during epidural insertion, but thought that it could be a very useful training tool. Some participants felt that the model was made less realistic by the absence of bony structures. Most found the model was useful in identifying their strengths and weaknesses, and the majority were confident the model allowed them to duplicate their real-life clinical performance. The use of video feedback from ubiquitous hand-held devices in a non-threatening environment added positively to the experience. The new model was highly portable and was used when time allowed. We feel it could be used both as a training device for novices and as an assessment device for the more experienced anaesthetist in a labour ward environment.

The model was developed in collaboration with Technovent Ltd, with an i-4-i NIHR grant.

References
P45 Evaluation of a high dependency midwife training programme
O Lubeigt, K Lake, M Markey, P Virhia*, J Reid
Maternity Unit, Southern General Hospital, Glasgow, UK,
*Training and Development, Gartnavel General Hospital, Glasgow, UK

Introduction: Critically-ill patients should receive the same standard of care irrespective of location. In 2009 a survey of midwives in Glasgow showed that 66% felt they had inadequate training in caring for women in the high dependency unit (HDU). 95% wanted more training but stated it was difficult to obtain study leave to attend. Training sessions were implemented at that time. Four years on we have restructured the training programme with the aim of providing accessible, sustainable HDU training for midwives.

Methods: Sessions in two sites within Glasgow were organised. Five workshops on invasive monitoring were carried out over three months. They took place within the labour ward allowing midwives to attend during their working day. Training consisted of a short lecture and practical training on the care and maintenance of invasive lines.

Results: 44 midwives attended the courses and 100% completed the survey questions. 34% had dual midwifery and nursing training. 70% had looked after a patient with invasive lines but only 34% had any kind of training on invasive monitoring. The following statements were rated using the Likert scale:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I had good knowledge of IM before the course</td>
<td>11%</td>
<td>27%</td>
<td>39%</td>
<td>21%</td>
<td>2%</td>
</tr>
<tr>
<td>I was confident caring for patients with IM before the course</td>
<td>16%</td>
<td>29.5%</td>
<td>29.5%</td>
<td>23%</td>
<td>2%</td>
</tr>
<tr>
<td>I feel more confident in IM after the course</td>
<td>0</td>
<td>2%</td>
<td>2%</td>
<td>48%</td>
<td>48%</td>
</tr>
<tr>
<td>The course was easy to attend</td>
<td>0</td>
<td>0</td>
<td>2%</td>
<td>11%</td>
<td>87%</td>
</tr>
<tr>
<td>The quality of the course content was good</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>11%</td>
<td>89%</td>
</tr>
</tbody>
</table>

IM: invasive monitoring

Discussion: There is a clear and urgent need for ongoing training and support for our midwives working in HDU. Some have been expected to care for patients with invasive lines without appropriate training. The feedback shows that the training sessions were well received and highly rated but above all, 98% felt that the sessions were accessible. We plan to continue the current format of training covering a variety of HDU topics. Evaluation will be conducted regularly to ensure standards are maintained.

References

P46 PROMPT – a practical approach to human factor training in obstetrics
M Keane, A Daoud*, S Sharma, H Barnes, R Pretorius*, A Surendran*
Department of Obstetrics and Gynaecology, The Queen Elizabeth Hospital, King’s Lynn, UK, *Department of Anaesthesia, The Queen Elizabeth Hospital, King’s Lynn, UK

Introduction: The recent CMACE report highlighted sub-optimal team interaction during obstetric emergencies as contributing to poor maternal and neonatal outcomes. In the last decade many Trusts have invested in high-fidelity simulators to facilitate crisis training in human factors. Several evaluative studies have shown this method of practiced interaction between teams to be highly effective. At present due to the cost implications only medical practitioners are supported to attend these courses. In an obstetric emergency, active participation from midwives, support workers and theatre practitioners are equally vital. The PROMPT (Practical Obstetric Multi-Professional Training) course which has evolved from Bristol utilises ‘candidate actors’ and local resources without additional costs. Demonstrable improvements in clinical outcomes have been published.

Methods: Thirty participants from two PROMPT courses were surveyed through a questionnaire. Areas of key non-technical skills were rated on a scale of 0-10, before and after the course. Participants included anaesthetists, obstetricians, midwives, support workers and theatre staff.

Results: Response rate was 100%. The results are shown in the Figure:

Figure: Average pre and post course self-assessment scores on human factor training

Discussion: Our experience suggests a perceived improvement in non-technical skills can be achieved through PROMPT. We believe that PROMPT allows the opportunity for all maternity staff to learn together in a safe, practical and cost effective manner and should be made integral to their professional development.

References
P47 Using a new electronic obstetric anaesthetic database for monitoring trainee activity

GNB Jackson, R Rohit, R Abraham
Anaesthetic Department, Royal Berkshire Hospital, Reading, UK

Introduction: We introduced a new electronic database ‘ROAD’ (Reading Obstetric Anaesthetic Database). Written and designed by one of our anaesthetists it is secure, password-protected and able to produce reports on patient data and the activity of individual anaesthetists. It has been shown to be accurate and we are now using the data to provide reports on patient activity as well as the activity of individual anaesthetists. Our ST2 anaesthetists contribute to the the resident obstetric rota and it is a challenge to ensure that they are ready for independent practice on delivery suite (with non-immediate supervision). We used the database to audit our new ST2 trainees procedural experience before starting resident on calls and again in the four weeks following once on call.

Methods: The ROAD was analysed retrospectively looking at trainee anaesthetist procedural activity between 01.11.13-15.12.13 (day before first on call) and also between 16.12.13-09.01.14 (first few weeks of on call duties).

Results: The data show that our new trainees had a reasonable (but limited) spread of procedural experience. The data also showed that they consolidated their experience in their first weeks on call.

<table>
<thead>
<tr>
<th>Trainee</th>
<th>Epidural</th>
<th>Epidural top-up</th>
<th>GA</th>
<th>Spinal</th>
</tr>
</thead>
<tbody>
<tr>
<td>01/11/14 - 15/11/14</td>
<td>A</td>
<td>8</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>B</td>
<td>12</td>
<td>2</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>C</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>16/11/14 - 09/01/14</td>
<td>A</td>
<td>4</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>B</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>C</td>
<td>8</td>
<td>5</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>

Discussion: The ‘Initial assessment of competence in obstetric anaesthesia certificate’ (IACOAC) from the Royal College of Anaesthetists is the official certificate of competence requiring completion before on-call duties in obstetrics. This includes a number of specified assessments (ACEXs, DOPs and CBDs) but does not stipulate a set number of procedures. While competence is not implied by a pre set number of procedures we feel it is important to also monitor this. Previously this has relied on self-reporting but now we are able to use our database to remotely monitor individual anaesthetist activity. This allows the lead obstetric anaesthetist to use both volume of procedures and progress towards the IACOAC (as well as the opinion of other obstetric anaesthetists) before allowing the new trainees on to the on-call rota. In addition, the level of supervision (immediate, local, distant, unsupervised), patient feedback (obtained at follow-up) and complication rates (dural puncture etc.) can be accessed. We are now able to access and assess trainees procedural experience via a reliable database. It is reassuring for the anaesthetist responsible for the trainees on the resident rota and a useful tool in our assessment of initial competence.

P48 Multidisciplinary communication in a tertiary obstetric unit

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Introduction: "An effective working relationship between the multidisciplinary team and a clear organisational structure for midwives and medical staff with explicit and transparent lines of communication is crucial to ensure optimum care for women".1 This is particularly true in geographically large, busy, tertiary units and in times of urgency. There are many challenges to communication on the delivery suite: frequent handovers and shift changes; rotating doctors and midwives and locum staff. In addition, going through switchboard may be time consuming and is not always appropriate, or necessary, to fast-bleep members of staff. Therefore, it is imperative that all members of staff have rapid access to contact numbers for the multidisciplinary team (MDT).

Methods: We devised a simple, anonymous questionnaire to identify knowledge of contact numbers from different team members and if not known, where they can be found. Over a two-month period (Nov - Dec 2013) we distributed the questionnaire to anaesthetists, obstetricians, midwives, theatre staff / ODPs, critical care nurses and health-care support workers (HCSW), all of whom had been working on our unit for more than two weeks.

Results: We collected 140 responses: anaesthetists (29), obstetricians (24), midwives (59), theatre staff / ODPs (22), critical care nurses (4) and HCSW (2).

Table: Knowledge of contact numbers

<table>
<thead>
<tr>
<th></th>
<th>Contact number known</th>
<th>Contact number unknown</th>
<th>Neither contact number nor where to obtain it known</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaesthetic Reg</td>
<td>82 (58.6%)</td>
<td>58 (41.1%)</td>
<td>13 (9.3%)</td>
</tr>
<tr>
<td>ODP</td>
<td>52 (37.1%)</td>
<td>88 (62.9%)</td>
<td>23 (16.4%)</td>
</tr>
<tr>
<td>Theatre co-ordinator</td>
<td>46 (32.9%)</td>
<td>94 (67.1%)</td>
<td>27 (19.3%)</td>
</tr>
<tr>
<td>Obstetric Reg</td>
<td>91 (65%)</td>
<td>49 (35%)</td>
<td>12 (8.6%)</td>
</tr>
<tr>
<td>Obstetric SHO</td>
<td>86 (61.4%)</td>
<td>54 (38.6%)</td>
<td>14 (10%)</td>
</tr>
<tr>
<td>Paeds Reg</td>
<td>44 (31.4%)</td>
<td>96 (68.6%)</td>
<td>28 (20%)</td>
</tr>
<tr>
<td>Paeds SHO</td>
<td>59 (42.1%)</td>
<td>81 (57.9%)</td>
<td>23 (16.4%)</td>
</tr>
<tr>
<td>Paeds anaesthetist</td>
<td>3 (2.1%)</td>
<td>137 (97.9%)</td>
<td>38 (27.1%)</td>
</tr>
</tbody>
</table>

Discussion: A considerable number of those questioned were unaware of how to contact other team members. It is not surprising that everyone cannot recite these contact numbers; however, they should have an awareness of where they can be found. Any member of the MDT should know how to contact key people as a matter of urgency. We have devised a universal sticker for all staff working in our delivery suite. It is to be attached to the back of the staff ID badge (also used for swipe access to the unit, the hospital and the car park). This is given out at induction and we feel this will be of benefit particularly in areas of the unit that are more remote from the main ‘hub’ of activity and where contact numbers are less well published.

Reference
P49 Human factor training further improves novice obstetric anaesthetists' confidence levels during simulation training
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Introduction: Simulation training offers a safe learning environment for reinforcing emergency drills and enabling non-technical skill acquisition for situations where clinical opportunities may be limited and is included in the RCoA curriculum 2010 for basic training. The high fidelity Novice Obstetric Anaesthetists’ Course was established in 2010 with the aim of improving the confidence of trainees starting obstetric anaesthetic on calls. We have developed the course following recent OAA/AAGBI Guidelines for Obstetric Anaesthesia Services to include essential non-technical team work training and human factor elements.

Methods: We ran a one day high fidelity simulation course for trainees about to, or who had recently started obstetric anaesthetic on-calls. Candidates voluntarily completed a pre- and post-course survey rating their confidence levels in managing a variety of obstetric anaesthetic scenarios using a visual analogue scale (VAS) of 0-100 mm. Each candidate led a regional (RA) or general anaesthesia (GA) scenario (8 in total) followed by an ‘ultimate scenario’ in which candidates were randomly assigned new teams and thrown into multiple simultaneous scenarios. In 2013 we introduced interactive small group discussion sessions between scenarios, emphasising the key learning points, with focus on the non-technical aspects of each scenario using a 'non-clinical checklist' and discussion of human factors.

Results: The mean confidence increase for all scenarios was 35 mm (range 26-43 mm) in 2013 compared to 27 mm (range 18-30 mm) in 2010-2011. Post course feedback praised and highlighted the value of emphasis on non-clinical skills, human factors and small group tutorials.

Discussion: We have demonstrated that the addition of human factor training to an established high-fidelity simulation training course helps novice anaesthetists increase their confidence in obstetric anaesthesia and improves the quality of care that they deliver to patients.

References
1. RCoA Curriculum 2010 for basic level training
2. OAA/ AAGBI Guidelines for Obstetric Anaesthesia Services 2013

P50 Lateral position for central neuraxial blocks in obstetric anaesthesia - a need for further training?
C Donohue, A Crean*, YM Liu, J Dick
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Introduction: The ability to perform central neuraxial blocks (CNB) confidently in both sitting and lateral positions is advantageous in obstetric anaesthesia. The lateral position (LP) conveys benefits, through improved maternal comfort and safety, improved placental perfusion and fetal monitoring and faster onset of subarachnoid block. These benefits may be particularly important in certain clinical contexts such as maternal distress requiring caesarean section (CS). This survey aimed to evaluate the trainee experience with CNB in the LP to inform and improve local training development.

Methods: We circulated a 10-question survey amongst North Central London and Oxford anaesthetic trainees using e-mail and social network sites. Statistical analysis was performed using chi-square test with P<0.05 defined as significant.

Results: 100 responses were collected. 69% of respondents were senior trainees (ST5-7). When asked how often they performed CNB for labour analgesia in the LP, 7% of respondents did this more than 50% of the time and a similar answer was given for performance of CNB for CS (10%). Difficulty determining the midline was the most commonly cited reason dissuading against performing CNB in the LP. 81% of respondents felt less confident performing CNB in the LP, though lack of confidence was less likely to be a problem for senior compared with junior (CT1-ST4) trainees (P=0.039). Significantly more senior than junior trainees would attempt CNB in the lateral position for a category 1 CS if the sitting position were unavailable (P=0.003). Most senior trainees felt that they would not benefit from further training in performing CNB in the LP (P=0.002). There was no difference between grades in whether they felt this should be a specific competency (P=0.432).

Table: Perceived benefits of CNB in the LP

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Responses %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal comfort</td>
<td>77%</td>
</tr>
<tr>
<td>Improved safety for drowsy mother</td>
<td>77%</td>
</tr>
<tr>
<td>Improved placental perfusion</td>
<td>36%</td>
</tr>
<tr>
<td>Facilitates fetal monitoring</td>
<td>27%</td>
</tr>
<tr>
<td>Faster onset of block</td>
<td>8%</td>
</tr>
<tr>
<td>No benefit</td>
<td>2%</td>
</tr>
</tbody>
</table>

Discussion: The vast majority of survey responders felt less confident performing CNB in the LP compared with sitting. As one might expect, senior trainees are more likely to attempt a CNB in the LP than junior colleagues, reflecting difference in clinical experience. Interestingly there was no consensus regarding making teaching of CNB in the LP a compulsory component of obstetric competencies, possibly reflecting the under representation of junior trainees in this survey. We wish to raise the profile of LP for CNB and suggest that greater attention should be given to the acquisition of this important skill during junior obstetric anaesthetic training.

References
P51 A survey of maternal attitudes to epidural analgesia for labour in a UK maternity unit
S Soni, M Arora*, C Papageorgiou†
Anaesthetics, Pain Medicine and Intensive Care, Chelsea and Westminster Hospital, London, UK; *Anaesthetics, Hammersmith Hospital, London, UK; †Anaesthetics, Hillingdon Hospital, London, UK

Introduction: Regional anaesthesia provides excellent analgesia in labour.1 However, it is estimated that only 22.7% of women in the UK use epidural analgesia before or during delivery.2 This is low compared to other developed nations where rates can be more than double.3 There is a scarcity of evidence investigating maternal attitudes towards epidurals in the UK to explain this variation. Therefore we conducted a survey in our maternity unit to: 1) Identify any predictive factors of mothers requesting regional analgesia during labour; 2) Understand reasons why women did not plan to have an epidural; 3) Identify the primary source of information used by expectant mothers.

Methods: Our study received approval from our local research ethics committee. Expectant mothers who attended the obstetric antenatal clinic over a two-month period were approached. The survey collected demographic data, mothers’ previous obstetric history and questioned whether an epidural would be considered during labour including reasons why not. Sources of information used by women to make their decision about regional anaesthesia were also examined. Mann–Whitney test was to compare non-parametric data and Fisher’s exact test was used to compare proportions.

Results: 200 mothers completed the survey (response rate of 89%). The following characteristics were predictive of expectant women requesting an epidural: Older age (P=0.0034); UK as birth country (P=0.0402); joint household income >£30 000 (P=0.0150); and a previous epidural for labour (P=0.0023). Back pain was the foremost reason not to plan for a labour epidural especially in ethnic groups (P=0.0001). The most popular sources of information regarding epidurals were friends and relatives (37%).

