Abstracts of free papers presented at the annual meeting of the Obstetric Anaesthetists' Association, Manchester, 19 & 20 May 2016

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O1 Quantification of haemodynamics and myocardial tissue characteristics in healthy pregnant women and women with preeclampsia using cardiac magnetic resonance

SS Chen, L Leeton, AT Dennis
Department of Anaesthesia, Royal Women’s Hospital, Parkville, Australia

Introduction: In preeclampsia (PE) women have increased cardiac output, reduced diastolic function, pericardial effusions and increased left ventricular (LV) wall diameters on echocardiography (TTE). Women with PE also have higher cardiovascular system risk in later life that may be related to PE induced changes within the myocardial tissue (oedema or fibrosis). TTE cannot differentiate between causes of increased wall thickness and cannot characterize the myocardium therefore it is uncertain whether this finding on TTE in women with PE is true LV hypertrophy or myocardial oedema and whether fibrosis is present. Cardiac magnetic resonance (CMR) is a non-invasive imaging technique can assess haemodynamics and characterise myocardial tissue. There are no studies of CMR in women with PE. We aimed to determine myocardial structure using CMR in healthy pregnant (HP) and PE women.

Methods: After institutional ethics approval and written consent, from June 2014-April 2015 36 women (31 HP; 5 PE) underwent CMR. HP women were ASA 1 on no medication and non-smokers. PE women had pregnancy-onset hypertension with evidence of end-organ dysfunction. Women with chronic hypertension, multiple pregnancy, body mass index (BMI) >45 kg/m² were excluded. CMR imaging was analysed using CMRTools (Cardiovascular Imaging Solutions, UK) for volumetric analysis and semi-quantification of STIR (short-tau inversion recovery) images for myocardial oedema assessment. Myocardial oedema was assessed by measuring myocardial signal intensity and comparing to signal intensity from skeletal muscle closest to the heart (serratus anterior). Myocardial intensities were measured from 16 LV segments (basal=6, mid-chamber=6, apical=4) and averaged to obtain a global myocardial signal intensity. Myocardial oedema was defined as a myocardial:skeletal tissue intensity ratio of ≥2.0.

Results: The mean±SD age, gestation and BMI for HP and PE women was 33±4.5 vs 36±3.4 years (P=0.22), 36±3.9 vs 33±5.0 weeks (P=0.29), 30±5.0 vs 28±2.1 kg/m² (P=0.15) respectively.

Table: Structure and function data

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<td>Systolic BP (mmHg)</td>
<td>117 ± 11.1</td>
<td>142 ± 14.7*</td>
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<tr>
<td>Diastolic BP (mmHg)</td>
<td>69 ± 9.3</td>
<td>88 ± 9.2*</td>
</tr>
<tr>
<td>LVEDV (mL)</td>
<td>130 ± 22.1</td>
<td>134 ± 31.5</td>
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<tr>
<td>LV ejection fraction (％)</td>
<td>64 ± 5.2</td>
<td>65 ± 6.0</td>
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<tr>
<td>LV mass (g)</td>
<td>127 ± 20.1</td>
<td>151 ± 43.8</td>
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<tr>
<td>Cardiac output (mL/min)</td>
<td>6.6 ± 1.3</td>
<td>6.0 ± 1.2</td>
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<tr>
<td>Heart rate (beats/min)</td>
<td>75 ± 11.0</td>
<td>73 ± 9.4</td>
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<tr>
<td>Myocardial:skeletal intensity</td>
<td>1.1 ± 0.15</td>
<td>1.6 ± 0.47*</td>
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*P<0.05 (one-sided unpaired t-test Welch’s correction)

Discussion: CMR can quantify haemodynamics and characterise myocardial tissue in HP women and in women with PE. Our data suggest that women with PE have a different myocardial wall composition and this may be due to oedema not muscle. Further work is needed to investigate this novel finding.

O2 Fibrinogen concentrate versus placebo for treatment of postpartum haemorrhage: a multicentre, prospective, double-blind randomised control study (OBS2)

D Bruynseels, J Dick*, CD Elton†, S Malliaiah§, RE Collis on behalf of OBS2 collaboration
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Introduction: A low fibrinogen is associated with progression of postpartum haemorrhage (PPH) but it is unknown whether early replacement improves outcomes. In the absence of timely coagulation results, many centres use early fixed ratios of red blood cells (RBC) and fresh frozen plasma (FFP) to treat presumed haemostatic impairment. FFP is associated with adverse events and it is not known whether withholding FFP based on point of care testing is safe. We investigated Fibrinogen-guided early fibrinogen replacement and FFP transfusion in moderate/severe PPH.

Methods: With consent, women with ongoing PPH (1000-1500 mL) were screened for enrolment into an MREC-approved multicentre double-blind randomised controlled trial. Fibrin A5 was performed at enrolment and repeated after every 500 mL blood loss or for clinical concern; no FFP or fibrinogen was infused if Fibrin A5 was >15 mm. If the Fibrin A5 was ≤15 mm, women were randomised to fibrinogen concentrate or placebo. The primary outcome was the number of allogeneic blood products (RBC, FFP, cryoprecipitate, platelets) transfused.

Results: The study enrolled 653 women of whom 55 had a Fibrin A5 ≤15 mm and were randomised: 28 to fibrinogen; 27 to placebo. The fibrinogen and placebo arms received a total of 58 and 75 allogeneic units, respectively; this was almost entirely due to a difference in FFP transfusion (18 vs 33 units). The adjusted incidence rate ratio (95% CI) for allogeneic products in the fibrinogen arm compared to placebo was 0.72 (0.30 to 1.70, P=0.45). Any transfusion was required in 53.6% of the fibrinogen and 55.6% of the placebo arm. In pre-specified subgroup analysis, the median [IQR] allogeneic units transfused in women with fibrinogen <2g/L in the fibrinogen (n=3) and placebo (n=4) arms was 1 [1-8] and 7[14-16], respectively. In women with a Fibrin A5 ≤12 mm, allogeneic units transfused were 1 [0-4.5] for fibrinogen (n=13) and 3 [0-6] for placebo (n=15). Of the 653 women, 598 (92%) maintained a Fibrin A5 >15 mm, indicating adequate haemostasis throughout. Of the 598 women, 23% received RBCs, 2% FFP and 82% had ≤1 invasive procedures to control bleeding.