Discussion: We have identified four characteristics predictive of women considering a labour epidural in our patient population: older age, UK as birth country, household income >£30 000 and a previous labour epidural. Back pain was still the most popular reason not to have an epidural, especially in certain ethnic groups. Research disproving the link between epidurals and back pain has not filtered through to our population. This may be explained by the fact that the most popular source of information regarding epidurals was via communication with friends and family, regardless of the widespread resources available today. We recommend improvements in maternal education to dispel common misconceptions regarding epidural analgesia.

References

P52 Survey of regional anaesthesia practice for septic parturients among Northern Ireland anaesthetists
D F Johnston, K L Spence
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Introduction: Within obstetric anaesthesia there are evidence based guidelines to direct the placement of central neuraxial blockade (CNB) for abnormalities of coagulation.1 The same is not true for siting CNB in sepsis. We aimed to ascertain the majority opinion among obstetric anaesthetists when considering CNB in septic parturients in the following areas: investigations requested and septic marker thresholds when comparing spinal versus epidural.

Methods: An on-line survey was sent to consultants with regular obstetric sessions and anaesthetic trainees at ST3 level or above. This was a two-stage clinical based questionnaire.

Results: Form completion for consultants who cover regular obstetric sessions was 42/48 (0.87) and 44/72 (0.61) for trainees. When asked to site a lumbar epidural for a patient with prolonged membrane rupture and raised white cell count (WCC) and temperature, 61% of responders would request further investigations before proceeding. Serum C-reactive protein makes up 60% of investigation requests, coagulation screen in 25% and blood culture in 10%. Eighty-one percent would ensure that antibiotic prophylaxis was given before siting an epidural. Ninety-three percent would offer alternative analgesia (half of those anaesthetists would refuse to sit an epidural if the patient declined alternative analgesia). Forty-five percent have a WCC maximum threshold for siting a labour epidural compared to 27% for siting a spinal. Fifty-five percent have an upper temperature threshold for siting a labour epidural compared to 27% for siting a spinal. Of those who have a maximum WCC threshold the results are displayed in Figure 1. Most comments remarked on the absence of agreed guidance. Decisions were based on how each individual patient appeared clinically, and used a risk versus benefit approach to decide if CNB should be sited.

Discussion: This survey suggests that there is a wide range of opinion among anaesthetists regarding CNB for patients with potential sepsis. There is a trend towards a higher threshold of WCC when siting single shot spinal compared to indwelling epidural catheters. There is no agreed criteria for setting thresholds in sepsis so practice varies greatly.

Reference
P53 Who do they think we are: maternal perception of the anaesthetist on labour ward

S Soni, M Arora*, C Papageorgiou†
Anaesthetics, Pain Medicine and Intensive Care, Chelsea and Westminster Hospital, London, UK, *Anaesthetics, Hammersmith Hospital, London, UK; †Anaesthetics, Hillingdon Hospital, London, UK

Introduction: The role of anaesthetists in obstetric practice is well established. However previous, well-publicised national surveys have demonstrated that the general public do not see anaesthetists as doctors.1,2 Interventions such as World Anaesthesia Day have tried to improve public awareness of the speciality. Therefore, we conducted a survey investigating the knowledge of the speciality in our obstetric population.

Methods: Our survey was approved by the local research ethics department and was offered to all expectant mothers attending our obstetric clinic between January-February 2013. Volunteers were asked whether anaesthetists were doctors, nurses or other allied healthcare professionals. Once informed that anaesthetists were doctors specialising in pain management during labour, women were asked whether an antenatal encounter with an anaesthetist would improve their understanding of labour analgesia. Once data collection was completed, we telephoned maternity units in London to investigate the number of antenatal classes that have anaesthetic involvement.

Results: 200 willing participants agreed to complete our survey. 52% (104/200) thought anaesthetists were doctors and 48% (96/200) did not. Of these 96 expectant mothers, 37 (39%) believed anaesthetists were nurses while 59 (61%) assumed anaesthetists were other healthcare professionals. Having informed these 96 pregnant women that anaesthetists were doctors and specialists in labour pain management, 86% (83/96) believed an antenatal encounter with an anaesthetist would improve their understanding of labour analgesia. Out of the 33 maternity units in London, we were able to contact antenatal class managers for 22 (response rate 67%). Of these 22 classes, only 2 (9%) have any anaesthetic involvement.

Discussion: In our population, a large proportion of prospective mothers were not aware that anaesthetists were doctors. Once informed, an overwhelming majority expressed an interest in meeting an anaesthetist antenatally to discuss pain management options. However, that facility is not available for the majority of patients across London. Fear of back pain and perceived increased risk of caesarean delivery are still cited as reasons by women not to have a labour epidural,3 despite medical literature disproving these risks. By increasing awareness of the anaesthetists’ role and expanding their availability to women antenatally, expectant mothers' knowledge of analgesic option for labour and their risks, may be improved.

References
1. Keep PJ Jenkins JR. As others see us. The patient's view of the anaesthetist. Anaesthesia 1978; 33: 43-45

P54 Awareness of emergency resources in a tertiary delivery suite - a multidisciplinary survey

JA Longbottom, LA Howie, W Macnab
Anaesthetics, St Mary's Hospital, Manchester, UK

Introduction: Anaesthetic and obstetric emergencies present a unique challenge requiring a rapid, coordinated team response with immediate access to drugs and equipment to avoid adverse outcomes. It is well recognised that awareness of the location of emergency anaesthetic equipment and drugs together with routine equipment checks are essential for safe anaesthesia.1 In the large, busy, modern maternity unit with frequently changing multidisciplinary teams similar preparations are required for the effective management of emergencies. All team members must be aware of the location of these emergency resources irrespective of their clinical role.

Methods: Over a two-month period (November-December 2013), we distributed an anonymous, paper-based questionnaire to all grades and specialties of staff. All participants had worked on the unit for more than two weeks.

Results: We received 140 responses: anaesthetists (n=29), theatre staff (n=22), obstetricians (n=24), midwives (MW, n=59), critical care nurses (CCN, n=4) and health care support workers (HCSW, n=2).

At least one location known All staff Anaes Theatre Obstet MW, CCN, HCSW

<table>
<thead>
<tr>
<th>Defibrillator (x5)</th>
<th>130</th>
<th>27</th>
<th>22</th>
<th>17</th>
<th>65</th>
</tr>
</thead>
<tbody>
<tr>
<td>(92.9%)</td>
<td>(93.1%)</td>
<td>(100%)</td>
<td>(70.8%)</td>
<td>(100%)</td>
<td></td>
</tr>
<tr>
<td>Pre-eclampsia</td>
<td>115</td>
<td>23</td>
<td>13</td>
<td>18</td>
<td>61</td>
</tr>
<tr>
<td>(82.1%)</td>
<td>(79.3%)</td>
<td>(59.1%)</td>
<td>(75.0%)</td>
<td>(93.8%)</td>
<td></td>
</tr>
<tr>
<td>trolley (x4)</td>
<td>113</td>
<td>24</td>
<td>19</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td>Masswe haem</td>
<td>132</td>
<td>26</td>
<td>8</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Masswe haem</td>
<td>126</td>
<td>25</td>
<td>18</td>
<td>20</td>
<td>63</td>
</tr>
<tr>
<td>Difficult airway</td>
<td>132</td>
<td>25</td>
<td>18</td>
<td>20</td>
<td>63</td>
</tr>
<tr>
<td>trolley</td>
<td>132</td>
<td>25</td>
<td>18</td>
<td>20</td>
<td>63</td>
</tr>
<tr>
<td>Blood fridge</td>
<td>132</td>
<td>25</td>
<td>18</td>
<td>20</td>
<td>63</td>
</tr>
<tr>
<td>Emergency GA</td>
<td>132</td>
<td>25</td>
<td>18</td>
<td>20</td>
<td>63</td>
</tr>
<tr>
<td>drugs</td>
<td>132</td>
<td>25</td>
<td>18</td>
<td>20</td>
<td>63</td>
</tr>
<tr>
<td>Intralipid (x3)</td>
<td>132</td>
<td>25</td>
<td>18</td>
<td>20</td>
<td>63</td>
</tr>
<tr>
<td>Dantrolene</td>
<td>132</td>
<td>25</td>
<td>18</td>
<td>20</td>
<td>63</td>
</tr>
</tbody>
</table>

0.7%, 1.4%, 17.9% and 21.4% knew the locations of all the defibrillators, intralipid, massive haemorrhage and pre-eclampsia trolleys, respectively.

Discussion: Participants had a good knowledge of the emergency resources most frequently required within their own clinical specialty. However, awareness of the location of drugs or equipment encountered less frequently is deficient. A cohesive multidisciplinary team approach is paramount to the management of these emergencies and the quick retrieval of necessary resources may fall to anyone. Furthermore, the knowledge of more than one location could avoid delays in time critical treatment. We created a schematic map of the unit to highlight the locations of these emergency resources. Maps sited at strategic points around the unit aim to ensure these resources can be accessed rapidly by all staff. Electronic maps are available on the intranet, handheld devices via Wi-Fi and issued at induction. We will continue to re-evaluate this issue.

Reference
P55 The usefulness of OAA-approved surveys

EJ Robson, JP Campbell, SM Yentis

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Introduction: The OAA has operated a system of approving surveys of its members since 1998. Russell has questioned the value of surveys in the context of falling submissions of obstetric research,1 although the response rate of surveys remains >60%2 and most are published in some form,3 suggesting they are relevant to the OAA membership. We aimed to investigate the usefulness of OAA-approved surveys by conducting a survey of our own.

Methods: After OAA Subcommittee approval, an e-survey (no. 142) was sent to 200 lead obstetric anaesthetists in August 2013. Questions were posed on the usefulness of OAA-approved surveys in relation to clinical practice and education. We asked those who wrote Expert Witness reports not to complete the survey as we considered them a potentially biased group.

Results: There were 124 completed responses (62%); we excluded three who wrote Expert Witness reports, leaving a denominator of 121. Of these, 64 (53%) search for the results of OAA-approved surveys 1-4 times/year, 11 (9%) do so >4 times/year and 46 (38%) never do. Lead obstetric anaesthetists rated OAA-surveys a median (IQR [range]) of 6 (5-7[1-9]) on a 0-10 scale for usefulness to their clinical practice (Figure). We asked respondents to quote three OAA-approved surveys that had informed their clinical practice. The most recollected topics were general anaesthetic drugs (n=9), antibiotic prophylaxis (n=6) and aseptic technique (n=5). Twenty-six (35%) lead obstetric anaesthetists had used the results of OAA-approved surveys in talks or lectures. Sixty-seven (55%) respondents felt they received about the right number per year, seven (6%) said they would not mind receiving more and 47 (39%) felt they received too many. As well as positive free-text comments, the most common negatives were: lack of feedback/results (n=11); low relevance (n=9) and poor quality (n=3).

Figure: How useful lead obstetric anaesthetists rated OAA-approved surveys for clinical practice

Discussion: Our results suggest that most lead obstetric anaesthetists find OAA surveys useful clinically and were happy with the number sent out. Free text comments suggest that the OAA process could be improved, particularly regarding the relevance of the topic and feedback/dissemination of results.

References

P56 Who is doing what for external cephalic version: a national survey

R T George, S M Yentis

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Introduction: External cephalic version (ECV), the manual rotation of breech-presenting babies to cephalic, has been shown to reduce the caesarean section rate and national guidance supports its use.1 ECV can be painful and two recent systematic reviews show improved comfort and success rates with regional anaesthesia (RA).2,3 We wished to investigate national practice regarding both ECV and the use of RA.

Methods: Consultant-led maternity units in England were identified via the BirthChoiceUK website (www.birthchoiceuk.com). The coordinating midwife at each unit was contacted by telephone and asked four specific questions regarding ECV practice in their unit. If unable to answer any of the questions, the relevant information was sought from others in the team.

Results: Complete data were gathered from all 164 units in England: 129 (79%) offered no analgesia; 32 (20%) offered it 'as required' and 3 (2%) routinely. Entonox was used in 31 (19%) units, RA in 3 (2%) and codeine or diamorphine in 2 (1%). In 84 units (51%), patients were routinely fasted beforehand. ECV was performed in a delivery room in 123 (75%) units, the rest using theatre, clinics or wards. Tocolysis was always used in 109 (66%) units and usually in 42 (26%); the first-line agent was terbutaline in 142 (87%) units, salbutamol in 11 (7%), nifedipine in 7 (4%), atosiban in 1 (1%) and glyceryl trinitrate in 1 (1%).

Discussion: RCOG guidance states that fasting is not necessary before ECV and tocolysis (with terbutaline) should always be used.1 Our survey shows that this advice is not always followed. RA was hardly ever used for ECV despite accumulating evidence of its efficacy. Possible reasons include a lack of resources, lack of awareness of the evidence, and uncertainty that its use would be cost-effective.

References
P57 Australasian Obstetric Neuraxial Antisepsis Survey

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Anaesthetics, Launceston General Hospital, Tasmania, Australia; *Anaesthetics, The Royal Womens Hospital, Parkville, Australia

Introduction: Aseptic technique is a key step in the initiation of central neuraxial blockade. Worldwide the guidelines of major anaesthesia groups refer to the importance of patient skin preparation in this process. In 2002 a survey among anaesthesia trainees in Australia and New Zealand revealed 41% used iodine for skin preparation.1 Since then the bactericidal superiority of chlorhexidine gluconate (CHG) in alcohol has lead to its widespread use for skin preparation. However, CHG use raises the issue of the potential risk of neurological sequelae, including chronic adhesive arachnoiditis. Recent case reports in obstetrics have led anaesthetists to re-examine CHG in this setting and so the aim was to conduct a survey to identify current skin preparation practices and recent changes in practice.

Methods: After ethics approval we conducted an Australasian electronic survey of consultant obstetric anaesthetists and obstetric anaesthesia trainees.

Results: 430 responses were received (37% response rate). Areas of change for trainees included, colour of the antiseptic (40%), drug preparation timing (34.5%), avoiding passing over the setup (34.5%) and method of application (32.7%). Areas of change for consultants included CHG-containing receptacle is never passed over exposed neuraxial setup (42.3%), drugs for neuraxial administration are drawn up after discarding CHG (40%), and wait for complete drying of CHG before starting neuraxial block (35.2%).

Table: Neuraxial antiseptic practice

<table>
<thead>
<tr>
<th>Current neuraxial antiseptic practice</th>
<th>Trainees</th>
<th>Consultants</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHG used</td>
<td>91.9</td>
<td>84.0</td>
</tr>
<tr>
<td>0.5% CHG in 70% alcohol</td>
<td>26.8</td>
<td>37.3</td>
</tr>
<tr>
<td>Tinted pink or red solution</td>
<td>97.2</td>
<td>47.6*</td>
</tr>
<tr>
<td>Sterile setup not exposed during CHG application</td>
<td>40.8</td>
<td>24.8*</td>
</tr>
<tr>
<td>CHG never passed over exposed setup</td>
<td>92.9</td>
<td>84.7</td>
</tr>
<tr>
<td>Drugs for neuraxial injection drawn up after CHG discarded</td>
<td>88.1</td>
<td>78.0</td>
</tr>
<tr>
<td>CHG is dry before neuraxial block</td>
<td>95.8</td>
<td>85.7*</td>
</tr>
<tr>
<td>Sterile gloves changed if they contact CHG</td>
<td>29.6</td>
<td>30.0</td>
</tr>
<tr>
<td>Practice has changed since adverse event reporting</td>
<td>70.0</td>
<td>44.0*</td>
</tr>
<tr>
<td>Practice guidelines needed</td>
<td>57.5</td>
<td>51.1</td>
</tr>
</tbody>
</table>

Data are percentages of respondents, *P<0.05 Fisher’s exact test comparing proportions.

Discussion: CHG is not approved for use in situations where it may contact the meninges, yet its bactericidal properties make it the superior skin preparation. Many respondents were aware of recent case reports and the potential risk of neurological sequelae with CHG use, however, the majority of trainees and consultants did not use 0.5% CHG solution. Trainees reported safer practices than consultants however there is a need for overall practice improvement and specific guidelines addressing skin preparation in obstetric practice.

Reference

P58 Patient opinion of the OAA Pain Relief In Labour leaflet

R S Newton, I Wrench, R Pothireddy, R Sriram, N Jena, S Asif
Obstetric Anaesthesia, Jessop Wing, Royal Hallamshire Hospital, Sheffield, UK

Introduction: The OAA produce a leaflet on pain relief in labour as part of the “information for mothers,” series.2 This leaflet is given to women during their pregnancy in Sheffield to inform them of their analgesia options for labour. A previous survey in our unit that quizzed women on their knowledge of epidurals showed that only 23% of parturients used the leaflet as a source of information to learn about epidurals. We wanted to find out why this is by asking women at the end of their pregnancy what they thought of the leaflet and whether they thought it could be improved.