Discussion: Haemostatic impairment is uncommon in moderate/severe PPH (<8%). Withholding FFP if Fibrin A5 >15 does not impair outcomes. Early fibrinogen replacement, triggered by a Fibrin A5 ≤15 mm, was not associated with a statistically significant reduction in allogeneic transfusion although fewer units of FFP were transfused. Subgroup analyses support investigation of a lower intervention trigger for fibrinogen replacement.

Disclosure: This study received funding from CSL Behring.

Reference
O3 Transnasal Humidified Rapid-Insufflation Ventilatory Exchange (THRIVE): an optimal method of pre-oxygenation for general anaesthesia in obstetrics
E McMaster, E Gent, T Mahendragoyam, A Surendran
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Introduction: General anaesthesia (GA) in obstetrics is known to be a high-risk endeavour due to the physiological changes in pregnancy and an increased incidence of difficult airway. A rapid-sequence induction (RSI) is standard for both elective and emergency procedures. Avoidance of hypoxaemia is key to preventing detrimental outcomes when a prolonged intubation is encountered. Pre-oxygenation allows creation of an oxygen (O₂) reservoir, reducing rapid onset of hypoxaemia during the apnoeic period. Apnoeic oxygenation transnasally at high flow rate has been shown to be beneficial in delaying intubation in patients with respiratory failure. Benefits during induction and emergence from GA are also proven in the non-obstetric population. O₂A/D₅S airway guidelines recommend nasal O₂ supplementation. We share our experience of introducing the technique in obstetrics.

Methods: Our established practice of THRIVE for intubation in intensive care and high risk GAs facilitated a smooth start in obstetrics. THRIVE was commenced from the time of arrival in theatre and continued during transfer to the operating table, induction and laryngoscopy until tracheal tube is secured. We aimed to achieve the recommended 10-min duration. Maternal and neonatal data are presented.

Results: We did not achieve the recommended period of pre-oxygenation; shortest being 7 min (mean 9 min). We used THRIVE for eight category-I caesarean sections and two cases of surgical control of postpartum haemorrhage. The lowest SpO₂ was 94% (mean 98%). Maternal body mass index ranged from 19 to 51 kg/m². Median apnoea time was 40 seconds, (longest 180 seconds). There was one anticipated difficult airway, and two cases needing more than one intubation attempt. There were no untoward neonatal outcomes among the caesarean group. The lowest Apgar score was 7 at 1 min and mean pH was 7.23.

Discussion: From our experience THRIVE can be used effectively for obstetric GAs. Supplemental maternal oxygenation does not seem to pose any additional risks to the neonate, although larger comparative studies may be required to confirm this. We also found the technique allowed ‘hands free’ pre-oxygenation allowing other aspects of a category-I caesarean section to be carried out. We recommend THRIVE as a superior alternative to standard pre-oxygenation in obstetrics.

References

O4 Efficacy and safety of intravenous carbetocin as a bolus compared to a short infusion for caesarean section
S Dell-Kuster, I Hoesli*, O Lapaire*, E Seeberger, LA Steiner, HC Bucher†, T Girard
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Introduction: Carbetocin is a synthetic oxytocin-analogue with a longer half-life. Oxytocin is known to cause less cardiovascular side effects when administered as a short infusion. We compared the application of carbetocin as a slow intravenous bolus with application as a short infusion in women undergoing a caesarean section (CS). We hypothesised that uterine contraction would not be inferior after a short infusion than after a bolus.

Methods: In this randomised, double-blind, investigator-initiated non-inferiority trial, with ethics approval and informed consent, women undergoing a planned or unplanned CS under neuraxial anaesthesia received a bolus and a short infusion, one of which contained carbetocin 100 μg (double dummy). Obstetricians quantified uterine tone 2, 3, 5 and 10 min after cord clamping by manual palpation using a linear analogue scale ranging from 0 to 100. We evaluated whether the lower limit of the 95% confidence interval (CI) for the difference of the maximal uterine tone within the first 5 min after cord clamping between both groups did not include the prespecified non-inferiority limit of -10.

Results: 140 patients were enrolled, 69 (49%) in the bolus, 71 (51%) in the short infusion group. Baseline characteristics were similar. Maximal uterine tone was 89 in the bolus and 88 in the short infusion group (mean difference -1.3, 95% CI -5.7 to 3.1). Blood pressure was similar (mean difference in mean arterial pressure -2 mmHg, 95% CI -5 to 1), but 36 (52%) in the bolus and 29 (41%) in the short infusion group received phenylephrine during the period carbetocin administration. Calculated blood loss, use of additional uterotonics and side effects were comparable.

Discussion: Administration of carbetocin as a short infusion does not compromise uterine tone. In concordance with oxytocin, carbetocin can safely be administered as a short infusion during caesarean section.

References
O5 Tranexamic acid in obstetric haemorrhage: is it for everybody?
R Harris, E Jackson, J Keough, H McNamara
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Introduction: Our management of obstetric haemorrhage includes ROTEM testing to guide replacement of clotting factors. The anti-fibrinolytic agent tranexamic acid (TXA) is widely used, particularly in trauma and orthopaedic surgery. TXA thrombotic risk is thought to be low based on retrospective studies. However, as pregnancy and haemorrhage are risk factors for thrombosis, there is cause for caution in this group. ROTEM testing of fibrinolysis has been validated in trauma patients. We estimated the incidence of fibrinolysis in obstetric haemorrhage, plus associated factors, to assess whether TXA use is appropriate.

Methods: Following approval by the trust audit department, retrospective data for all obstetric ROTEM performed between July 2014–June 2015 were collected. We selected patients with coagulopathy (EXTEM A5 <47mm)1. Within this subset we looked for fibrinolysis (Lysis index at 30 min (LI30) <95% and/or maximum lysis (ML) >15%2) and visually reviewed traces. We recorded diagnosis, estimated blood loss and TXA administration (plus timing in relation to ROTEM).

Results: In one year, we identified 149 traces with EXTEM A5 <47mm from 97 individual patients. Fibrinolysis on ROTEM was only present in one patient. Excluding women who received TXA before ROTEM (14/97), this represents a fibrinolysis incidence of 1.2% amongst coagulopathic patients.

Discussion: In a busy tertiary obstetric unit (>8000 deliveries/year), we demonstrated that fibrinolysis measured by ROTEM is rare, even among patients with significant haemorrhage. This suggests that TXA administration may not be routinely required. As it appears difficult to predict which patients will exhibit fibrinolysis, ROTEM may be useful. Measured parameters of fibrinolysis are available using the EXTEM test after 30 min (LI30) although visual assessment of traces may provide a more rapid indicator, and APTEM reagent would be a more definitive test. The results of the World Maternal Antifibrinolytic (WOMAN) trial are awaited and may assist in assessing the risk versus benefit of TXA in the obstetric population.

References

O6 Maternal outcomes in women with aortopathy: experience in a tertiary joint cardiac obstetric centre
EV Plunkett, S Bull*, R Gertz*, RK Morris*, TJ Selman, PJ Thompson, S Bowater†, P Clift†, L Hadshim†, S Thorne†, PA Moore
Birmingham Women's Hospital, Birmingham, UK, †Queen Elizabeth Hospital Birmingham, Birmingham, UK.
*University of Birmingham, Birmingham, UK

Introduction: Pregnancy is associated with an increased risk of cardiovascular complications for women with aortic pathology, and a 10% incidence of these are widely quoted. Our institutions joint cardiac service sees women with aortopathy for pre-pregnancy assessment and counselling and subsequently manages them during pregnancy. We sought to review our recent cases and describe maternal outcomes in our patient population.

Methods: Female patients aged 16–35 years with aortopathy and a recent pregnancy (2008–2015) were identified from our database. Patients with a bicuspid aortic valve, structural congenital cardiac disease and coarctation of the aorta were excluded. Electronic and paper patient records were reviewed to collect data regarding diagnosis, medical management, mode of delivery, anaesthetic for delivery and maternal obstetric and cardiovascular complications during or subsequent to pregnancy (within 1 year).

Results: Twenty-three patients were identified with the following diagnoses: Marfan syndrome (n=14), Ehlers-Danlos (n=4), Loeys-Dietz (n=1) and undefined aortopathy (n=4). One patient was excluded as she was under follow up for a family history of aortic disease which did not subsequently manifest itself in the patient. There were a total of 28 pregnancies in the remaining 22 patients. Two patients had aortic dissections related to pregnancy. One was diagnosed immediately postpartum in a woman with known Marfan syndrome and the other at 38 weeks of gestation in a woman subsequently found to have to have Marfan syndrome. Both had successful emergency aortic root replacement, the second immediately after delivery of the fetus by caesarean section. The caesarean section was performed under regional anaesthesia (combined spinal epidural), which was subsequently converted to general anaesthesia for the aortic surgery. One patient with undefined aortopathy presented acutely with chest pain and a rapidly dilating aorta; she had an emergency aortic root replacement at 22 weeks of gestation and was found to have a necrotising granulomatous aortitis. This patient was later delivered by category-3 caesarean section at 34 weeks of gestation under epidural anaesthesia. No patients died.

Discussion: Although our numbers are small, the incidence of complications during pregnancy or immediately postpartum are similar to those that we quote to our patients. Anaesthetic management of patients with aortic disease is usually straightforward but it is important to be aware of the risk of complications. Pregnant and postpartum women complaining of severe chest pain should be brought to the immediate attention of senior staff and investigated urgently.

Reference
O7 The incidence and outcomes of anaphylaxis in pregnancy: a UK population-based descriptive study

S McCall, K Bunch, P Brocklehurst, K Hinshaw*, JJ Kurinczuk, DN Lucas†, B Stenson§, D Tuffnell*, M Knight

Introduction: Anaphylaxis is a potentially fatal systemic hypersensitivity reaction, characterised by life-threatening airway, breathing or circulatory problems often with skin or mucosal change. Recent policy changes recommending administration of prophylactic antibiotics before caesarean delivery have led to concerns about the maternal and fetal impacts of anaphylactic reactions. The aim of this study was to estimate the incidence of anaphylaxis in pregnancy and describe the management and outcomes in the UK.

Methods: A population-based descriptive study was conducted using the UK Obstetric Surveillance System (UKOSS) monthly mailing to all consultant-led maternity units in the UK between 1st October 2012–30th September 2015. Cases of anaphylaxis were defined as a severe, life-threatening generalised or systemic hypersensitivity reaction.

Results: There were 37 confirmed cases of anaphylaxis in pregnancy, giving an estimated incidence of 1.6 (95%CI 1.1 to 2.2) per 100 000 maternities. The majority of women had a single identified causal agent; in five women multiple candidate causal agents were reported. The main reported causal agents were: penicillin-based antibiotics (n=11), cephalosporins (n=3), metronidazole (n=4), oxytocires (n=4), blood products (n=3), and intravenous iron (n=2). For one woman reported to have had a reaction to oxytocics there was no other reported possible cause of the anaphylactic reaction. Only three women were reported to have a reaction to an anaesthetic agent, either suxamethonium, thiopental or “unspecified agents” used for spinal anaesthesia. Nineteen (51%) of the cases occurred in obstetric theatre, 10 (27%) in the delivery suite. 29 women (78%) were managed with adrenaline, 28 (76%) received chlorphenamine and 34 (92%) received hydrocortisone. Tryptase levels were measured in 31 (84%) women after resuscitation and were raised in nine (24%) cases. Two women died (5%), 14 (38%) women were admitted to level-3 critical care. No infants died; however, 10 (30%) of 33 infants were admitted to NICU and there was one case of neonatal encephalopathy.

Discussion: Anaphylaxis is an extremely rare severe complication of pregnancy that may result from administration of antibiotics and other drugs. Reactions to anaesthetic agents are an infrequent cause, and less frequent than reported reactions to oxytocic agents. Reactions to antibiotics appear no more frequent than in the general population. Anaphylaxis may have severe outcomes for both mother and fetus but these were uncommon.

O8 National survey on training and assessment of competency of midwives managing epidurals

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Introduction: As anaesthetists, we are responsible for women receiving regional analgesia in labour. OAA/AAGBI guidelines state “midwives caring for women receiving regional analgesia for labour should have been trained and deemed competent to do so by a local mechanism. Competence to care for women with epidural analgesia should be recertified annually as a minimum.” 1 We wanted to find out what training is given by whom and how competency is assessed in UK obstetric units.

Methods: An OAA approved survey (number 158) was sent to UK lead obstetric anaesthetists (n=200). Questions were asked about the epidural training for midwives and assessment of their competence to look after women with epidural analgesia.