Methods: We carried out an OAA approved survey of 100 induction patients on our antenatal ward. Patients agreed to review the leaflet1 and complete the questionnaire which was collected later the same day.

Results: The proportion of patients who remembered seeing the leaflet earlier in their pregnancy was 64%. Most patients found that the leaflet was useful for deciding methods of analgesia (Table). Over 88% of patients found the leaflet very or quite easy to read, said that it provided the right amount of information and was all or mostly fair and balanced. Seventy five percent of patients indicated that they would like to have the information in another form of which the smart phone app was the most popular (54%).

Table: Usefulness of OAA leaflet

<table>
<thead>
<tr>
<th>How useful was the leaflet in helping you decide on the method of analgesia in labour?</th>
<th>Percentage of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very useful</td>
<td>55</td>
</tr>
<tr>
<td>Quite useful</td>
<td>31</td>
</tr>
<tr>
<td>Made no difference</td>
<td>13</td>
</tr>
<tr>
<td>Quite unhelpful</td>
<td>1</td>
</tr>
<tr>
<td>Very unhelpful</td>
<td>0</td>
</tr>
</tbody>
</table>

Discussion: Even though a large proportion of patients had seen the leaflet earlier in their pregnancy they still said the leaflet was useful in informing them about analgesia choices for labour whilst they were awaiting induction on the antenatal ward. The feedback received justifies the expense of providing the leaflets, and reinforces their importance in provision of information in written form to pregnant women. The difference shown from the previous study may relate to the timing of reading of the leaflet as patients completing this survey had the leaflet immediately to hand. This raises the issue of when should the leaflet be given out. As the information is readily available on the OAA website in app or video form it would make sense to provide patients with the links to access this information at any point in their pregnancy.

Reference
P59 How X-ray aware are we? Doctors knowledge of radiation exposure in pregnancy
K Webster, K MacIlenan
Anaesthesia, St Mary’s Hospital, Manchester, UK
Introduction: Pulmonary embolism is an important cause of direct maternal death. Doctors use diagnostic tests which expose both the mother and fetus to radiation. The risk of this radiation is dependent on the duration and extent of pregnancy. Despite requesting these investigations, doctors knowledge of radiation exposure has been proven to be poor. We compiled a questionnaire to ascertain knowledge surrounding radiological examinations in pregnancy. Furthermore, we examined if doctors routinely gained consent and discussed the risks with the patient involved.

Methods: A convenience sample of doctors working at a tertiary referral obstetric unit consented to undertake a paper-based anonymous questionnaire. The survey was executed over a one-week period. The questions focused on specific knowledge of chest X-ray, computerised tomography pulmonary angiography (CTPA) and ventilation perfusion scintigraphy (V/Q). We ascertained the extent of education and training the participant had received regarding the risks of radiation exposure and assessed the information routinely explaining to patients in consenting to the examination.

Results: 56 surveys were completed that incorporated both specialties of anaesthesia (79%) and obstetrics (21%). The majority of doctors were aware of government regulations on radiation exposure (64%) but only 30% had completed formal training. 54% routinely explained the risk of radiological examinations to aid diagnosis of PE to women who are pregnant. Doctors were asked to state the equivalent number of chest X-rays for both CTPA and V/Q. The table below demonstrates the numbers (and percentage) of doctors with a correct answer for each investigation:

<table>
<thead>
<tr>
<th>Investigation</th>
<th>Equivalent number of chest X-rays</th>
<th>Correct Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTPA</td>
<td>300</td>
<td>4 (7%)</td>
</tr>
<tr>
<td>V/Q scan</td>
<td>50</td>
<td>10 (18%)</td>
</tr>
</tbody>
</table>

Discussion: Our survey demonstrates a lack of formal training regarding radiation exposure, despite the majority of doctors being aware of government regulations. There are well-described risks to both mother and fetus depending on investigation chosen and stage of pregnancy. However, only half of those surveyed would routinely discuss these with the patient. Furthermore, knowledge of radiation dosing was poor. We plan to initiate an educational programme for all members of the delivery suite team and to introduce an information and consent package for patients.

References

P60 Anaesthetists’ knowledge of emergency equipment location in two hospitals
AL Richardson, B Dwyer*, DN Lucas
Department of Anaesthetics, Northwick Park Hospital, Harrow, UK, *Department of Anaesthetics, St. George’s Hospital, London, UK
Introduction: Equipment to manage both obstetric and anaesthetic emergencies is commonly accessible on maternity units. Availability of certain equipment, for example a difficult intubation trolley, is mandated by national guidelines. Other equipment or drugs are placed at the discretion of local departments.

Methods: We distributed surveys amongst anaesthetists who regularly work on delivery suite at two hospitals. Respondents were asked to complete as accurately as possible the locations of equipment necessary to treat anaesthetic and obstetric emergencies. Authors confirmed the correct location and marked responses. Respondents were also asked to indicate for how long they had worked in the department.

Results: 18 responses were received in total: 10 at hospital A and 8 at hospital B. The percentage of respondents correctly locating emergency equipment is listed in the Table. Eighty-three percent of respondents had worked in their department for more than six months.

Table: Knowledge of emergency equipment location

<table>
<thead>
<tr>
<th>Correct responses at each site (%)</th>
<th>Hospital A</th>
<th>Hospital B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac arrest trolley</td>
<td>100</td>
<td>88</td>
</tr>
<tr>
<td>Difficult airway trolley</td>
<td>100</td>
<td>75</td>
</tr>
<tr>
<td>Videolaryngoscope</td>
<td>60</td>
<td>38</td>
</tr>
<tr>
<td>Major obstetric haemorrhage trolley</td>
<td>90</td>
<td>75</td>
</tr>
<tr>
<td>Pre-eclampsia trolley</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>Malignant hyperpyrexia box</td>
<td>10</td>
<td>63</td>
</tr>
<tr>
<td>Intralipid®</td>
<td>100</td>
<td>88</td>
</tr>
<tr>
<td>Sugammadex</td>
<td>70</td>
<td>38</td>
</tr>
<tr>
<td>Intraosseous access kit</td>
<td>30</td>
<td>N/A</td>
</tr>
<tr>
<td>Anaphylaxis kit</td>
<td>N/A</td>
<td>50</td>
</tr>
</tbody>
</table>

Discussion: Knowledge of the location of emergency equipment is poor. Several reasons could account for this. Firstly, this may reflect a high turnover of staff, and inadequate local induction. However, this is unlikely as 83% of respondents had worked in their department for over six months. Secondly, results may represent anaesthetists’ reliance upon other individuals to source equipment should an emergency situation arise. Finally, these results may be due to a lack of simulation of emergency scenarios within departments, meaning anaesthetists are poorly practiced at locating emergency equipment. Simulation training in our own clinical facilities may improve performance locating emergency equipment. In addition, prominently placed laminated cards summarising the location of emergency equipment may prove beneficial in many delivery suites.

Reference
P61 Survival outcomes in the maternal critically ill requiring renal replacement therapy: an analysis of the national Scottish Intensive Care Society database

J Erskine, E Beattie, S Young, A Khan*
Department of Anaesthesia, Glasgow Royal Infirmary, Glasgow, UK. *Information Services Division, Scottish Intensive Care Society Audit Group, Edinburgh, UK

Introduction: There has been increasing focus on the appropriate use of critical care facilities to support pregnant and postpartum women. Numbers are small for each individual intensive care unit (ICU) but by using the Scottish Intensive Care Society’s database of admissions to all ICUs we were able to analyse the admission rate and level of organ support provided to this patient group within Scotland. Focussing on the subgroup of obstetric patients requiring renal replacement therapy (RRT) identified those individuals at high risk of death, as requiring RRT during critical illness is known to be associated with higher ICU mortality.1

Methods: Ethical permission was obtained from the Scottish Intensive Care Society Audit Group (SICSAG) before obtaining an anonymised dataset of women admitted with a pregnancy related diagnosis to any Scottish ICU over the period Jan 2001 to Dec 2011. The primary outcome was survival to ICU discharge. Women receiving critical care solely within a maternity unit setting are not included.

Results: Of the 1046 admissions identified during this period, 17 required RRT. The two groups were compared using Fisher’s exact test, results are displayed in the Table. Four additional women in the non-RRT group died before hospital discharge whilst there were no further deaths in the RRT group. Mean ± SD admission APACHE II scores for the RRT group were 22 ± 14-30. Median ICU length of stay for RRT was 5 days [range 0-55 days]. During this period, 667 587 births were registered in Scotland giving an ICU admission rate of 0.17%.2

Table: Survival rates and renal replacement therapy

<table>
<thead>
<tr>
<th>RRT</th>
<th>No RRT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survivor</td>
<td>1029</td>
</tr>
<tr>
<td>Non-survivor</td>
<td>15</td>
</tr>
</tbody>
</table>

Discussion: Critical illness in pregnancy resulting in admission to a general ICU is rare, with the requirement for RRT as part of ICU care being rarer still. Requiring RRT is strongly associated with ICU mortality; 29.4% in this group. Discharge from ICU is associated with survival to hospital discharge. ICU admissions are low compared to previous reports using English data, however sick mothers cared for solely in maternity units do not appear in this dataset.3

References
**P63** Pharmacological treatment of eclampsia – 5 year review of cases at the Royal Women’s Hospital, Melbourne, Australia

AT Dennis, K Sarang, E Chambers

Department of Anaesthesia, The Royal Women’s Hospital, Parkville, Australia

**Introduction:** Eclampsia is uncommon with an estimated incidence of one in 2000 births. When it occurs it is associated with high maternal morbidity and mortality. Magnesium sulphate (MgSO₄) is the first line therapy for eclampsia. Many trials demonstrate that MgSO₄ is more effective in treating eclampsia than historical therapies and when compared with diazepam, it reduces the risk of maternal death. As a result of these studies MgSO₄ has been incorporated into clinical practice guidelines. The aim of this study was to determine the characteristics of women who presented with eclampsia and to examine the pharmacological treatment of these women to determine the number who received MgSO₄ as the first line therapy.

**Methods:** After ethics approval histories of women coded for eclampsia (ICD-10 AM) from November 2007 – November 2012 were obtained & reviewed to determine the agents used for initial pharmacological management of eclampsia.

**Results:** 29 women were classified as having eclampsia. Six (21%) women were incorrectly classified. Incidence of eclampsia was 1 in 1504 births. There was one stillborn fetus. There was no maternal mortality. No women received MgSO₄ before or during ambulance transfer to hospital. 19 (83%) women were either admitted to an intensive care or high dependency unit.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Eclampsia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>30 ± 6.1</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>29 ± 7.3</td>
</tr>
<tr>
<td>Nulliparous</td>
<td>15 (65)</td>
</tr>
<tr>
<td>Antepartum eclampsia</td>
<td>15 (65)</td>
</tr>
<tr>
<td>Gestation when fit occurred (weeks)</td>
<td>36 ± 4.1</td>
</tr>
<tr>
<td>Fit occurred at home (ambulance transfer)</td>
<td>8 (35)</td>
</tr>
<tr>
<td>BP recorded in the 4 hours prior to fit</td>
<td>9 (39)</td>
</tr>
<tr>
<td>Systolic BP in previous 4 h (mmHg)</td>
<td>165 ± 32.5</td>
</tr>
<tr>
<td>Diastolic BP in previous 4 h (mmHg)</td>
<td>98 ± 17.5</td>
</tr>
<tr>
<td>Hypertension in previous 4 h</td>
<td>7 (78)</td>
</tr>
<tr>
<td>Time taken to record BP after fit (min)</td>
<td>12 ± 10.9</td>
</tr>
<tr>
<td>First systolic BP after fit (mmHg)</td>
<td>154 ± 21.8</td>
</tr>
<tr>
<td>First diastolic BP after fit (mmHg)</td>
<td>96 ± 15.7</td>
</tr>
<tr>
<td>MgSO₄ bolus and infusion as initial therapy</td>
<td>11 (48)</td>
</tr>
<tr>
<td>Benzo diazepine as initial therapy</td>
<td>5 (22)</td>
</tr>
<tr>
<td>No initial therapy given</td>
<td>7 (30)</td>
</tr>
</tbody>
</table>

Data are mean ± SD, or number (%), BP = blood pressure

**Discussion:** Most women who had their BP measured within 4 h before the fit were hypertensive and remained hypertensive. Most women with eclampsia were given inappropriate initial treatment including no treatment. Of the women who fitted at home and were transported to hospital by ambulance, none received appropriate treatment. There is an urgent need to raise awareness of eclampsia and the evidence for the use of MgSO₄ for reducing the risk of death.

**Reference**


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**P64** Maternal critical care: the midwife’s perspective

D Rangarajan, S Matthews, H Bojahr, S Wijayatilake*, V Patil*

Anaesthetics, Royal London Hospital, London, UK,
*Anaesthetics, Queen's Hospital, Romford, UK

**Introduction:** With the growth of the high-risk obstetric population, it is envisaged that maternal critical care units (MCCUs) will become common place. The safe delivery of maternal critical care is crucially dependant on the attitudes and training of midwives who deliver the care. We aimed to ascertain the views of midwives on this evolving field.

**Methods:** A questionnaire was designed and approved by our audit office. Questions related to professional background, levels of confidence in knowledge/skills and experience of maternal critical care. Attitudes to and willingness to participate in maternal critical care along with potential incentives for involvement, were also explored. Where ever possible a Likert scale was used. Midwives were asked to identify barriers to working on the MCCU from a list provided. Multiple selections were permissible. Midwives from a district general and a teaching hospital completed the questionnaire. Both hospitals had >5500 births per year, serviced high-risk obstetric populations and had an MCCU. Responses were collated into an MS Excel spreadsheet for analysis.

**Results:** We collected 101 completed questionnaires over a 4-week period. 79.4% of midwives were UK trained and 72.6% had a nursing background. 27.5% routinely cared for patients on the MCCU of whom a third had attended a formal relevant course. Of the 73 midwives who did not work in an MCCU, few felt they possessed sufficient knowledge (18%), skills (25%) and experience (19%) to work there. Of the 101 respondents the majority either strongly agreed (47.5%), or agreed (35.6%) that they should be trained to look after critically ill mothers. Similarly of 101 respondents the majority either strongly agreed (43.6%) or agreed (41.6%) that MCCU knowledge and competency should be part of midwifery training. When asked to identify barriers to working on the MCCU 146 selections were made: the majority identified insufficient knowledge and clinical skills (47.9%). Other reasons included interest in another subspeciality (17.8%) or no interest in MCCU (11%). Few wanted uncomplicated midwifery (3.4%), or thought it was too high risk (2.1%). The cohort was asked to identify factors from a list that would encourage participation in MCCU. Of 131 selections, 55% identified more training and daily teaching as incentives. Shadowing general HDU nurses accounted for 19.1%. Few selections were made for financial gain (8.1%) or for nothing would be enticing (6.9%).

**Discussion:** Our survey shows that 83.1% of midwives felt that they should care for critically-ill mothers on MCCUs. Furthermore, 85.2% thought midwifery curriculum should include critical-care skills. Barriers to participation on the MCCU was mostly due to inadequate knowledge and clinical skills and this cohort clearly identified that more training would facilitate greater midwifery interest in MCCU. It is imperative to adequately train and support our midwifery colleagues, in order to deliver a high quality and safe service to critically-ill mothers.

**Reference**

P65 A 5-year review of maternal obesity and induction of labour on mode of delivery and risk of labour, anaesthetic and neonatal complications

C Joannides, P McGlone, M Hon*, S Al-Rawi
Anaesethics, Princess Anne Hospital, UHSFT, Southampton, UK, *Obstetrics and Gynaecology, Princess Anne Hospital, UHSFT, Southampton, UK

Introduction: Maternal obesity is associated with adverse pregnancy outcomes.1 We routinely assess patients with body mass index (BMI) above 45 with the recommendation of siting an early epidural.2 Within our department, we wanted to investigate delivery, anaesthetic, and neonatal outcomes in patients with a BMI >45 kg/m².

Methods: Retrospective analysis of patients with a booking BMI >45 kg/m² between January 2009 and October 2013 (excluding elective caesarean section (CS) and late fetal losses). Our primary aim was to compare delivery outcomes against the UKOSS study findings.1 Our secondary aim was to look at neonatal outcomes and anaesthetic complications.

Results: A total of 158 patients were analysed (mean BMI 49). Forty one percent delivered “in hours” (8am-6pm) and 59% “out-of-hours”. Sixty eight percent of all patients were either induced or required augmentation of labour, however 64% of those induced or augmented still achieved a vaginal delivery. Of women who commenced labour spontaneously (32%) and did not require augmentation, 70% delivered vaginally. Seventy one percent of multiparous women who laboured spontaneously and had achieved a vaginal delivery in a previous pregnancy, delivered vaginally again. Nulliparous women requiring induction or augmentation of labour had an emergency CS rate of 50%. Forty nine percent of women had a regional anaesthetic during labour, of which 42% required multiple attempts and 19% needed either a re-site of their epidural during labour or removal of their epidural and a spinal sited for delivery. The incidence of manual removal of placenta was 1.3%, postpartum haemorrhage 12%, stillbirth 1.2%, macrosomia 7.5% and Apgar scores of <6 at 1 min 2.5%.

Discussion: Our results mirror the UKOSS study findings.1 Higher maternal BMI is associated with an increased incidence of induction and augmentation of labour. Despite this, 64% of all those induced still achieved a vaginal delivery, which is similar to those who laboured spontaneously (72%). Those most likely to need obstetric intervention during their labour were nulliparous women requiring induction or augmentation of labour. Apart from macrosomia, the risks of delivery and neonatal complications are similar to those who have a BMI <45 kg/m². Our data suggest an individualised approach is required regarding counseling for an early epidural in obese women. This is especially true for multiparous women who labour spontaneously and have previously achieved a vaginal delivery.

References

P66 Antenatal class attendance by obese primiparous parturients undergoing induction of labour

J Dolan, S Young, J Kinsella*
Department of Anaesthesia, Glasgow Royal Infirmary, Glasgow, UK, *Department of Anaesthesia, University of Glasgow, Glasgow, UK

Introduction: Obesity (body mass index (BMI) > 30 kg/m²) in women of reproductive age is increasing in western societies.1 Maternal obesity is now recognised as a risk factor for maternal death as well as other unequivocal obstetric and fetal complications.2 The recent Confidential Enquiry into Maternal and Child Health (CEMACH) has reported that more than half the women who died were obese.3 Therefore, this study aimed to determine if obese patients were more likely to attend antenatal classes.

Methods: After obtaining local research ethics approval, primiparous patients who had undergone induction of labour were asked about their antenatal class attendance. The incidence of obesity was recorded in those patients who attended all or none of their scheduled antenatal classes. Data were analysed using the Pearson chi-squared and student t-tests.

Results: 62/139 (44.6%) primiparous parturients undergoing induction of labour failed to attend any antenatal classes. 42/139 (30.2%) primiparous parturients were obese. Of these 19 (45.2%) failed to attend any of their antenatal classes. There was no significant difference in maternal BMI between participants who attended none or all antenatal classes (P=0.42).

Antenatal Class Attendance

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obese</td>
<td>23</td>
<td>54</td>
<td>77</td>
</tr>
<tr>
<td>All</td>
<td>23</td>
<td>54</td>
<td>77</td>
</tr>
<tr>
<td>None</td>
<td>19</td>
<td>43</td>
<td>62</td>
</tr>
<tr>
<td>Total</td>
<td>42</td>
<td>97</td>
<td>139</td>
</tr>
</tbody>
</table>

Discussion: We have observed that antenatal class attendance by primiparous parturients undergoing induction of labour remains low with only 55.4% attending all antenatal classes. 45.2% of primiparous parturients undergoing induction of labour who were obese failed to attend any antenatal classes and may therefore be unaware that obesity is a risk factor for maternal and foetal complications.2

References
P67 Obese parturients’ outcomes and the impact of new referral pathways to the antenatal anaesthetic clinic

J Goodman, AW Pool, S Bapat, C Nicholson, S Sharafudeen, D Abell
Anaesthetics, King’s College Hospital, London, UK

Introduction: The Centre for Maternal and Child Enquiries (CMACE) report on maternal obesity found that 45% of women have a written anaesthetic management plan. We believe improved referral systems and pathways can achieve better screening levels than the national average. Based on the recommendations we studied the outcome of these high-risk women and the impact of the pre-assessment clinic

Methods: We analysed our maternity database and obstetric clinic attendance over two time periods: Oct 2009-June 2011 and June 2011-April 2013. Dates were chosen following the introduction of departmental awareness training, a telephone clinic referral system and subsequently an electronic patient referral system. We recorded mode of delivery, analgesia, anaesthesia, maternal medical problems, neonatal outcomes, referrals and weights and admissions to the neonatal unit (NNU).

Results: We identified 17080 deliveries: 464 had a booking BMI ≥40 kg/m² (2.7%). Following the changes, clinic attendance for parturients with BMI ≥40 kg/m² increased from 21% to 52.7%. The uptake of epidural analgesia was greater in the BMI≥40 kg/m² group who attended clinic than both the BMI≥40 kg/m² group who did not attend clinic and the overall sample group. Emergency caesarean section (CS) rates were higher in the BMI≥40 kg/m² group compared with the overall sample group. However the BMI≥40 kg/m² group seen in clinic had lower incidence of CS under general anaesthesia (GA) than the BMI≥40 kg/m² group not seen in clinic (Table). There was no difference in fetal outcomes between the BMI≥40 kg/m² groups (stillbirths or unplanned NNU admissions).

Table: Epidural and emergency caesarean section rate for all deliveries, clinic and non-clinic attendees

<table>
<thead>
<tr>
<th>Total deliveries</th>
<th>Total BMI≥40</th>
<th>BMI≥40 seen in clinic</th>
<th>BMI≥40 not seen in clinic</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=17080</td>
<td>n=440</td>
<td>n=142</td>
<td>n=298</td>
</tr>
<tr>
<td>Epidurals</td>
<td>4299 (24.8%)</td>
<td>105 (23.9%)</td>
<td>48 (33.8%)</td>
</tr>
<tr>
<td>Cat 1-3 CS</td>
<td>2678 (15.7%)</td>
<td>107 (24.3%)</td>
<td>36 (25.4%)</td>
</tr>
<tr>
<td>Cat 1-3 CS under GA</td>
<td>294 (1.7%)</td>
<td>12 (2.7%)</td>
<td>2 (1.4%)</td>
</tr>
</tbody>
</table>

Discussion: Introducing midwifery awareness training, a telephone referral system and an electronic referral system produced a marked increase in women with BMI≥40 kg/m² attending antenatal anaesthesia clinic, comparing favourably with the CMACE standard. High-risk clinics increased the epidural rate and reduced the GA CS rate. They allow vital parturient education concerning analgesia and anaesthetic planning. However, with our current capacity we are unable to see all obese parturients. To improve risk stratification we are now focusing on obese women with other comorbidities e.g. hypertension and diabetes who are attending high-risk obstetric clinics.

Reference


P68 Anaesthetic input and labour outcomes in morbidly obese parturients

AE Dodd, G Peters
Obstetric Anaesthesia, Wishaw General Hospital, Wishaw, UK

Introduction: Obesity in pregnant women is increasing. OAA recommendations include antenatal anaesthetic consultation and early epidural analgesia in women booking a body mass index (BMI) >40 kg/m². Due to service demands we can only see women with BMI ≥45 kg/m² in the antenatal period and see those with BMI >40 kg/m² on admission. We evaluated the numbers, anaesthetic interventions and labour outcome of women with BMI >40 kg/m².

Methods: Retrospective data analysis over 12 months (2012) was performed with approval and assistance from NHS Lanarkshire Clinical Quality Department. Parturients were divided into BMI 40-44.9 and ≥45 kg/m². Category 4 caesarean sections (CS) were excluded. We identified women who had an epidural, and determined delivery method (spontaneous vaginal delivery (SVD), assisted delivery (AD) or CS) and whether an anaesthetic procedure was required to aid delivery.

Results: 178 deliveries out of a total of 4827 (3.7%) were in women with BMI >40 kg/m². Of these, 19 had a category 4 CS and were excluded, leaving 159 for analysis.

<table>
<thead>
<tr>
<th>Analgesia/anaesthesia</th>
<th>BMI 40-44.9</th>
<th>BMI ≥45</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=108</td>
<td>n=51</td>
<td></td>
</tr>
<tr>
<td>No Epidural Total</td>
<td>77 (71%)</td>
<td>40 (78%)</td>
</tr>
<tr>
<td>SVD or AD with no anaesthetic</td>
<td>56 (73%)</td>
<td>31 (77.5%)</td>
</tr>
<tr>
<td>Spinal for AD or CS</td>
<td>17 (30%)</td>
<td>8 (20%)</td>
</tr>
<tr>
<td>GA</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>AD or CS (anaesthetic unknown)</td>
<td>4 (7%)</td>
<td>1 (2.5%)</td>
</tr>
<tr>
<td>Epidural in Total</td>
<td>31 (29%)</td>
<td>11 (22%)</td>
</tr>
<tr>
<td>labour SVD or AD with no anaesthetic</td>
<td>14 (45%)</td>
<td>4 (36%)</td>
</tr>
<tr>
<td>Epidural top up for AD</td>
<td>6 (19%)</td>
<td>3 (27%)</td>
</tr>
<tr>
<td>Epidural top up for CS</td>
<td>10 (32%)</td>
<td>3 (27%)</td>
</tr>
<tr>
<td>Spinal for AD or CS</td>
<td>1 (3%)</td>
<td>0</td>
</tr>
<tr>
<td>GA</td>
<td>0</td>
<td>1 (9%)</td>
</tr>
</tbody>
</table>

Discussion: Fewer than one in three women with BMI 40-44.9 kg/m² and one in four women with BMI ≥45 kg/m² took up our recommendation for early labour epidural suggesting that women do not act on this recommendation. Despite concerns, this was not associated with an increased incidence of failed spinal and/or general anaesthesia at delivery. One possible contributing factor to this is the seniority of resident staff in our unit out of hours. This is principally from consultant and associate specialist anaesthetists with trainees contributing fewer shifts. Restricting antenatal review to parturients with BMI ≥45 kg/m² does not appear to affect labour analgesia or anaesthetic technique at delivery. It may be that recommendation for antenatal review could be altered further to better utilise limited resources.

References

P69 Anaesthetic management of univentricular hearts for caesarean delivery: a case series
L Borovickova, G Valchev, P Thornton
Department of Anaesthesia, Rotunda Hospital, Dublin, Ireland

Introduction: More than 85% of patients with congenital heart disease survive to adulthood due to the recent advances in paediatric cardiology and cardiac surgery. Subsequently, a significant proportion of women with congenital cardiac disease reach childbearing age. However, about half of these women will require further surgery or will develop complications such as arrhythmias, heart failure and premature death if managed inappropriately. In addition, pregnancy represents an additional burden on patients with heart disease. A univentricular heart accounts for 3.2% of congenital cardiac abnormalities. We present a review of the successful anaesthetic management of six parturients with single ventricle physiology.

Methods: We retrospective reviewed the medical records of parturients with known single ventricle physiology who underwent a caesarean section in our institution.

Results: Six patients with a univentricular heart successfully underwent an elective or emergency caesarean section under regional anaesthesia. They were closely monitored throughout pregnancy by a multidisciplinary team including a consultant anaesthetist with a special interest in cardiac anaesthesia, a cardiologist, an adult congenital heart nurse and an obstetrician. Particular attention was paid in the perioperative period to achieve meticulous homeostasis, maintain adequate hydration and to avoid vasodilatation and air emboli through venous lines. All patients received antibiotic cover during their hospital stay.

Discussion: Pregnancy in patients with a univentricular heart is associated with high incidence of maternal and fetal complications. Successful management of these patients requires a detailed knowledge of the lesion and the current stage of surgical palliation, their functional status and the impact of pregnancy and labour on the cardiac physiology. A multidisciplinary approach is crucial to achieve a positive outcome.

References

P70 Audit of parturients with a BMI ≥40 kg/m²: a bridge too far!
K Suri Mohanram, U Misra
Anaesthetics, Sunderland Royal Hospital, Sunderland, UK

Introduction: The joint RCOG/CMACE guidelines on management of women with obesity in pregnancy makes specific recommendations of antenatal care for these parturients as well as in labour to limit morbidity. The aim of this audit was to see to what extent our obstetric unit was achieving some of the recommended standards in the RCoA audit recipe book.

Methods: Fifty case notes of parturients who were admitted to our unit with a body mass index (BMI) ≥40 kg/m² were reviewed. The standards reviewed were: 1) antenatal anaesthetic assessment; 2) duty anaesthetist informed on admission; 3) establishing early venous access in labour; 4) grade of anaesthetist providing care ≥ ST6; and 5) postnatal thromboprophylaxis provided.

Results: The range of BMI was from 40 to 55 kg/m². Ten patients had elective caesarean sections and were not included.

Table: Outcome in obese patients

<table>
<thead>
<tr>
<th>Standards</th>
<th>Yes</th>
<th>No</th>
<th>Target for best practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antenatal anaesthetic review</td>
<td>72%</td>
<td>28%</td>
<td>90%</td>
</tr>
<tr>
<td>Duty anaesthetist informed and</td>
<td>70%</td>
<td>30%</td>
<td>90%</td>
</tr>
<tr>
<td>documented by midwife</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early venous access</td>
<td>83%</td>
<td>17%</td>
<td>90%</td>
</tr>
<tr>
<td>Anaesthetist grade ≥ ST6</td>
<td>15%</td>
<td>85%</td>
<td>90%</td>
</tr>
<tr>
<td>Postnatal thromboprophylaxis</td>
<td>17%</td>
<td>83%</td>
<td>90%</td>
</tr>
</tbody>
</table>

There were nine emergency caesarean sections, of which seven were performed under spinal anaesthesia and two were epidural top-ups. The grade of anaesthetist was ST6 and above in eight (20%) patients. It was difficult to site a spinal in two patients and in two cases there was extreme difficulty with intravenous access.

Discussion: Despite the provision of regular antenatal anaesthetic clinics, we are unable to meet the recommended standard. Currently we provide ST4 and above anaesthetic cover for emergency obstetric anaesthesia, this is unlikely to change due to limited number of trainees with individual training requirements. Trainees are, however, encouraged to involve the consultant at an early stage. We believe other units might be in a similar position. An OAA approved survey no.115 performed in 2011, reported that 26% of units had CT2 anaesthetic cover for these mothers. The results of this audit are to be presented to the delivery suite forum in our trust with a specific recommendation of reviewing nulliparous women with a BMI ≥45 kg/m² as a priority in the antenatal period. It is this morbidly obese group that has a higher likelihood of having an emergency caesarean section and adverse obstetric and neonatal outcomes.

References
P71 Is it time to stop thinking laterally? Influence of body position on the identification of Tuffier’s line: an ultrasound pilot study

N Nguyen-Lu, H Chamarette, F Plaat
Department of Anaesthesia, Queen Charlotte’s and Chelsea Hospital, London, UK

Introduction: Based on a case series of conus medullaris damage after neuraxial block insertion, clinicians have been reminded not to insert spinal needles above L3. The palpation of external landmarks, however, has been found to be markedly inaccurate; by as much as 4 interspaces. This study aims to compare the accuracy of the palpation method for identifying Tuffier’s line (L4-5) in the sitting and the lateral position, using ultrasound (US).

Methods: Informed consent was obtained from female volunteers of reproductive age. This study was a prospective, double blind, case-controlled series. With the subject in the sitting position, one anaesthetist used ultrasound to identify Tuffier’s line by palpation and marked it using invisible ink (×1). A second anaesthetist used USS to identify L4-5 and marked it, again with invisible ink (×1). The same procedure was repeated with the subject in the left lateral position with corresponding markers (×2) and (×2). Using ultra-violet light to reveal the marks, the distance between the palpated mark and USS mark (the ‘true space’) was measured.

Results: Data from 20 female volunteers were evaluated. The mean difference between USS and palpated L4-5 interspace was 30 mm in the sitting, and 34.4 mm in the lateral position. In both positions the palpated level was always more cephalad than the USS measurement. Relative to the skin, in moving from the sitting to the lateral position, the vertebral ultrasound landmarks moved caudally by a mean of 13 mm.

Discussion: To our surprise, our results suggest that the lateral position leads to more inaccuracy in determining intervertebral levels by palpation. Forty percent of cases in the lateral position would have had insertion of the needle above L3, opposed to 30% in the sitting position. The finding that relative to the skin, the vertebrae, visualised by USS, moved caudally when the subject lies down, suggests that if the lateral position is used, the operator should insert spinal needles at a lower interspace.

References
1. Reynolds F. Damage to the conus medullaris following spinal anaesthesia. Anaesthesia 2001;56:238-47

P72 Preservative-free sodium bicarbonate: what options are available?