Results: The response rate was 60% (n=120) with one unit that does not have an epidural service. 76% (n=91) of units report that midwives undergo regular epidural update training.

Table: Frequency of epidural training

<table>
<thead>
<tr>
<th>Frequency of epidural update training</th>
<th>Number (%)</th>
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<tbody>
<tr>
<td>Every year</td>
<td>60 (66%)</td>
</tr>
<tr>
<td>Every 2 years</td>
<td>11 (12%)</td>
</tr>
<tr>
<td>3-5 years</td>
<td>4 (4%)</td>
</tr>
<tr>
<td>Don’t know</td>
<td>16 (18%)</td>
</tr>
</tbody>
</table>

The majority of epidural update training sessions (63%, n=76) are lead by anaesthetists and up to 2 h long: some form part of an annual update day. Some commented that lack of SPA time meant this was no longer delivered. In other units sessions are delivered by midwives (26%) or the acute pain team (10%). Most take the form of a lecture or face-to-face training but 8% of units (n=9) use a virtual learning environment (VLE) and 9% (n=11) use a workbook. 59% (n=70) of lead anaesthetists reported that midwives have to demonstrate competency in the management of epidurals. This is mostly undertaken using practical assessment by senior midwives/practice educators. Six units use VLE to assess competency. The majority of units just assess initial competence. Only eight units (7%) repeat this competency assessment. 113 units train midwifery students. In only 45% of these (n=51) is the lead anaesthetist aware of any formal training in epidural management during the undergraduate period.

Discussion: Only six UK units are known to be fully compliant with the OAA/AAGBI guidelines on epidural training and annual recertification of competence of midwives. Of concern, competency is not assessed in at least 25% of units and many lead obstetric anaesthetists are unaware of training and competency assessments in their units. Half of units reporting provide annual update training to midwives - with the large number of midwives this itself can be a challenge to deliver. Use of standardised VLE packages may help ensure timely training. They would also enable assessment of competency and re-certification at a time to suit the learner and the service.

Reference
09 Regulation of leukocyte caspase-1 activity by bupivacaine in labour

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Introduction: Epidural-related maternal fever (ERMF) is associated with neonatal morbidty and more obstetric interventions. ERMF occurs in ~25% labouring women within 5 h of commencing epidural analgesia. Pyrogenic cytokines are implicated, although the mechanism remains unclear. We hypothesized that bupivacaine promotes inflammation by activating the inflammasome in circulating leukocytes. Caspase-1 activity is part of the inflammasome complex that generates the pro-inflammatory, pyrogenic cytokine interleukin-1β following exposure to sterile and pathogenic danger molecules, and hence systemic fever.

Methods: Consent was obtained from women in labour in this cross-sectional, mechanistic study (ISRCTN11281491). Peripheral blood samples were obtained before and 4 h after epidural analgesia was commenced. Blood was separated (Ficoll) to isolate mononuclear cells (lymphocytes, monocytes); active caspase-1 was measured using the fluorescent inhibitor FM-YVAD-FMK (flow cytometry). Leukocytes, obtained before epidural infusion, were also spiked with a clinically relevant concentration of bupivacaine (10 μM), mimicking the potential 4h exposure of leukocytes to local anaesthetic. Nigericin (10 μM) was added to each sample as a positive control to activate assembly of the inflammasome, and hence increase caspase-1 activity maximally. Apoptosis, measured by annexin-V/propidium iodide co-staining, was also quantified after bupivacaine/nigericin incubation for 4 h using flow cytometry. Data were analyzed by paired t-test; P<0.05 was considered significant.

Results: In lymphocytes obtained before epidural analgesia, bupivacaine reduced basal caspase-1 activity by 19±5% (P=0.004; Fig. 1; n=9). Similarly, in monocytes obtained before epidural analgesia, caspase-1 activity was reduced (8±1%; P=0.001). Cells obtained from women 4h after epidural analgesia showed qualitatively similar results. Apoptosis was reduced following incubation with bupivacaine.

Discussion: Contrary to our original hypothesis, bupivacaine does not promote activation of the inflammasome in circulating leukocytes obtained from labouring women. ERMF is unlikely to be attributable to the generation of excess cytokine production triggered by exposure to bupivacaine.

Reference

O10 Active warming for elective caesarean section: a randomised controlled trial

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Introduction: Perioperative hypothermia occurs frequently during caesarean sections but active warming is not widely used.1,2 Following several local audits we decided to introduce active warming in our obstetric theatres.3 A literature review demonstrated a paucity of evidence in the obstetric population so we decided to carry out a randomised controlled trial comparing active warming methods.

Methods: Following ethical approval, women presenting for uncomplicated elective caesarean section with spinal anaesthesia were invited to take part in the study. 132 women were randomised to one of 3 groups, induction mattress (Ind twilight), forced air warming (full length Bair Hugger undersheet) and the control group. Core temperature and patient reported thermal comfort were measured perioperatively at 15 min intervals. All patients received intravenous fluids warmed to 40°C using the enflow® system.

Results: One-hundred-and-thirty-one women completed the study. Core temperature was maintained throughout the perioperative period in all groups with no significant difference observed between the groups (P=0.48). No patients had a temperature of 36°C or less at any time. Five patients in the Bair Hugger group had warming discontinued due to becoming uncomfortably warm.

Figure: Mean core temperature versus time for women in the Bair Hugger, Inditwilight and control groups. Vertical bars represent standard deviation.

Discussion: No advantage in using active warming to maintain the perioperative core temperature in uncomplicated caesarean sections under spinal anaesthetic was shown. The absence of hypothermic patients contrasts with our departmental audit data demonstrating a Hawthorne effect in the trial population.

References
P1 Changes in rotational thromboelastometry (ROTEM) parameters during the first, second and third trimesters of pregnancy
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Introduction: Rotational thromboelastometry (ROTEM) is viscoelastic testing of coagulation which can guide management of major haemorrhage. Pregnancy is a hypercoagulable state and plasma fibrinogen levels are greatly elevated by term, reflected in ROTEM parameters. Normal ranges have been derived for the third trimester, but life-threatening bleeding may also occur during the first trimester (e.g. ruptured ectopic pregnancy, termination or miscarriage) or second (e.g. late termination or placental abruption associated with intrauterine death). In order to use ROTEM-guided treatment in these women, we should compare to appropriate normal ranges. Our aim was to ascertain whether there are significant differences in ROTEM parameters between the three trimesters.