AW Rivers, S Halder, R Agrawal, SM Yentis
Magill Department of Anaesthesia, Chelsea and Westminster Hospital, London, UK

Introduction: Sodium bicarbonate is widely used to improve the speed of onset of epidural anaesthesia. The potential neurotoxicity of the preservative disodium edetate led many units, including ours, to specify the use of preservative-free sodium bicarbonate. Our supplier of preservative-free sodium bicarbonate has temporarily stopped production, leaving us considering our options. We therefore decided to identify all formulations available on the UK market.

Methods: We identified 219 institutions with an MRHA licence, including commercial pharmaceutical manufacturers, commercial suppliers, NHS pharmacies and manufacturing units. We were unable to contact 20. Three companies manufactured and sold sodium bicarbonate 8.4% for injection. Two formulations contained disodium edetate 0.01%, and one (B Braun Medical Ltd) contained disodium edetate 0.005%. One company (IDIS Ltd, Weybridge, UK) was able to import preservative-free sodium bicarbonate 8.4% (ABBOJECT single-dose syringes (10 mL and 50 mL) and fliptop vials (50 mL), Hospira Healthcare Corporation, Saint-Laurent, Canada). Two other companies stated that they would consider manufacturing or importing a preservative-free formulation. No solution of sodium bicarbonate <8.4% was available with <0.01% disodium edetate.

Discussion: There is no straightforward method of identifying all sources of pharmaceutical products in the UK, in part because suppliers of unlicensed relevant medicinal products (‘specials’) are not permitted to advertise them. We believe our search has identified the currently available options. If departments decide to use sodium bicarbonate for epidural top-up, the choice is between the cheapest option, with 0.01% disodium edetate, a more expensive licensed product with half that concentration, or an imported unlicensed product that is preservative-free. We are currently evaluating our options.

Acknowledgement: We are grateful to the MRHA for supplying the list of manufacturers.

References
P73 Programmed intermittent epidural bolus vs midwife top-up labour analgesia: the effect on midwife workload

ECB Harty, C Papageorgiou
Department of Anaesthesia and Pain Medicine, Hillingdon Hospital, Uxbridge, UK

Introduction: The National Obstetric Anaesthetic Database shows that the use of patient-controlled epidural analgesia (PCEA) is increasing in UK maternity units. Programmed intermittent epidural boluses (PIEB) have been shown to increase maternal satisfaction, decrease clinician workload and decrease maternal motor blockade, in comparison to continuous infusion with PCEA. The Royal College of Midwives data show that the small annual increase in midwife numbers is not keeping pace with the increase in birth rate. This service evaluation compares the effect of using PIEB or intermittent epidural boluses (PIEB) have been shown to decrease workload will become increasingly relevant. This service evaluation compares the effect of using PIEB or MTU on midwifery workload. Any intervention that can be shown to decrease workload will become increasingly relevant.

Methods: We first established the process by which midwives organise (a) PIEB and (b) MTU based labour analgesia. We then timed the stages involving midwives in each process 10 times in each group. We then estimated the number of top-ups required per patient in the MTU group by examining syringe usage in a three-month period before the PIEB pumps were in place.

Results: We found that the average time (all times in min:sec) taken to initially collect and prepare drugs was 3:58 for the PIEB group and 2:40 for the MTU group. Subsequent top-ups took on average 7:00 and occurred a mean of 5.0 times per epidural - a total of 35:00. All times were doubled as each procedure is done by two midwives. The final total time for each group was 75:20 for the MTU group and 7:57 for the PIEB group. Therefore the time saved by using the PIEB system was 67:00 min (or 33:30 per midwife).

Table: Total time taken by two midwives in each group.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean initial epidural set up time</th>
<th>Mean subsequent top ups per parturient</th>
<th>Mean midwife top up time</th>
<th>Mean total time taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTU</td>
<td>5:20</td>
<td>14:00</td>
<td>5</td>
<td>75:20</td>
</tr>
<tr>
<td>PIEB</td>
<td>7:57</td>
<td>0</td>
<td>0</td>
<td>7:57</td>
</tr>
</tbody>
</table>

Data are min:sec

Discussion: This short service evaluation offers evidence that automated systems are much less time consuming for midwives than top-ups. It further supports the use of automated systems in clinical practice, which allow midwives to spend more time with patients.

References
P75 Catheter differences in non-Luer epidural kits
R Vedantham, A Ling, P Sharpe
Department of Anaesthetics, University Hospitals Leicester NHS Trust, Leicester, UK

Introduction: We recently changed to non-Luer spinal equipment using the Surety® connector. As a result we wanted to assess the properties of epidural products using the same connection. An integral part of the success of our current, Portex® Luer, system is the function of the catheter. We determined relative stiffness of epidural catheters by axial load testing, comparing this with perceived stiffness and ease of threading using an epidural simulator.

Methods: Ethical approval was deemed unnecessary for this project. Non-Luer epidural kits from Sarstedt®, Pajunk®, Vygon®, and B.Braun® were tested. For comparison, we tested the Portex® 16G Luer epidural kit. We aimed to anonymise all non-Luer samples, however some samples had integral company markings on them. 40 consultants recorded perceived stiffness, sharpness of tip and ease of threading of epidural catheters in a epidural simulator on a scale of 1-10. Independent samples Kruskal-Wallis tests were used to determine statistical significance. Epidural catheters were subjected to axial load testing at room temperature (21 ±1°C). Modulus of elasticity (E) was determined. Using micro metric measurements of diameters, area moment of inertia (I) was calculated. Bending stiffness was calculated as (EI).

Results: Shown is a scatter plot of above variables:

Discussion: Portex® epidural catheter was the easiest to thread of all catheters assessed despite it being less stiff than the BBraun® product. We postulate that this is because the stiffest catheter was too rigid to bend easily as it passed out of the end of the epidudal needle. Pajunk® provided two catheters; reinforced and non-reinforced, only the former was assessed on the epidural simulator. There is a positive association between measured and perceived catheter stiffness, but not with ease of threading of catheter on a simulator.

Reference

P76 Ultrasound for spinal anaesthesia for elective caesarean section
H Breach, N Muchatuta
Department of Anaesthesia, St Michael's Hospital, UH Bristol NHS Trust, Bristol, UK

Introduction: The use and potential benefits of ultrasound to assist in identifying the optimal site for insertion of epidural catheters and lumbar punctures has been studied previously in a 2013 meta-analysis, but attempts to assess the time implications of the use of ultrasound and its effect on theatre efficiency have proved difficult. We set out to assess the time taken for the entire procedure of a spinal anaesthetic before elective caesarean section with, and without, the use of ultrasound.

Methods: After ethical approval, the study period was divided into two periods. In the first period, 17 consecutive patients were identified. All were scheduled for elective caesarean section with spinal anaesthesia alone. There were no excluding criteria within the group. The spinal anaesthetic was then undertaken in the manner normally performed by the anaesthetist carrying out the procedure. Clinicians varied in grade from specialty registrar year 3 to consultant. The time, to the nearest second, was recorded when the patient was in their optimal position on the table, the time when the clinician first touched the patient's back once all aseptic precautions had been undertaken and the necessary equipment prepared and finally the time when the spinal anaesthetic itself was administered. Subsequently, the process was repeated for a further 16 consecutive patients over another two-week period, with the same inclusion criteria, with the additional use of ultrasound to mark the intended site of skin puncture before skin asepsis preparation.

Results: The modal preparation time for set up in the non-ultrasound group was between 3 and 5 min, with a mean of 4 min 29 sec. This increased to a modal preparation time of 9 to 11 min in the with-ultrasound group, with a mean of 9 min 3 sec. The "procedure time" had a modal group of 2 to 3 min in the non-ultrasound group, with a mean of 5 min 23 sec. In the ultrasound group, the modal time group was <2 min, with a mean of 4 min 17 sec. Patient satisfaction scores were high in both groups, rating more than 90% in each.

Discussion: This small study demonstrates that with proper preparation, the use of ultrasound need only add around 4.5 minutes to the total set up time of the procedure and reduces by around 1 minute the time for the actual procedure itself. We suggest that the time impact of the use of ultrasound is minimal and need not delay the efficient running of an elective list. In addition to results of previous studies showing a reduction in number of failed procedures, needle passes and traumatic complications, the use of ultrasound is a valuable skill for all obstetric anaesthetists.

Reference
P77 Mobility with programmed intermittent epidural bolus labour analgesia
JTE Cremin, CH Papageorgiou
Department of Anaesthesia, Hillingdon Hospital, Uxbridge, UK

Introduction: A new delivery method for labour analgesia combining programmed intermittent epidural boluses (PIEB) with patient controlled epidural analgesia (PCEA) has recently been introduced onto our labour ward. Recent trends have shown that the uptake of PCEA by maternity units is increasing in popularity.1 Research into PIEB combined with PCEA has shown a reduced incidence of motor block and instrumental delivery.2 We conducted a service evaluation to investigate maternal motor block and maternal satisfaction with analgesia.

Methods: After local audit department approval, prospective data were collected over a one-month period from parturients who received PIEB analgesia for labour. The protocol was a PIEB of 0.1% levobupivacaine with 2 µg/mL fentanyl 7 mL every hour with a PCEA 6 mL bolus of the same solution, available every 20 min. Following initiation of analgesia, mobility was assessed hourly by the midwife and categorised as one of four options: “walking around”, “sitting/standing”, “mobilising in bed” or “dense motor block”. Mothers were then reviewed on the postnatal ward before discharge home and questioned on their satisfaction with their analgesia.

Results: Mobility data were collected on 87 mothers. Of these, 63 were reviewed before discharge home and maternal satisfaction of analgesia noted. Of the 87 patients, 6 (6.9%) had a worst documented mobility of “walking around”, 11 (12.6%) of “sitting/standing”, 68 (78.2%) of “mobilising in bed” and only 2 (2.3%) had a “dense motor block”. Maternal satisfaction with analgesia was excellent (Table 1).

Table: Satisfaction with pain relief

<table>
<thead>
<tr>
<th></th>
<th>Very Satisfied</th>
<th>Satisfied</th>
<th>Dissatisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>During labour</td>
<td>50/63 (79.4%)</td>
<td>13/63 (20.6%)</td>
<td>0/63 (0.0%)</td>
</tr>
<tr>
<td>During vaginal delivery</td>
<td>32/45 (71.1%)</td>
<td>11/45 (24.4%)</td>
<td>2/45 (4.4%)</td>
</tr>
</tbody>
</table>

Data are number (%)

Discussion: We have shown that our PIEB protocol maintains mobility for the vast majority of patients. Dense motor block was very uncommon and a large proportion of patients were able to mobilise in bed. Being able to mobilise in bed during labour allows mothers to move into comfortable positions, especially for the delivery of their baby. We also note that maternal satisfaction for analgesia remains excellent. We aim to repeat the audit once PIEB is more firmly established in our unit and mobility is encouraged to a greater extent.

References

P78 A service evaluation to assess epidural bolus requirements
HK Wrigley, P Yoxall
Department of Anaesthesia, St Helens and Knowsley NHS Trust, UK

Introduction: In our department, we use both continuous infusion and programmed intermittent bolus techniques for labour epidural management. As a service evaluation project, we decided to assess the number of additional boluses which were required with each of these techniques.

Methods: We retrospectively examined the clinical records of 97 women who had received labour epidurals. All women received epidural infusions of 0.1% levobupivacaine + 2 µg/mL fentanyl either as a continuous infusion, between 10-15mL/h, or as a programmed intermittent bolus regime (PIB) giving 8 mL/h plus a 5 mL bolus every hour. Midwives could give further boluses of 10 mL from the pump every 30 min, the anaesthetist could give rescue boluses of whatever they felt appropriate. We recorded the number of the two types of boluses that were administered and the highest level of sensory block documented.

Results: Forty-nine women had a continuous infusion and 48 a PIB epidural.

Table: Requirements for midwife led boluses (MLB) and anaesthetist led boluses (ALB).

<table>
<thead>
<tr>
<th></th>
<th>Continuous infusion group (n=49)</th>
<th>PIB group (n=48)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 MLB</td>
<td>20 (41%)</td>
<td>28 (58.5%)</td>
</tr>
<tr>
<td>1 MLB</td>
<td>13 (27%)</td>
<td>12 (25%)</td>
</tr>
<tr>
<td>2 MLB</td>
<td>10 (20%)</td>
<td>5 (10.5%)</td>
</tr>
<tr>
<td>&gt;2 MLB</td>
<td>6 (12%)</td>
<td>3 (6%)</td>
</tr>
<tr>
<td>0 ALB</td>
<td>43 (88%)</td>
<td>41 (85.5%)</td>
</tr>
<tr>
<td>1 ALB</td>
<td>4 (8%)</td>
<td>5 (10.5%)</td>
</tr>
<tr>
<td>2 ALB</td>
<td>1 (2%)</td>
<td>2 (4%)</td>
</tr>
<tr>
<td>&gt;2 ALB</td>
<td>1 (2%)</td>
<td>0</td>
</tr>
</tbody>
</table>

There was no significant difference in required boluses between the two regimes (MLBs P=0.133, ALBs P=0.72). The highest recorded sensory block in the continuous infusion group had a range from T12-T3 (median T6), and in the PIB group T11-T5 (median T8). The sensory block was significantly higher in the continuous infusion group (P=0.002).

Discussion: Studies suggest the use of PIB epidurals can reduce manual bolus requirements.1 In addition, there may be reduced local anaesthetic usage and improved maternal satisfaction.2 This evaluation has given us information about our current requirements for manual boluses and therefore the workload impact on both midwifery and anaesthetic staff. The requirement for anaesthetist led rescue boluses was reassuringly low at <15%. We did not show a significantly lower requirement for boluses in our PIB group to support recent studies.1 However, further work with greater patient numbers may show more difference between the groups.

References
**P79 Active warming in obstetric theatres: three completed service reviews**

ME Walters, MJ Woolnough, S Aluri, F Roberts, M Berwertz, N Ahmad  
Department of Anaesthesia, Sheffield Teaching Hospitals  
NHSFT, Sheffield, UK

**Introduction:** Inadvertent perioperative hypothermia (patient core temperature <36 °C) occurs commonly during both general and regional anaesthesia for surgical procedures. The National Institute for Health and Care Excellence (NICE) have issued guidance that temperature should be measured regularly and all procedures longer than 30 min be actively warmed to help prevent inadvertent hypothermia. Obstetric operations are excluded from this guidance, however. Anecdotally, cases in our unit seemed cold and an initial service review confirmed this. Further reviews using two types of active warming followed to complete the cycles.

**Methods:** Following service review registration locally, retrospective data were collected from 120 obstetric theatre cases, including demographic information, procedure and duration, temperature measurements at various points and type of warming device (if any) used. Initial results were disseminated and practice altered to routinely use forced air warming devices. A further retrospective review of 68 case notes was performed after their introduction to assess efficacy. Due to practical issues with FAW and the publication of NICE medical technologies guidance, further prospective data collection was carried out of 64 cases using "Inditherm" conduction mattress warming. Data analysis was performed using Microsoft Excel.

**Results:** The duration of procedure was similar in all three phases of the review and pre-warmed intravenous fluids were routinely used in all cases. Overall, patients with post-operative temperatures <36 °C were significantly less after active intraoperative warming (39% vs. 18.7% and 9.7% for FAW and Inditherm respectively) (Figure). Under general anaesthesia, 25% were hypothermic in the first review compared to 3.7% with FAW and none with Inditherm.

**Discussion:** Both forced air warming and conduction mattress under-warming appear to be effective in reducing inadvertent perioperative hypothermia in obstetric practice. The practical difficulties in obstetrics of using forced air warming may make conduction mattress warming ("Inditherm") a more appealing solution.

**References**


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**P80 Timing of epidural analgesia delivery on a busy obstetric unit: a quality improvement project**

H Gooneratne, C Moss, M Doraiswami  
Anaesthesia, Queen's Hospital, Romford, UK

**Introduction:** Our unit provides peripartum care for over 8000 deliveries per year, with a significant proportion classified as high risk. During a review by the Care Quality Commission (CQC), it was noted that due to the volume of operative emergencies, there was a delay in the time to provision of labour epidural analgesia. Poor pain management in labour is known to be a significant factor in maternal satisfaction with their birth experience. Guidelines are in place for the timely provision of epidural analgesia once requested, and on minimum levels of anaesthetic staffing required within an obstetric unit. Following the above review, a second dedicated anaesthetist was allocated 24 h/day, which is relatively unique to our labour ward. The aim of this project was to ensure compliance with the published guidelines for timely labour epidural provision with this increased anaesthetic staffing.

**Methods:** We performed a retrospective analysis of a random selection of notes for patients who had a labour epidural sited from June 2013 to November 2013. Data collected included: time anaesthetist informed of request, time anaesthetist arrived in the room, any delay greater than 30 min, the time over 30 min before anaesthetist attended, and any recorded reason for any delay. Our audit standard was against the national guideline target of providing epidural analgesia within 30 min of request in > 80% cases, and within 60 min of request in > 90% cases.

**Results:** 453 epidural episodes were reviewed during the audit period out of a total of 1016 (44.5%) performed. The anaesthetist was documented as attending within 30 min of being informed in 422 cases (93%), and never fell below the 80% target in any month. Attendance was within the 60 min target in 446 cases (98.4%). Only eight of the delays beyond 30 min occurred within normal working hours. The most common reason for delay documented was that the anaesthetist was sitting another epidural or in theatre.

**Discussion:** Since emergency peripartum care has a higher clinical priority, in a unit with only one dedicated anaesthetist, provision of labour analgesia will often get delayed to ensure the safety of mother and baby, with a potentially negative impact on the birth experience. Our results demonstrate that we are now consistently exceeding the national recommendations to provide epidural analgesia within 30 min since provision of two dedicated anaesthetists for emergency obstetric cover. Given the economic constraints trusts are under, the threshold activity within a unit at which point a second anaesthetist is introduced should be reviewed locally dependent on the nature of the activity within each unit.

**References**

P81 Anaesthetic management of sickle cell disease in pregnancy: an audit of practice in a tertiary referral centre

E Oteri, V Sodhi
Anaesthetic Department, Queen Charlottes and Chelsea Hospital, London, UK

Introduction: Sickle cell disease (SCD) is the most common genetic disorder worldwide with 12-15 000 affected individuals in the UK. We aimed to compare our management of mothers with SCD with RCOG standards and local guidelines.

Methods: A total of 54 patients with SCD were seen in the Joint Haematology and Obstetric Specialist clinic over the 5-year period from 2008-2012. The following data were obtained retrospectively: haemoglobin subtype, antenatal anæsthesia/anaesthesia, postoperative physiotherapy, incentive spirometry and/or prophylactic CPAP.

Results: Notes of 42 patients were available for evaluation (77%). 30 patients had HBSS, 15 patients had HBSC, five patients had sickle beta thalassemia, one patient had SE disease and one patient who had a bone marrow transplant. 93% of patients had echocardiography and pulmonary function tests antenatally. 90% of women had regional anaesthesia/anaesthesia with combined spinal-epidurals (CSE) being the technique of choice. 61% (n=26) of women required caesarean section (CS). 50% of patients saw a physiotherapist postoperatively with 28% (n=12) having incentive spirometry and 11% (n=5) having CPAP post delivery. Five patients who required CS (19%) developed a chest infection postpartum. Three of these patients did have prophylactic CPAP postoperatively.

Discussion: Only two patients attended the high-risk anaesthetic clinic antenatally. Despite this there was a high uptake of regional analgesia/anaesthesia and no CS required general anaesthesia. The RCOG green top guidelines and our local guidelines state that all patients who have an operative delivery should be seen by a physiotherapist postoperatively and this was only done in 50% of our patients. The RCOG recommends that all SCD patients should have incentive spirometry post CS, which may potentially decrease pulmonary complications post surgery. Again we did not meet these standards. We are currently following the guidelines for pain relief in labour but we need to improve access to physiotherapy follow-up and incentive spirometry for sickle cell patients who have CS. We also need to improve our pre-assessment of this cohort of patients given our high CS rate. We aim to perform a prospective audit of this patient group starting later this year.

References

P82 Ethnicity and risk of postpartum hemorrhage

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Introduction: Postpartum haemorrhage (PPH) is an obstetric emergency with various risk factors. The role of ethnicity in occurrence and severity of PPH, however, is not well investigated. Large disparities in term of obstetrical outcomes have been documented in women of different ethnic origins. The aim of this retrospective study was to investigate whether ethnicity is a risk factor for PPH and severe PPH (SPPH) in our tertiary obstetric centre. Secondary, we attempted to identify ethnicity-related predicting factors of PPH/SPPH.

Methods: After ethical committee approval, we reviewed all parturients records within a 5-year period (2008-2012). Patients were divided into five ethnic groups: European, North African/Middle East, Sub-Saharan African, Latino American and Asians/Pacific Islanders. We identified the ethnic group with the highest incidence of PPH/SPPH and examined whether this was a predictive factor. We then analysed all ethnic groups for common covariates, known to be risk factors for PPH, to define those specific to the identified ethnic group. Finally, we examined whether these factors were predictive of PPH/SPPH for this ethnicity. P<0.05 was significant.

Results: Among 15083 deliveries during the study period, ethnic origin was identified for 13884 parturients. Sub-Saharan Africans were found prone to PPH/SPPH within 24 h (24.1% and 3.7%, P<0.001) and total hospital stay (25.1% and 3.9%, P<0.001). Sub-Saharan African ethnicity was identified as a predictive risk factor of PPH/SPPH (95% CI, 1.50 (1.35-66), P<0.001; 95% CI, 2.58 (1.97-3.36), P<0.001).

<table>
<thead>
<tr>
<th>Sub-Saharan Africans</th>
<th>Other groups</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>29.3</td>
<td>29.7</td>
</tr>
<tr>
<td>Parity</td>
<td>1.27</td>
<td>1.00</td>
</tr>
<tr>
<td>Multiple gestation</td>
<td>65 (2.6%)</td>
<td>187 (1.7%)</td>
</tr>
<tr>
<td>Hypertensive disease</td>
<td>301 (11.7%)</td>
<td>598 (5.3%)</td>
</tr>
<tr>
<td>Preeclampsia</td>
<td>146 (5.7%)</td>
<td>274 (2.4%)</td>
</tr>
<tr>
<td>Anaemia</td>
<td>592 (25.8%)</td>
<td>1736 (15.3%)</td>
</tr>
<tr>
<td>Induction-delivery</td>
<td>782 (30.4%)</td>
<td>3211 (28.4%)</td>
</tr>
<tr>
<td>Placental abruption</td>
<td>31 (1.2%)</td>
<td>53 (0.5%)</td>
</tr>
<tr>
<td>Caesarean section</td>
<td>636 (24.8%)</td>
<td>1974 (17.5%)</td>
</tr>
<tr>
<td>Spinal anaesthesia</td>
<td>429 (16.7%)</td>
<td>1406 (12.4%)</td>
</tr>
<tr>
<td>General anaesthesia</td>
<td>50 (1.9%)</td>
<td>120 (1.1%)</td>
</tr>
<tr>
<td>ICU admission</td>
<td>74 (2.9%)</td>
<td>103 (0.9%)</td>
</tr>
<tr>
<td>Total hospital stay</td>
<td>5.9</td>
<td>5.1</td>
</tr>
</tbody>
</table>

Discussion: Sub-Saharan African parturients were the more commonly affected by PPH/SPPH and this ethnicity seems to be a predictive risk factor of PPH/SPPH. Younger age, hypertensive disease, caesarean section and anaemia are independently related to PPH in this ethnicity. Exhaustive investigation of risk factors with prospective studies is essential for prevention of PPH.

Reference
P83 An evaluation of intraoperative cell salvage in obstetrics
D Leslie, S Morris*, G Lilley†
*Department of Anaesthesia, University Hospital of Wales, Cardiff, UK, Department of Anaesthesia, Morriston Hospital, Swansea, UK, †Department of Anaesthesia, Royal Gwent Hospital, Newport, UK

Introduction: In the most recent CMACE report, haemorrhage was responsible for the death of nine women. Blood loss in obstetrics is notoriously difficult to predict, but frequently occurs. Allogeneic blood is increasing in cost as the donor pool decreases. As yet, there are no specific guidelines regarding the use of intraoperative cell salvage (ICS) in obstetrics, despite growing evidence of both safety and efficacy. Our aims were to identify risk factors associated with postpartum haemorrhage (PPH) >1000 mL at caesarean section (CS) in order to establish departmental guidelines, and assess our current use of ICS.

Methods: Data were collected retrospectively from April to December 2012. Patients with measured blood loss (MBL) >1000 mL were identified using the Obstetric Bleeding Study 1 database, and denominator data obtained from the departmental database.

Results: Between April and December 2012, 1069 CS were performed.

<table>
<thead>
<tr>
<th>Type of CS</th>
<th>Total number of patients (%)</th>
<th>Median blood loss (mL)</th>
<th>% with MBL &gt;1000 mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elective</td>
<td>470 (44)</td>
<td>500 [350-700]</td>
<td>11%</td>
</tr>
<tr>
<td>Emergency before 2nd stage</td>
<td>513 (48)</td>
<td>500 [400-800]</td>
<td>13%</td>
</tr>
<tr>
<td>Emergency during 2nd stage</td>
<td>86 (8)</td>
<td>800 [500-1500]</td>
<td>36%</td>
</tr>
</tbody>
</table>

Data are number (%) and median [interquartile range]

For emergency CS, median MBL in Syntocinon-augmented patients was 800 mL [500-1200 mL] compared to 500 mL [300-850 mL] in those not receiving Syntocinon. ICS was used in 41 patients, but blood was returned to just seven patients.

Discussion: Our data highlights that use of ICS in our unit is sub-optimal. ICS was not used in many patients in whom it would have been beneficial, and when used, return rate was poor. For cost effectiveness, our return rate must increase from 17% to approximately 25%. Second stage CS has been identified as a clear risk factor for PPH, with 36% of patients bleeding >1000 mL. Syntocinon augmentation was also shown to increase severity of PPH. We suggest that ICS should be used for all second stage CS, and that its use should be strongly considered for all patients undergoing CS after receiving Syntocinon.

References

Figure: Number of red cell units transfused by year

Discussion: We believe with the measures described above we have significantly reduced our red cell transfusion rates. Although these measures are relatively simple, change is often difficult to implement in practice. Communication, ongoing education, reviewing all MOH cases and cases of over transfusion are important. The most controversial change was to increase the MOH trigger to 2000 mL to improve the overall response as a result of such a call being made.

Reference
P85 Elective caesarean section and preoperative group and save: should we follow NICE guidance?
S N Phillips, M Cole, A Bonell, N Taylor
Anaesthetics, Frimley Park Hospital, Frimley, UK

Introduction: In 2011, NICE issued clinical guideline number 132 for the management of caesarean section (CS), in which they state that: pregnant women who are healthy and who have otherwise uncomplicated pregnancies should not routinely be offered a group and save (G&S) or cross matching of blood. This guidance is based on one study, which was a retrospective case review of 3962 CS. In the study 3.3% of women required a blood transfusion during their hospital stay. Most blood transfusions were related to previously identified risk factors and they conclude the overall urgent blood transfusion rate without risk factor at 0.8/1000. At our hospital there was some concern over the safety of patients not having a preoperative G&S sample before elective CS. We have almost 600 deliveries per year including over 600 elective CS.

Methods: We looked at the previous five years of elective CS and women who had required a blood transfusion. Our aim was to assess the appropriateness of applying NICE guidance to our patient group. We used the blood banks database to look at all patients who had received a blood transfusion from 2008-2012, and were then able to filter this to only patients who had undergone CS of any category. From the dataset all notes were requested and data were collected from only patients who had undergone an elective CS.

Results: There were 3091 patients who underwent elective CS in the years 2008-2012. Only eight patients required an intraoperative or postoperative blood transfusion (within the first 24 h). Seven of these patients had identifiable risk factors: placenta praevia (n=2) Fibroids (n=3), anticoagulated for antithrombin III deficiency (n=1) and previous postpartum haemorrhage (n=1). One patient required urgent blood transfusion in the post anaesthetic care unit after elective CS. This patient had no previously identifiable risk factors, but had a 1.5 L haemorrhage secondary to uterine atony. This gave us an urgent blood transfusion rate, without identifiable risk factors of 0.32/1000.

Discussion: NICE guidelines are issued with the advice that ‘providers are reminded that it is their responsibility to implement the guidance, in their local context, in light of their duties to avoid unlawful discrimination and to have regard to promoting equality of opportunity.’ The introduction of a national protocol or procedure to local departments should be considered carefully. As with any change in practice it is vital to evaluate the service provided and the demands of the patient population. We were able to use audit as a tool to satisfy our concerns and answer the question - should we follow NICE guidance? Yes. If we implement NICE guidance our trust could save £3820 per year (estimating the incidence of recognized risk factors for bleeding at 5%, and the cost of a being G&S £6.70).

References
1. NICE CG 132 Caesarean Section. November 2011

P86 Service evaluation of intraoperative cell salvage as routine for all caesarean sections in a tertiary hospital
S Bellam, PJ Rose, M Porter
Anaesthesia, University Hospitals Coventry and Warwickshire, Coventry, UK

Introduction: Intraoperative cell salvage (ICS) is increasingly used in obstetric units. However, there is a wide variation in its uptake across the country. As far as we are aware, we are the only obstetric unit in the UK that sets out to use ICS as routine for all eligible patients undergoing caesarean section (CS). We present our experience with cell salvage in a 14-month period.

Methods: Over a period of fourteen months in 2011-12 we observed and audited our practice on use of ICS. We also audited the use of allogenic blood transfusions.

Results: Of the total 1631 patients undergoing CS, we gathered data from 1461. Overall 146 patients (10%) had blood processed and re-infused intra-operatively. These patients had a mean blood loss of 1220 mL and median blood loss of 1000 mL. We calculated that an equivalent of 158 units of blood was salvaged and transfused. Amongst all patients undergoing CS during this audit period 58 patients had 164 units of allogenic blood transfused perioperatively.

Table: Blood loss category of 146 patients having ICS blood

<table>
<thead>
<tr>
<th>Blood loss category</th>
<th>Total number of patients</th>
<th>Number (%) having salvaged blood</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;500 mL</td>
<td>608</td>
<td>15 (2.4%)</td>
</tr>
<tr>
<td>500 - 1000 mL</td>
<td>675</td>
<td>68 (10%)</td>
</tr>
<tr>
<td>1000 - 2000 mL</td>
<td>164</td>
<td>49 (30%)</td>
</tr>
<tr>
<td>&gt;2000 mL</td>
<td>14</td>
<td>14 (100%)</td>
</tr>
</tbody>
</table>

Discussion: In the year 2007-2008 we used cell salvage for elective cases when we anticipated major obstetric haemorrhage. However, upon auditing our figures, we found this ‘high-risk group’ constituted only 15% of patients with major obstetric haemorrhage. The majority of the patients with major haemorrhage (85%) were unanticipated or urgent and did not benefit from cell salvage. Therefore we decided to move to using ICS for all eligible patients undergoing CS. Since we have started using ICS as routine the perioperative allogenic transfusion rate has reduced from 1:10 patients to 1:25 patients. We use a single suction device and all processed blood is reinfused through standard blood filters, rather than using leucocyte depletion filter. To date none of our obstetric patients had any immediate reported adverse outcome. With two thirds of cell salvage cases and most non-cardiac cases taking place in obstetrics, the obstetric theatres have become the centre for training of staff across the trust. The cost of disposables is low; about £18 to collect blood and about £37 more to process and reinfuse salvaged blood. This represents a significant saving on the cost of a unit of packed red cells aside from the acceptability for the patients. While not attaining the evidential standard of a randomised controlled trial, our satisfactory service evaluation gives us reassurance that we are helping mothers and making the best use of scarce resources.

Reference
P87 An audit of anticoagulation following regional anaesthesia for caesarean section

A Odubiyyi, CM Mitchell, W Wight
Obstetrics, Royal Victoria Infirmary, Newcastle upon Tyne, UK

Introduction: Low molecular weight heparin (LMWH) reduces the risk of thromboembolism and should be administered after all caesarean sections. The AAGBI recently published guidelines for thromboprophylaxis after regional anaesthesia, instigated to address the risk of vertebral canal haematoma associated with administration of LMWH too soon after regional anaesthesia. Before these guidelines, subcutaneous LMWH was given to women in our hospital on the operating table after caesarean section under spinal anaesthesia and 2-4 h after removal on an epidural catheter for caesarean sections performed with an epidural. Following alteration of our prescribing policy this audit set out to investigate compliance with the new AAGBI standards.

Methods: This was a prospective audit completed over a one-month period. All medical staff were asked to complete an audit proforma after completion of a caesarean section. Data collection included demographic details, dose of tinzaparin prescribed, time of tinzaparin prescription and administration.

Results: Data for 142 caesarean sections were included. 100% of women were prescribed LMWH and 141 of the 142 women received the prescribed tinzaparin. 79 (55.6%) of patients were correctly prescribed LMWH 4 h postoperatively. Of these 48 (34% of all patients) received the prescribed tinzaparin 4 h post regional blockade. Only 28% of the time did the women receive the correct dose at the correct time.