Methods: After ethical approval, pregnant women were recruited into three groups according to gestation, plus a non-pregnant control group. ROTEM testing with EXTEM and FIBTEM reagents, Clauss fibrinogen and full blood count were performed. ROTEM parameters compared were EXTEM: Clotting time (CT), Clot amplitude at five minutes post CT (A5), Maximum clot firmness (MCF) and FIBTEM: A5 and MCF. Results were compared using ANOVA and Dunn’s multiple comparison testing.

Results: A total of 316 women were recruited. One patient was excluded (inadequate sample). These were grouped as first (T1, n=99), second (T2, n=60), third (T3, n=80) trimester and the control group (C, n=75).

Table: ROTEM parameters in each trimester and controls

<table>
<thead>
<tr>
<th>ROTEM</th>
<th>Control</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
</tr>
</thead>
<tbody>
<tr>
<td>A5, mm</td>
<td>10 (4-24)</td>
<td>10 (6-17)</td>
<td>14 (8-29)</td>
<td>18 (7-31)</td>
</tr>
<tr>
<td>MCF, mm</td>
<td>12 (5-24)</td>
<td>13 (8-21)</td>
<td>17 (9-47)</td>
<td>23 (8-49)</td>
</tr>
<tr>
<td>Fibrinogen</td>
<td>2.7 (1.7-3.8)</td>
<td>2.9 (2.0-4.1)</td>
<td>3.9 (2.7-5.2)</td>
<td>4.3 (3.4-5.6)</td>
</tr>
</tbody>
</table>

Data are median (2.5-97.5 percentiles)

FIBTEM A5 and MCF did not differ significantly between the control and first trimester group, but by the second trimester a significant increase had occurred (P<0.0001). This increases further in the third trimester (P<0.05), mirroring plasma fibrinogen levels.

Discussion: We have demonstrated significantly different ROTEM parameters between trimesters, especially FIBTEM the most important in major obstetric haemorrhage. As with other physiological adaptations, changes in coagulation appear to happen gradually. The observed changes in FIBTEM A5 and MCF paralleled changes in plasma fibrinogen, consistent with previous studies. This study provides evidence for utilising gestation appropriate reference ranges.

References

P2 Closed-loop feedback computer-controlled phenylephrine for maintenance of blood pressure during spinal anaesthesia for caesarean section: randomized comparison of automated boluses versus infusion
WD Ngyan Kee, YH Tam, KS Khaw, FF Ng, SW Lee*
Department of Anaesthesia and Intensive Care, The Chinese University of Hong Kong, Shatin, Hong Kong, *Department of Health Technology and Informatics, The Hong Kong Polytechnic University, Kowloon, Hong Kong

Introduction: Closed-loop computer-controlled infusion of phenylephrine is effective for maintaining blood pressure (BP) during spinal anaesthesia for caesarean section. The aim of this study was to test the hypothesis that computer-controlled delivery of phenylephrine by intermittent boluses would result in more precise control of BP than continuous infusion.

Methods: 214 consenting patients having elective caesarean section were randomized to have systolic BP maintained by phenylephrine using computer-controlled intermittent boluses or infusion. In the infusion group, a previously-described algorithm was used. In the bolus group, the same dose of phenylephrine that would be infused over 1-min was given as a rapid bolus after each BP measurement. The BP monitor was set to 1-min cycles. Cardiac output was measured every 5 min by suprasternal Doppler. BP control was compared using previously-described performance error calculations, with comparison between groups using the Mann-Whitney U test.

Results: Data were analysed for 204 patients. The precision of BP control was greater, as shown by smaller values for median absolute performance error (MDAPE), in the bolus group (median 4.38 [IQR 3.22–6.25] %) versus the infusion group (5.39 [4.12–7.04] %, P=0.008, Table). In the bolus group, phenylephrine consumption was smaller and BP was slightly lower overall as indicated by smaller values for median performance error (MDPE) (P<0.001). There were no differences in cardiac output, nausea or vomiting, or neonatal outcome between groups.

Table: Performance Error Calculations

<table>
<thead>
<tr>
<th>Group</th>
<th>Bolus Group</th>
<th>Infusion Group</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median performance error (MDAPE) (%)</td>
<td>-0.21 [-2.82 – 1.95]</td>
<td>3.72 [0.43 – 5.84]</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Median absolute performance error (MDAPE) (%)</td>
<td>4.38 [3.22 – 6.25]</td>
<td>5.39 [4.12 – 7.04]</td>
<td>0.008</td>
</tr>
<tr>
<td>Wobble (%)</td>
<td>3.35 [2.59 – 4.61]</td>
<td>3.71 [2.63 – 4.65]</td>
<td>0.38</td>
</tr>
<tr>
<td>Divergence (%/min)</td>
<td>-0.05 [-0.29 – 0.27]</td>
<td>0 [-0.22 – 0.22]</td>
<td>0.93</td>
</tr>
</tbody>
</table>

Data are median [IQR]

Discussion: Closed-loop computer-controlled phenylephrine delivery by intermittent boluses resulted in more precise control of BP compared with continuous infusion. However, differences were modest and clinical outcomes were similar. The use of intermittent boluses during computer-controlled closed-loop administration of phenylephrine is an incremental improvement of a system that already performs well.

Reference
P3 Codeine for postnatal analgesia: friend or foe? A re-audit of post caesarean section pain control following MHRA guidance

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Introduction: The Medicines and Healthcare products Regulatory Agency (MHRA) issued a drug safety update in June 2013, stating that codeine should not be used in breast feeding mothers, and the Food and Drug Administration likewise cautioned its use in 2007. 1 However, controversy exists whether it is reasonable that a single tragic but very rare event should change practice. 2 Our postnatal prescribing guideline was changed in 2013 to oral morphine, where tolerated, as the sole opioid for women post caesarean section. Furthermore, following the concomitant MHRA update regarding diclofenac safety there was a pharmacy-led trust wide change to ibuprofen as the preferred non-steroidal anti-inflammatory drug. Our aim was to investigate the effect of these imposed changes.