Table 1 Number of women in relation to LMWH prescription and administration following neuraxial blockade

<table>
<thead>
<tr>
<th>Time after delivery</th>
<th>LMWH prescription</th>
<th>LMWH administration post neuraxial blockade</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4 h</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td>4-5 h</td>
<td>79</td>
<td>48</td>
</tr>
<tr>
<td>5-8 h</td>
<td>53</td>
<td>69</td>
</tr>
<tr>
<td>&gt;8 h</td>
<td>1</td>
<td>11</td>
</tr>
</tbody>
</table>

Discussion: Though 99% of cases received LMWH, only 34% of women received it at the prescribed time. 10% received it early and 56% received it later than the recommended 4 h post neuraxial blockade. This audit compares unfavourably with results from 2010 when LMWH was given at the end of the procedure following spinal anaesthesia. Moving the timing of administration from within the control of the prescribing anaesthetist onto the busy postnatal ward has resulted in more women receiving their LMWH beyond 4 h. We have concerns that alteration of the guidance to address the rare complication of vertebral canal haematoma may have had detrimental effect on the delivery of timely thromboprophylaxis.

References

P88 Does reinfusion of blood salvaged at emergency caesarean section increase the risk of infection?

D Baker, KM Teare*, CJ Ralph*
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*Anaesthesia, Royal Cornwall Hospital, Truro, UK

Introduction: There is little evidence regarding bacterial contamination of cell salvage blood, and no studies investigating contamination of blood salvaged at emergency caesarean section (CS). Given the proximity of the vagina to the surgical site it is possible that salvaged blood from emergency CS could contain bacteria. The aim of this evaluation was to identify if women who received cell salvaged blood had a higher rate of postoperative infection.

Methods: We completed a retrospective case note review of three groups of women who delivered during 2012.

Group 1: Women reinfused with cell salvage blood after emergency CS.

Group 2: Women with an estimated blood loss (EBL) of ≥500 mL at emergency CS, who did not have cell salvage reinfusion or allogeneic transfusion.

Group 3: Women receiving allogeneic transfusion only after emergency CS or vaginal delivery.

Results: 180 women met the criteria for the study. 148 sets of case notes were reviewed, four were excluded as they received both cell salvage and allogeneic blood. All women having emergency CS received prophylactic antibiotics.

Group 1: 15/51 (29%) women who had cell salvaged blood reinfused were treated for infection post-operatively. 1/51 had new onset symptoms of sepsis during the reinfusion (tachycardia and tachypnoea without fever or rigors). Median [IQR] EBL was 750 mL [500-1000 mL].

Group 2: 17/57 (30%) women who had an emergency CS without reinfusion or transfusion were treated for infection postoperatively. Median [IQR] EBL was 575 mL [500-700 mL].

Group 3: 15/36 (42%) women who had an allogeneic transfusion were treated for infection postoperatively. Of the 36 women 30 delivered vaginally and six by emergency CS. Median [IQR] EBL was 1450 mL [850-2000 mL].

Discussion: The risk of postoperative infection is similar in women who are reinfused with cell salvage blood as those who are not. Infection rate was higher in women receiving allogeneic blood, although they also had the greatest EBL. The study is underpowered to make definitive conclusions.

References
P89 Anaesthetists vs. obstetricians: a survey of uterotonics use at caesarean section

N Trask, Q Lo, M Naik, S Wray
Anaesthetics, The Royal London Hospital, London, UK

Introduction: Major obstetric haemorrhage remains the sixth leading cause of maternal death in the UK,1 most commonly secondary to uterine atony. Uterotonics are the mainstay of conservative treatment although the choice, dose and order of agents used varies. There are existing guidelines from the RCOG2 but presently no anaesthetic consensus guidelines.3 In light of this we report current anaesthetic vs. obstetric opinion on uterotonics use at caesarean section (CS).3

Methods: An electronic survey was sent to all consultant and ST3-ST7 anaesthetists and obstetricians working on our labour ward in Oct-Nov 2013. Questions explored choice of routine and escalation uterotonics at CS, initial and subsequent doses, method of administration, appreciation of side effects and contraindications.3

Results: 29/54 responses were received: 19/29 (66%) from anaesthetists, 10/25 (40%) from obstetricians. Syntocinon: 100% obstetricians expect a bolus to be given routinely (30% as a “push”) whereas 20% anaesthetists await a request (89% giving it slowly). 100% anaesthetists give 5 IU but 30% obstetricians believe >5 IU are given. 30% obstetricians might request a repeat bolus but 17% anaesthetists would object. 17% anaesthetists routinely administer a 40 IU infusion but 100% obstetricians desire this only on request. 100% anaesthetists list hypotension and tachycardia as side effects (vs. 50% obstetricians) and 67% (vs. 20%) change their regimen in preeclampsia and 50% (vs. 10%) in cardiac disease. Ergometrine: favoured by 89% obstetricians as second line, unless precluded by hypertension (a problem acknowledged by 94% anaesthetists). 100% obstetricians choose a single dose of 500 µg (89% IM) but 41% anaesthetists opt for 250 µg (94% IM) and would repeat this. Caroprost: preferred by 11% obstetricians as second line and 63% as third line. All responders choose 250 µg IM and would repeat after 10-15 minutes. Obstetricians have a greater appreciation of maximal dose (78% vs. 40%) but are less likely to acknowledge asthma as a contraindication (56% vs. 63%). Misoprostol: 37% obstetricians select as third line with 100% choosing 1000 µg PR vs. 54% anaesthetists choosing <1000 µg PR. More obstetricians than anaesthetists identify fever (67% vs. 16%) and diarrhoea (89% vs. 21%) as side effects.3

Discussion: All anaesthetists questioned follow the pharmacological treatment ladder for uterine atony suggested by obstetricians at CS but most would challenge a decision they disagreed with. Anaesthetists and obstetricians vary regarding choice of routine uterotonics, dose and administration. Does this reflect suboptimal communication, teaching that differs between specialties, or an appreciation of side-effects that develops through the specific experience of giving a drug? We suggest consensus guidelines draw on both expert anaesthetic and obstetric opinion.3

References

P90 Audit of compliance with British Committee for Standards in Haematology (BCSH) 2012 guidelines for blood grouping before blood transfusion

K Caulfield, N Hayes, D Murphy, S Ryan Enright, F Ni Aine
Anaesthetics, Rotunda Hospital, Dublin, Ireland

Introduction: Recent guidelines from the British Committee for Standards in Haematology (BCSH) have recommended that before transfusion “Unless secure electronic patient identifications systems are in place, a second sample should be requested for confirmation of the ABO group..... where this does not impede the delivery of urgent red cells or other components”.1 This is to reduce the risk of “wrong blood in tube” error that could result in missed incompatibility and potential fatality. In our maternity unit (9000 deliveries per annum) current practice is to have a minimum of one blood typing sample in the laboratory within 72 h of transfusion.2 The aim of this audit was to assess hospital compliance with BCSH guidelines.

Methods: Information on pre-transfusion sampling for 201 consecutive obstetric, gynaecological and neonatal patients receiving red cell transfusion was collected. This included reason for transfusion, date and time of samples. The audit was approved by our Hospital Audit Committee.

Results: Of the total 201 blood transfusion, there were 121 neonatal and 80 obstetric/gynaecological patients. 49% of the neonatal population had no blood group on record in the laboratory before the pre-transfusion sample. Only 11.25% of obstetric/gynaecological patients had no blood group available in the laboratory before the pre-transfusion sample. Concluding that only 59.5% of neonates were complaint with BCSH guidelines whereas 88.75% of the obstetric/gynaecological population were compliant. This figure could have been 100% if 9 gynaecological patients had a blood group on record in the laboratory before their pre-transfusion sample.

Discussion: Blood typing and screening are most commonly performed to ensure transfusion of compatible blood and that clinically significant antibodies are identified. Selection and issue of blood products are high risk procedures. Safety of transfusion begins with collection of the sample. It can be estimated that 1 in 2000 samples is from the wrong patient commonly known was “wrong blood in tube” and second sample may identify this problem.1 We are 100% complaint with BCSH guidelines for our obstetric population but not for gynaecological and neonatal patients. This raises issues of potential delay in emergency transfusions or possible overuse of O-negative units. This audit, however, has allowed identification of the need for further plans and hospital policies to be put in place for neonatal and gynaecological patients.

References
P91 Myocardial infarction following subcutaneous terbutaline for external cephalic version
S Bellam, RJ Elton, L Lacey*, DL Adamson†
Anaesthesia, University Hospitals Coventry and Warwickshire, Coventry, UK. *Obstetrics, University Hospitals Coventry and Warwickshire, Coventry, UK. †Cardiology, University Hospitals Coventry and Warwickshire, Coventry, UK.

Introduction: In the 2006–2008 CMACE report, cardiac disease was the commonest cause of maternal death.1 We describe the case of a primigravida who suffered non-ST elevation myocardial infarction (NSTEMI) following subcutaneous injection of terbutaline for external cephalic version (ECV).

Case report: A previously healthy 27-year-old nulliparous woman, at 36 weeks gestation was admitted to the labour ward for ECV. After routine preparation she received subcutaneous terbutaline 250 µg to facilitate uterine relaxation. About two minutes after the injection the patient started complaining of nausea, palpitations and chest tightness. Observations done at this time showed her to be in sinus tachycardia with a heart rate of 122 beats/min with a blood pressure of 90/62 mmHg. She was given intravenous crystalloids and although her symptoms abated partially she continued to be tachycardic. She was given intravenous crystalloids and although her symptoms abated partially she continued to be tachycardic and experienced intermittent central chest pain. An ECG showed sinus tachycardia and evidence of anterolateral ischaemia (1–2 mm ST segment depression in leads V3–V6). Troponin T at six hours was raised at 159 µg/L (normal<10 µg/L). Thereafter she was transferred to our hospital for care under an obstetric cardiologist. A bedside echocardiogram showed good biventricular function with no regional wall motion abnormalities. She was started on low dose bisoprolol, aspirin and prophylactic enoxaparin. Her heart rate stabilised about an hour after administration of beta blockers. A repeat troponin level at 24 h was normal and patient was discharged home the following day. She underwent an uneventful elective caesarean section at 39 weeks gestation and continued to remain asymptomatic when seen four weeks postpartum in obstetric cardiology clinic.

Discussion: Although infusions of terbutaline are often associated with tachycardia, it is very rare for patients to suffer myocardial infarction following subcutaneous terbutaline. Indeed, to date, only two such similar cases have previously been reported to the MHRA.2 As our patient developed symptoms in less than two minutes following injection, one of the possibilities was that the terbutaline was inadvertently injected into a small subcutaneous vein. This large bolus caused tachycardia and coronary artery spasm leading to ischaemia. The persistent tachycardia and hypotension was probably secondary to NSTEMI caused by ischaemia. It would have been easy to dismiss the symptoms as non-cardiac in origin as our patient had no risk factors for ischaemic heart disease. This case further highlights the importance of taking patients symptoms seriously and having a low threshold for investigating ischaemic sounding chest pain.

References

P92 Intra-operative anaphylactic reaction to oxytocin followed by postpartum haemorrhage
S Askoorum, O Hickey
Anaesthetics, Cork University Hospital, Cork, Ireland

Introduction: Allergic reactions to anaesthetic drugs have previously been reported in obstetric anaesthesia, but reactions to oxytocin are rare. In this report, with permission from the patient, we present a case of anaphylactoid reaction to syntocinon during caesarean section.

Case report: A 38-year-old nulliparous woman with an uneventful IVF facilitated pregnancy, underwent an elective caesarean section under spinal anaesthesia. There was no known history of drug allergy. Past medical history included CIN 3 and bronchiectasis secondary to bilateral pneumonia. Spinal anaesthesia, consisting of bupivacaine 11.5 mg, fentanyl 12.5 µg and morphine 150 µg was administered. A sensory block to cold, using ethyl chloride spray, was noted to T3 bilaterally. However, she had good motor power in both hands and reported no dyspnoea. Hypotension was noted and she was treated successfully with Hespan®, intravenous ephedrine and phenylephrine. Post-delivery, she reported feeling nauseated, drowsy and dyspnoeic with her BP dropping to 54/45 mmHg. A widespread macular rash was observed, which resolved once all medications were stopped. Hydrocortisone 200 mg, chlorphenamine 10 mg and 10–20 µg intravenous boluses of adrenaline were administered. Serum tryptase levels were taken at 1, 4 and 24 h post reaction. Concerns about uterine tone lead to an oxytocin infusion being restarted but she suffered an episode of vaginal blood loss of 1 L. Within an hour of the oxytocin administration, she was acutely unwell. Her fingers were dusky blue and the oxygen saturation monitor could not obtain a reading. Her condition started to improve with a 10 mg chlorphenamine infusion. An arterial blood gas indicated metabolic acidosis (pH 7.37, pCO₂ 2.8 KPa). Echocardiography showed no evidence of significant pulmonary embolism or cardiomyopathy. On day one postpartum, she was given two units of packed red cells. During infusion of the second unit, she became tachycardic and reported feeling unwell. The infusion was stopped and chlorphenamine 10 mg and hydrocortisone 200 mg were given. Immunological testing that followed involved skin prick testing with medications used during the procedure. All were negative except for oxytocin that caused an erythema followed by a small transient weal reaction of 1 mm.

Discussion: The incidence of anaphylactic and anaphylactoid reactions under anaesthesia is estimated to be between 1 in 4000 and 1 in 25 000.1 To date, few authors have reported cases of anaphylactic reactions after administration of synthetic oxytocin. While clinical presentations of anaphylactoid reactions to oxytocin include patchy erythema, hypotension, bronchospasm and reduced oxygen saturation, anaphylactic reactions cause a more widespread systemic effect. Based on the literature, the symptoms exhibited by our patient were highly consistent with those occurring during an anaphylactoid reaction. She was advised to avoid the specific preparation and a recent conversation with the patient indicated she was well but planning another pregnancy.

Reference
P93 Unusual cause of T wave inversion in a pregnant women identified in operating theatre

VK Melachuri
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Introduction: T wave inversion is known to be a normal ECG change in some pregnant women. We encountered an undiagnosed hypertrophic obstructive cardiomyopathy in a pregnant woman who was previously fit but was noted to have deep T wave inversion on ECG monitor before spinal anaesthesia and was thus fully investigated after elective caesarean section (CS).

Case report: A 33 year old G2P1 woman was scheduled to have a category 4 CS for breech presentation at 39 weeks of gestation. Preoperative assessment was unremarkable but ECG monitor in operating theatre before inducing anaesthesia revealed deep T wave inversion in all leads. There was no significant history: the patient had an uneventful pregnancy and no family history of cardiac morbidity or mortality. She had a good exercise tolerance and was going to gym until three years previously but discontinued since the birth of her first child. Clinical examination revealed an ejection systolic murmur along the left heart border but not radiating to the carotids. As she was a breech presentation at 39 weeks of gestation, there was not enough time for further evaluation. She was asymptomatic both before and during pregnancy and hence we decided to proceed with CS under spinal anaesthesia. Intraoperative hypotension was treated with intermittent boluses of phenylephrine and the estimated blood loss was 400 mL. Postoperatively she was referred to a cardiologist who suggested echocardiogram which showed severe apical hypertrophy with a left ventricular outflow tract gradient of 21 mmHg and pulmonary artery systolic pressures of 10 mmHg (±10 mmHg). A diagnosis of severe apical hypertrophic cardiomyopathy was made and she was fully investigated subsequently. She underwent six-day Holter monitoring, cardiac MR, referral to clinical geneticist and GP screening of her immediate family as the condition is an autosomal dominant. Cardiac MR confirmed the diagnosis and the Holter monitoring showed paroxysmal SVT and thus was commenced on daily bisoporolol 2.5 mg. Currently, she is on regular six-monthly follow-up.

Discussion: The most recent CEMACE report indicated that cardiomyopathy is the commonest cause of indirect maternal deaths and the most common cause was identified to be peripartum (dilated) cardiomyopathy. However, in general population, hypertrophic cardiomyopathy is the commonest form of cardiomyopathy and thus is possible that pregnancy can worsen symptoms in these patients. On identification of ECG changes, serious consideration was given to further investigation before CS to identify the cause of T wave inversion. As there was not enough time to consider full investigation and she was completely asymptomatic the decision to proceed with CS was made.

Reference

P94 Peripartum care of two women with Noonan Syndrome

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Introduction: Noonan Syndrome is a multi-system disorder characterised by facial, cardiovascular and skeletal abnormalities.1,2 We present two phenotypically different patients with Noonan Syndrome and the anaesthetic strategies used to manage their peripartum care.