Methods: We prospectively audited the pain score (VAS 0-10), satisfaction with postnatal analgesia and side effects on days 1 and 2 following caesarean section, in 2009 and 2015 using the same standardised proforma. Standards were >95% of women satisfied, and >95% of women with VAS 0-4. Postnatal analgesia in 2009 comprised regular paracetamol and diclofenac (if not contraindicated), with as required codeine and oral morphine, versus regular paracetamol and ibuprofen, with as required oral morphine in 2015.

Results: 125 and 148 women were audited in 2009 and 2015, respectively. 112/125 (2009) and 126/148 (2015) women were interviewed on day 1, and 75/125 and 80/148 on day 2.

Table: Comparison of results in 2009 and 2014 audits

<table>
<thead>
<tr>
<th></th>
<th>VAS≤4 (%)</th>
<th>VAS≥7 (%)</th>
<th>VAS (mean) ≤1 dose opioid (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>49</td>
<td>18</td>
<td>4.3</td>
</tr>
<tr>
<td>2015</td>
<td>37</td>
<td>23</td>
<td>5.1</td>
</tr>
<tr>
<td>Day 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>77</td>
<td>8</td>
<td>3.2</td>
</tr>
<tr>
<td>2015</td>
<td>56</td>
<td>18</td>
<td>4.6</td>
</tr>
</tbody>
</table>

Women were less satisfied with their analgesia in 2015, 88% versus 94% in 2009, with 9% neutral and 5% dissatisfied. Side effects were similar in 2009 (32% nausea, 20% vomiting, 55% itch) as compared to 2015 (35%, 25%, 59% respectively).

Discussion: The results of the re-audit were disappointing and demonstrated higher pain scores, and less satisfaction after the imposed changes. We suspect the reasons are multifactorial and include; the decreased effectiveness of ibuprofen compared to diclofenac (despite 6-hourly dosing), the shorter duration of action of oral morphine and therefore need for more frequent dosing, and perhaps the reluctance of women to continue taking morphine on day 2. More frequent analgesia dosing also impacts on midwifery work. Earlier discharge may also skew results. Recommendations include; introducing as required dihydrocodeine 30 mg, and exploring the use of self-administered analgesic packs in hospital.

References

P4 Emergency drugs in obstetric anaesthesia: a quick reference guide

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Introduction: Uterotonic and tocolytic medications are an integral part of obstetric and anaesthetic practice. Incident reporting from medication errors and anecdotal evidence show a lack of knowledge and confidence amongst trainees and consultants in both specialties. In response to this, we conducted a survey of anaesthetists and obstetricians of all grades to assess knowledge, perceived confidence in administration and whether individuals felt that a credit card style aide memoire would be a useful tool to improve patient safety.

Methods: A questionnaire was devised to assess knowledge and confidence in using these medications. The knowledge questions included naming medications, dosing, routes and contraindications. These were distributed to 25 obstetrics and anaesthetics, including both trainees and consultants: 23 responses (92%) were received. A gold standard reference card was created from local and national guidelines 1-2 and approved by local clinical leads.

Results: Considering the results for the uterotonic medications, perceived confidence in dosing and administration was high, with 78% of respondents feeling "confident" in their use. This was true of Syntocinon and ergometrine, where there was good knowledge of route, dose and major contraindications/cautions. However, only 60% of clinicians gave the correct doses for carboprost and misoprostol and 40% failed to mention the major contraindications to administration of carboprost. Overall in this group, 83% felt a uterotonic reminder card would be useful to them. Secondly in the tocolytic group, clinicians generally considered themselves far less confident, with only 4 of 23 feeling proficient in their use. In this group, terbutaline was named in 80% of cases, however the dosing was correct in less than half of these. Respondents were generally confident in the use and dosing of glyceryl trinitrate (GTN) spray, but few mentioned the use of intravenous GTN/magnesium for this purpose. Similar to the uterotonic group, the majority (83%), felt that an aide memoire card would be beneficial.

Discussion: Our survey findings demonstrated a number of areas of medication knowledge that can be improved for safer anaesthetic practice. A credit card style aide memoire was felt to be a practical and effective solution and was welcomed by the anaesthetists surveyed. We created the cards in this style so they could be attached to identity badges and be immediately available in an emergency situation, to aid quick, safe administration. As the cards are universally relevant and readily reproducible, extending their use in other hospitals has been possible and they have subsequently been introduced in two other tertiary centres with very positive feedback. Additionally, the cards have been reproduced in a poster format for display in the anaesthetic room/theatre for quick reference.

References
P5 Pulmonary aspiration during pregnancy or immediately postpartum in the UK: a two-year national descriptive study
M Knight, D Bogod*, DN Lucas†, A Quinn§, JJ Kurinczuk

Introduction: The risk of gastric content inhalation is increased by both emergency general anaesthesia and pregnancy; despite this, there are no epidemiological data for the UK on maternal pulmonary aspiration in pregnancy. Recent amendments to the National Institute for Health and Care Excellence (NICE) guidelines no longer restrict maternal oral intake during established labour unless a woman has received opioids or has risk factors making general anaesthesia (GA) more likely, and this has the potential to increase the incidence of pulmonary aspiration in pregnancy. The aim of this study was to identify all cases of maternal pulmonary aspiration in the UK and describe the subsequent outcomes.

Methods: Cases were identified between 01/09/2013 and 31/08/2015 using the UK Obstetric Surveillance System (UKOSS) monthly mailing to all consultant-led maternity units in the UK. Cases were defined as women who had an unprotected airway while unconscious, semi-conscious or paralysed during pregnancy or immediately postpartum; AND a clinical history consistent with regurgitation of stomach contents and pulmonary aspiration AND symptoms / signs of respiratory compromise requiring supplementary oxygen and antibiotics or level 2 or level 3 (HDU or ITU) respiratory support, in the absence of any other clear cause.

Results: There were nine confirmed cases of aspiration in an estimated 1,496,720 maternities, representing an incidence of 6.0 per 1,000,000 maternities (95% CI 2.8 to 11.4). Seven cases (78%) occurred in association with GA; an estimated 2.2 per 10,000 GAs (95% CI 0.9 to 4.5), based on an estimated 16,000 obstetric GAs in the UK annually. Two cases occurred when the woman was semi-conscious for other reasons. Five of the seven women who were undergoing general anaesthesia received prior antacid prophylaxis (71%); three of seven (43%) were known to have had fluid intake within the preceding 6 h. At the time of the aspiration event, two women were reported to have an LMA Supreme™ airway in place, two an oropharyngeal airway and one a tracheal tube. One further aspiration event occurred in the context of a difficult intubation and one following extubation. Six women (67%) showed x-ray signs consistent with aspiration. One woman died (case fatality 11%).

Discussion: Gastric aspiration in pregnancy or immediately postpartum in the UK is extremely rare. Reassuringly, there does not appear to be a substantial number of cases associated with oral intake in labour following the change in policy.

Reference

P6 Reducing spinal hypotension during caesarean delivery with glycopyrrolate: a meta-analysis
SD Patel, AS Habib*, S Sodha, B Carvalho†, P Sultan
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Introduction: Hypotension is a common and important complication associated with spinal anaesthesia for caesarean delivery. The objective of this meta-analysis was to determine if prophylactic glycopyrrolate administration reduces the hypotensive changes associated with spinal anaesthesia.

Methods: A literature search (Medline, Embase, CINAHL, Scopus and Pubmed) was performed to identify randomised controlled trials (RCTs) investigating the effect of glycopyrrolate on spinal-induced hypotension for caesarean delivery. Primary outcomes were incidence of hypotension and dose of vasopressor used (ephedrine equivalent). Secondary outcomes included: incidence of bradycardia, maximal heart rate (HR), incidence of nausea and vomiting and incidence of dry mouth. Risk ratios (RR), odd ratios (OR) and weighted mean differences (WMD) were calculated using random effects modelling with 95% confidence interval.

Results: Five RCTs met our inclusion criteria. A total of 311 patients were recruited in all study groups: 153 patients in the glycopyrrolate group and 158 in the control group. The incidence of spinal-induced hypotension was no different with prophylactic glycopyrrolate administration compared to placebo controls (RR 0.93 [0.71 to 1.21]; P=0.59), but the dose of ephedrine required to treat hypotension was significantly reduced in the glycopyrrolate group (WMD -5.3 mg [1.80 mg to -1.79 mg]; P=0.003). The glycopyrrolate group had a lower incidence of bradycardia (RR 0.15 [0.03 to 0.80]; P=0.03), and the maximal HR achieved was significantly higher compared to the control group (MD 15.85 [7.90 to 23.81]; P<0.0001). The incidences of nausea and vomiting, and dry mouth were similar between both groups with OR 0.7 [0.2 to 2.45]; P=0.58 and RR 1.56 [0.10 to 23.24]; P=0.75, respectively.

Discussion: Prophylactic glycopyrrolate administration for caesarean delivery does not affect the incidence of spinal-induced hypotension, but does result in a modest reduction in vasopressor requirements and incidence of bradycardia. Utilising glycopyrrolate for caesarean delivery under spinal anaesthesia should be considered. However, large, adequately powered studies investigating side-effects are still needed before routine use can be recommended.

Reference
P7 Regional variation in the use of de novo regional anaesthesia for caesarean delivery
PM Barclay, LH Nyman*
Anaesthetics, West Middlesex University Hospital, London, UK, *Technical Analyst, London, UK

Introduction: Combined spinal-epidural (CSE) techniques have become popular in recent years, being used by 65% of obstetric anaesthetists¹ and accounting for 8.1% of all obstetric neuraxial blocks.² Their benefits have been extensively researched and promoted by a number of highly influential consultants who have taught this technique to their trainees. We wished to test the hypothesis that this has led to a geographically distinct pattern of CSE use in the UK.

Methods: Data were extracted from the 2013 cohort of the National Obstetric Anaesthetics Database (NOAD) to compare the number of de novo CSEs with those of spinal anaesthetics given for caesarean delivery in each reporting Trust.

Results: NOAD reporters from 140/206 (68%) Trusts supplied data about anaesthetic techniques used for 136 331 caesarean deliveries. The proportion of CSE varied significantly by Trust: median 2% [IQR 0-9.25%], chi-squared P<0.0001. A cluster analysis showed significant evidence of geographical clustering with an optimal clustering value of 2 and mean silhouette value of 0.93. This is shown on the heatmap below.

Figure: Heatmap of the proportion of CSEs

Discussion: This study supports the hypothesis that trainees in obstetric anaesthesia throughout the UK are exposed to different patterns of CSE usage which may influence their future practice. This level of detail about obstetric anaesthetic practice in the UK is only available from NOAD.

References

P8 The association between maternal size and outcomes for women undergoing for caesarean section: a multicentre prospective observational study (The MUM SIZE Study)
Anaesthesia, Royal Women’s Hospital, Parkville, Australia, *University of Melbourne, Australia

Introduction: World Health Organization (WHO) defines obesity as body mass index (BMI) ≥30 kg/m². Obesity in pregnancy is increasing and may contribute to adverse pregnancy outcomes. During pregnancy, however, BMI may naturally increase leading to misclassification of term women according to WHO BMI groups and a reluctance of clinicians and researchers to use WHO BMI groups at term. The rate of caesarean section (CS) is also increasing. When combined with increased BMI this may lead to adverse maternal and neonatal outcomes, increased theatre times and hospital costs. There is no research in this area. We aimed to investigate associations between maternal size (using term pregnancy specific BMI cut-off values 5 kg/m² higher in each WHO group), and clinical, theatre utilisation and health economic outcomes for women having CS.

Methods: Following ethics approval, consent and trial registration (ACTRN1261300608786) we undertook a prospective multicentre observational study in women having CS. We recorded BMI at first antenatal visit and delivery. Linear regression and health economic models were used to analyse associations between delivery BMI and total theatre, surgical and anaesthesia times, maternal and neonatal adverse outcomes, and total hospital and theatre costs.

Results: 1457 participants from seven hospitals were included. Mean gestation was 38 weeks. Mean BMI increase (booking to delivery) was 4.0 kg/m². Each unit increase in BMI increased total theatre time by 0.6 min (P<0.001) (Fig). Increased delivery BMI was associated with increased risk of maternal intensive care unit admission (OR 1.07, P=0.046) but no increase in neonatal admission to higher acuity care. Total hospital and theatre costs were increased by 15% (P=0.032) and 27% (P=0.001), respectively in super-obese (BMI ≥45 kg/m²) compared to normal (BMI 23.5 - <30 kg/m²) women.