Case 1: A 21-year-old nulliparous woman with Noonan Syndrome was booked for caesarean section (CS) because of short stature and possible cephalo-pelvic disproportion. Past history included free pulmonary regurgitation after valvotomy for pulmonary stenosis but good biventricular function. There was no history of bleeding or spinal deformity and an unremarkable airway apart from a typical webbed neck. For her CS invasive blood pressure monitoring was sited, followed by combined spinal-epidural anaesthesia with intrathecal hyperbaric bupivacaine 5 mg with opiates and subsequently a 12 mL incremental L-bupivacaine epidural top-up. She was cardiovascullarly stable throughout. After delivery Syntocinon 5 U was administered over 15 min but atony was noted and a Syntocinon infusion was commenced; tranexamic acid was also given and no further bleeding was seen. Total measured blood loss was 1750 mL. Four hours postoperatively, her haemoglobin (Hb) had dropped from 10.2 g/dL to 7.3 g/dL. She was transfused and discharged on day three.

Case 2: A 26-year-old G5P3 woman was referred at 36 weeks of gestation. She had a recent diagnosis of Noonan Syndrome with short stature but minimal other external characteristics. She had no cardiac anomalies or signs of a difficult airway but had an extensive bleeding history including three CS each followed by postpartum haemorrhage; heavy periods and prolonged bleeding after miscarriage and dental extraction. Haematology review showed normal platelet count; clotting and factor levels but abnormal platelet aggregation in response to collagen and a fibrinogen of 3.3 g/L. CS was planned under general anaesthesia. Before induction, intravenous DDAVP and tranexamic acid were given with haematological guidance. After delivery a slow 5 U Syntocinon bolus was given followed by an infusion. Measured blood loss was 400 mL. Postoperatively, she received an iron infusion due to a fall in Hb from 9.3 g/dL to 8.1 g/dL, regular tranexamic acid and she was discharged on day five.

Discussion: These contrasting cases demonstrate the two main management dilemmas of Noonan Syndrome. It can present with a variable expression of clinical features including difficult airways, cardiac abnormalities, chest and spinal deformities, and coagulation disorders. Pregnant women with Noonan Syndrome should be referred for early anaesthetic review, with careful consideration for the need of cardiology and haematological input. The second case was a late referral due to previously unrecognised bleeding problems. For those with significant cardiac and clotting abnormalities, consideration should be given to delivery in a tertiary centre. Women with Noonan Syndrome require multidisciplinary planning for delivery.

References
P95 Management of pregnancy in a patient with Bombay phenotype blood
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Introduction: Obstetric haemorrhage is a leading cause of maternal morbidity and mortality. Rapid access to blood and blood products is essential for all obstetric units. We present the case of a patient with the extremely rare 'Bombay' blood group.

Case report: A 31-year-old woman presented in her second pregnancy. Her first baby was delivered two years previously via elective caesarean section (CS) at 36 weeks, for fetal reasons. During the first pregnancy, she was identified as being rhesus negative and also having a highly unusual blood group, ‘Bombay blood.’ Due to the extreme difficulty in obtaining blood products, necessitating a European search, a decision was made early in this pregnancy to deliver the baby via elective CS at 37 weeks. Following antenatal contact with the National Blood Service, two units of packed red cells were obtained from Spain, and flown to be stored in at the National Frozen Blood Bank in Liverpool. To optimise haemoglobin the patient was treated with ferrous sulphate antenatally and her haemoglobin before delivery was 11.4 g/dL. Elective CS was carried out at 37 weeks by two consultant obstetricians with cell salvage available. Following consultation with haematology, O-negative, Kell-negative blood was available on site, with a plan to transfuse with methylprednisolone and intravenous immunoglobulin cover, in the event of massive acute transfusion being required. The CS was uneventful, with an estimated blood loss of 500 mL. The patient was discharged home two days later with a haemoglobin of 10.6 g/dL.

Discussion: The Bombay phenotype occurs in the general population at an incidence of approximately four per million. In some populations, such as Mumbai (formerly Bombay) the incidence may rise to 1 in 10 000. The Bombay phenotype is characterised by the lack of H-antigen, which is found on all red blood cells, including group O. H-antigen is also the precursor for formation of both A and B antigens, hence a patient with the Bombay phenotype will have anti-H, anti-A and anti-B. If a patient with Bombay phenotype blood is given a transfusion of type O, A or B blood, they will have an acute haemolytic reaction. Patients can therefore only receive a transfusion from others with the Bombay phenotype. This case underlines the importance of routine antenatal blood group screening to ensure early identification of potentially problems with blood cross matching at the time of delivery. Blood for transfusion may be sought from maternal siblings prior to delivery, however in this case, the situation was further complicated by the rhesus negative status of the patient, meaning her siblings were unsuitable donors. Bombay phenotype patients should be encouraged, where possible, to donate blood 6-12 months postnatally, so blood may be frozen and stored for potential future pregnancies. Our patient has consented to this in the near future.

Reference

P96 The wolf in sheep's clothing: an unusual case of complete heart block
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Introduction: Complete heart block (CHB) is a potentially life-threatening cardiac conduction abnormality, particularly in the context of anaesthesia, and has a number of aetiologies. We present the case of a fit, young, asymptomatic woman who was found to be in CHB when she attended for an evacuation of retained products of conception (ERPC). Subsequent investigation and treatment of the patient revealed the cause to be systemic lupus erythematosus, a rare cause of CHB, and one with many other sequelae.

Case report: A 40-year-old G1P0 woman presented for evacuation of retained products of conception (ERPC) for a missed miscarriage at nine weeks of gestation. She was an extremely fit woman whose past medical history revealed only an above knee DVT three years previously. This was attributed to the oral contraceptive pill, and she had no other known risk factors at that time. She denied any other medical issues. When standard monitoring was commenced before induction of anaesthesia, a pattern of complete heart block, with a ventricular escape rate of 38 beats/min, was noted on the three-lead ECG by the anaesthetist. Her blood pressure was 120/50 mmHg, and she was completely asymptomatic. A subsequent 12-lead ECG confirmed this diagnosis. A cardiology opinion was obtained, and it was decided that transcutaneous pacers should be applied during the ERPC. The procedure was performed without complication, and the patient transferred to the coronary care unit, where a permanent ventricular pacemaker was inserted. Interrogation of the patient's medical records from three years prior (subsequently delivered from another hospital) revealed a history of Reynaud's phenomenon, factor V Leiden, anti-Ro positive serology, and a normal ECG at that time. Subsequent echocardiogram and coronary angiography were found to be normal. However, a cardiac MRI showed focal transmural scarring of the left ventricle in a number of locations, consistent with the conduction abnormality observed. The patient's recovery was complicated by a further DVT, a malar rash, a pericardial effusion and bilateral pleural effusions. She was later discharged home on steroids and life-long anticoagulation.

Discussion: Although bradycardia is a common occurrence in the young, fit population, complete heart block is rare and potentially life threatening. The case presented here reminds us that it is vital for the obstetric anaesthetist to be vigilant in even the most seemingly straightforward of situations, as unrecognised cardiac dysrhythmias can lead to catastrophic complications. In addition to providing treatment, it is also imperative to fully investigate the aetiology of such uncommon conditions, so that an accurate diagnosis may be made, perioperative status may be optimised, and potential complications may be anticipated and avoided.
P97 Ventriculoperitoneal shunt malfunction secondary to the gravid uterus: a case of a parturient with neurofibromatosis presenting with hydrocephalus

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Introduction: An increasing number of parturients are presenting with pre-existing neurosurgical comorbidities. We describe the malfunction of a ventriculoperitoneal (VP) shunt during the third trimester of pregnancy leading to symptomatic hydrocephalus. Following delivery of the baby there was resolution of the hydrocephalus. We hypothesise that the shunt malfunction was secondary to functional obstruction by the gravid uterus.

Case report: A 33-year-old nulliparous woman at 37 weeks of gestation, was admitted to the neurosurgical intensive care unit (NICU) with a reduced conscious level. She was known to have neurofibromatosis type 1. At the age of 16 she required a VP shunt for aqueduct stenosis. At 27 weeks of gestation she was admitted with raised intracranial pressure (ICP) thought to be due to shunt obstruction and underwent a third ventriculostomy. A postoperative ventilation/perfusion scan showed a high probability of a pulmonary embolism so she was anticoagulated with enoxaparin. At 37 weeks she presented with headaches, vomiting and confusion. A CT scan showed marked hydrocephalus with the tip of the shunt placed correctly in the lateral ventricle. Abdominal examination and CTG showed she was in labour so she underwent an emergency caesarean section under general anaesthesia. Surgery and anaesthesia were uneventful with a reduced conscious level. She was extubated and transferred to NICU. On postoperative day 5 her EVD was clamped with a view for operative shunt revision. However, CT scans showed complete decompression of the ventricular system. The EVD was removed and she remained asymptomatic and was discharged home.

Discussion: The conduct of anaesthesia in neurofibromatosis is tricky. Central nervous system neurofibromas and a high incidence of scoliosis causes challenging, unpredictable regional blockade while involvement of the oropharynx and cervical spine makes airway management difficult. In this case raised ICP and anticoagulation necessitated a careful general anaesthetic. With regards to shunt malfunction, evidence suggests that normal intraabdominal pressure (IAP) is 5-7 mmHg. A recent study in term parturients measured median IAP as 22 mmHg (range 15-29 mmHg).1 Postpartum the same group had a median IAP of 16 mmHg (range 11-24 mmHg). Thus it is feasible that the rise in IAP can cause functional shunt obstruction and has been reported previously.2,3 While such cases are rare, the recent CMACE report highlighted neurological disease as the second leading cause of indirect maternal deaths. Such patients need early multidisciplinary input and management in tertiary neurological centres.

References

P98 Anaesthetic implications of anti-N-methyl-D-aspartate receptor encephalitis in a parturient

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Introduction: Anti-N-methyl-D-aspartate receptor encephalitis is a rare encephalitis first described in 2007. It comprises 1-4% of all cases of encephalitis. We describe the case of a parturient with a history of paraneoplastic anti-NMDA receptor encephalitis secondary to ovarian teratoma and discuss the anaesthetic management of her delivery.

Case report: A 36-year-old woman was referred to our high-risk anaesthetic antenatal clinic at 32 weeks of gestation. Six years previously the patient had presented with increasing confusion which progressed to coma. A diagnosis of anti-NMDA receptor encephalitis was made due to ovarian teratoma; anti-NMDA receptor antibodies were detected by indirect fluorescent antibody testing. She underwent salpingooophorectomy but required tracheostomy with prolonged ventilation and recovery. Residual problems included short-term memory impairment, fatigue and balance problems, obstructive sleep apnoea requiring CPAP and symptomatic tracheal stenosis secondary to tracheostomy. A multidisciplinary approach was required for the management of her delivery. ENT review was undertaken to assess severity of tracheal stenosis. Neurology review suggested current antibody levels were unlikely to be significant. Delivery was by elective caesarean section under combined spinal-epidural anaesthesia. Surgery and anaesthesia were uneventful with good maternal and fetal outcome.

Discussion: Anti-NMDA receptor encephalitis is an autoimmune neurological disorder, with 80% of cases occurring in young women. It can present with psychiatric symptoms, impaired consciousness and central hypoventilation.1 Antibodies bind to the NR1/NR2 heteromers of the NMDA receptor causing inhibition of the receptor and its down-regulation and action of drugs acting at this receptor, such as ketamine, nitrous oxide and tramadol, may be altered. Antibodies are of IgG type, which may cross the placenta and this may have implications for the neonate.2 Like other autoimmune disorders, it may improve during pregnancy with risk of relapse post partum.3

References
P99 Peripartum cardiomyopathy presenting as left bundle branch block and preeclampsia

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Introduction: Peripartum cardiomyopathy (PPCM) is a rare and potentially life-threatening condition, with incidence between 0.2-3%.1 We report a case of PPCM presenting as left bundle branch block and preeclampsia.

Case report: A 31-year-old (G2P1) patient presented at 38 weeks of gestation for a category 2 caesarean section (CS). She was previously well, was diagnosed with preeclampsia at 37 weeks on the basis of hypertension and proteinuria. She was receiving 8-hourly labetolol 200 mg. Wide QRS complex were seen on attachment of ECG electrodes and a 12-lead ECG revealed left bundle branch block with left axis deviation. The patient appeared well and denied any symptoms. Clinical examination was unremarkable. Due to preeclampsia and the absence of symptoms, it was agreed that surgery should proceed. CS was performed under spinal anaesthesia. The patient was haemodynamically stable throughout. An echocardiogram performed two days post-delivery showed a mildly dilated left ventricle, moderate systolic dysfunction with a left ventricular ejection fraction (LVEF) of 40%. She was reviewed by a cardiologist and started on bisoprolol and ramipril. Labetolol was discontinued. She has been advised not to become pregnant until review six months post-delivery.

Discussion: PPCM is a dilated cardiomyopathy presenting with signs of heart failure in the last month of pregnancy or within five months of delivery.2,4 Several aetiological mechanisms have been suggested, including myocarditis, cardiotoxic viral infection, abnormal haemodynamic response in pregnancy and cardiac angiogenic imbalance.3,4 However, it is largely an idiopathic disease associated with pregnancy, presenting with signs and symptoms of heart failure including dyspnoea, arrhythmias and cardiac arrest.1,4 Diagnosis is established from four criteria; (1) heart failure developing in the last month of pregnancy or within five months postpartum, (2) absence of other cause of heart failure, (3) absence of recognisable heart disease before the last month of pregnancy, and (4) left ventricular dysfunction with LVEF of <45%.1,2,4 Risk factors include multiparity, advanced maternal age (>30 years), pregnancy-induced hypertension, preeclampsia, multiple pregnancy, and long-term tocolytic therapy.1,2,4 Relapse risk depends on the recovery of LV function. With full recovery, pregnancy is considered low risk, while if the LV function does not recover, pregnancy is considered high risk and not recommended.4 There is overlap between PPCM and preeclampsia with 43% of cases associated with hypertension.2 This case highlights the importance of anaesthetists being vigilant for unusual findings, especially in a busy obstetric theatre where these can be missed.

References

P100 Oocyte donation and caesarean delivery in a woman with Turner syndrome: anaesthetic implications

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Introduction: Turner syndrome is the commonest sex chromosome disorder (1:2500 live-born females)1 caused by abnormalities or absence of the X chromosome. Oocyte donation is used for infertility in Turner syndrome. Pregnancy and delivery can be fraught with difficulty due to cardiovascular abnormalities and hypertensive disorders, which can lead to aortic dissection. We obtained patient consent and present a case of a pregnant woman with Turner syndrome who delivered in our unit.

Case report: A 38-year-old nulliparous woman with Turner syndrome underwent oocyte donation and intracytoplasmic sperm injection. She had characteristic features of Turner syndrome including short stature. Her height was 1.39 m and weight 60 kg. Of note she had a webbed neck, high arched palate, receding chin and limited jaw subluxation. She had a known dilated aortic root of 28 mm on MRI, which was two standard deviations from the mean for her body surface area. Serial echocardiography did not demonstrate further dilation of her ascending aorta during pregnancy. Her heart and aorta were otherwise normal. A detailed clotting screen was unremarkable. Elective caesarean section at 39 weeks of gestation was planned to avoid the haemodynamic stress of labour. An arterial line was used for invasive monitoring. A combined spinal-epidural technique was used with intrathecal hyperbaric bupivacaine 7.5 mg and diamorphine 300 µg. Onset of motor block was noticeably delayed. Epidural volume expansion technique was used to successfully increase block height to T4 bilaterally and further supplemented with 2% lidocaine with adrenaline 8 mL. A 3120 g female infant was born with Apgar scores of 9 and 9 at 1- and 5 min. Uterine contraction was achieved following 5 U of oxytocin followed by a 40 U intravenous infusion over 4 h. Estimated blood loss was 900 mL and postoperative haemoglobin was 11.4 g/dL. She recovered well and was discharged home on day three.

Discussion: Most Turner karyotypes are monosomy, (45,X) although a spectrum of abnormalities exists. Characteristic features include short stature, neck webbing, cardiac and renal malformations, hypothyroidism, hypertension, and hypergonadotrophic ovarian failure. Hypertension and preeclampsia are more common in oocyte recipients and higher still in those with Turner syndrome. The risk of death from aortic dissection in Turners syndrome is approximately 2% or higher.2 There is a paucity of data in the literature regarding the anaesthetic management of such patients with Turner syndrome. Elective caesarean avoided the risks of shearing forces across the aorta encountered in labour and a careful regional technique offered the greatest haemodynamic stability. Given the potential difficulty in intubation, we had prepared for awake fibroptic intubation had regional anaesthesia been unachievable or unsuccessful.

References