Figure: Relationship between theatre time and BMI

Discussion: Higher BMI is associated with clinical, time and economic costs. These issues need to be considered in pregnancy. To do so we must record term BMI.
P9 The effects of audit and research in postpartum haemorrhage: benefits for all!
T Moses, D Leslie, SF Bell, RE Collis
Anaesthetics, University Hospital Wales, Cardiff, UK

Introduction: Postpartum haemorrhage (PPH) remains an important cause of obstetric morbidity in the UK. The combination of audit cycles and original research in our institution has led to major changes in our PPH protocol for all patients; including gravimetric measurement of abnormal bleeding, early senior review, algorithms for uterotonics and early blood sampling at 1000 mL blood loss, with point-of-care (POC) coagulation testing. The effect of these changes on the outcome of all women has been measured.

Methods: Information on blood transfusion, hysterecmy and level 3 ICU admission was collected from local databases (2010-2015). Individual case review of patients admitted to ICU was performed and a previous published audit of patients was used for comparison. Results: The annual number of deliveries since 2010 has ranged from 6530 to 5972. In the last five years the use of cell-salvage and fibrinogen concentrate has remained largely unchanged, despite 12 patients being randomised to receive fibrinogen concentrate during the past 30 months. In 2010-2012 a total of 102 g of fibrinogen concentrate were given and in 2013-2015 an estimated 108 g were transfused (including predicted study medication). Previous audit data revealed that the number of patients admitted to ICU level 3 care in a two year period was 12 (2004-05, 10713 deliveries) and then seven (2007-08, 12160 deliveries).

Table Postpartum haemorrhage data summary

<table>
<thead>
<tr>
<th>Year</th>
<th>Level 3 ICU admission</th>
<th>Hysterecmy</th>
<th>≥5 unit RBC transfusion</th>
<th>FFP transfusion (units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>4</td>
<td>2</td>
<td>13</td>
<td>35 (168)</td>
</tr>
<tr>
<td>2011</td>
<td>0</td>
<td>0</td>
<td>13</td>
<td>38 (165)</td>
</tr>
<tr>
<td>2012</td>
<td>4</td>
<td>1</td>
<td>14</td>
<td>40 (187)</td>
</tr>
<tr>
<td>2013</td>
<td>3</td>
<td>0</td>
<td>10</td>
<td>31 (163)</td>
</tr>
<tr>
<td>2014</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>12 (49)</td>
</tr>
<tr>
<td>2015</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>6 (21)</td>
</tr>
</tbody>
</table>

ICU admissions and hysterectomies were due to PPH. Blood bank data includes women receiving blood on the delivery suite, in the operating theatres or on the post-natal ward.

RBC: red blood cells, FFP: fresh frozen plasma.

Discussion: Repeated audit cycles (2004-08) and research since 2012 has led to changes in our management of PPH. Since 2012 we have recruited about half of the women with PPH into a research protocol, yet changes to our overall approach has benefited all women. This has led to a reduction in the number of women with major adverse outcomes. We believe the adoption of POC coagulation testing as soon as abnormal bleeding is identified for all women (around 1000 mL) and a restrictive FFP policy (based on POC results), has driven the recent improvements.

References

P10 Unforeseen benefits of an enhanced recovery programme for elective caesarean section on postoperative length of stay after emergency caesarean section
SE King, SS Kumar, JH Francis
Anaesthesia, Norfolk and Norwich University Hospital, Norwich, UK

Introduction: Uptake of ‘fast-track surgery’ or enhanced recovery (ER) in obstetrics has been slow. A 2013 survey of UK practice showed that 4% of units discharged their patients the following day. In 2014 we introduced an ER programme encompassing all aspects of care including anaesthetic technique, early mobilisation and discharge logistics with the specific aim to facilitate discharge on the first postoperative day for parturients undergoing elective caesarean section (CS). The objective of this service evaluation was to investigate the change in post-operative length of stay (LOS) for both elective and emergency parturients after introduction of ER.

Methods: Audit hospital committee approval was obtained. Data were analysed retrospectively for the financial years 2013/14 and 2014/15 (representing pre- and post-introduction of elective ER) using Microsoft Excel spread sheet for post-operative LOS for both types of CS. Statistical significance was assessed using Mann Whitney U test.

Results: Of the 2228 CS performed during the two-year period, 45% were classified as emergency (1005). One-day LOS increased from 17.1% to 38.7% in the elective group (P<0.0001) and from 7.7% to 19.0% in the emergency group (P=0.0446). Readmission rates have decreased by 2% for both groups. The relative risk of readmission after implementation of ER is 0.94 and 0.93 for seven and 30 days respectively for elective CS, and 0.82 and 0.87, respectively, for emergency CS.

Figure: Percentage of one-day postoperative LOS for elective and emergency CS

Discussion: Our results show that there has been a concomitant increase in one-day postoperative LOS for both groups without targeted intervention in the emergency group. Importantly, there has been no increase in readmission rates. Changes in expectations of midwives and obstetricians over the past year may have facilitated this, so that enhanced recovery has become normal practice for elective and emergency alike. A change in maternal expectation is crucial so that more parturients are prepared and motivated to go home the next day. Our results highlight the drip-feed effect into other areas of practice. Perhaps it is time to stop talking about enhanced recovery and apply these principles to all parturients.

References
P11 Anaesthesia for abnormally invasive placenta
NJ Taylor, R Russell
Nuffield Department of Anaesthetics, Oxford University Hospitals NHS Foundation Trust, Oxford, UK

**Introduction:** Abnormally invasive placenta (AIP) is associated with significant maternal haemorrhage, poor fetal outcome and high demand on healthcare resources. Although MBRRACE-UK reported only one death from AIP, case numbers are increasing due to the rising incidence of uterine surgery and increasing maternal age.

**Methods:** Surgically confirmed cases of AIP from February 2010 to July 2015 in a tertiary maternity unit were analysed. Data are presented as mean ± SD or [range].

**Results:** Thirty-four cases of AIP were identified. Mean maternal age was 35.4±3.4 years, body mass index of 25.7±4.4 kg/m² and gestation at delivery of 36 weeks [29-39]. All were delivered by caesarean section (94% category 3 or 4) and were performed in the delivery suite. Neuraxial anaesthesia was used in 94% (combined spinal–epidural 92%; needle-through-needle 71%; double-needle double-space 21%) and general anaesthesia (GA) in 6%. One undiagnosed emergency was started under spinal anaesthetic alone. Of cases started under neuraxial anaesthesia, 47% were converted to GA intraoperatively. Invasive blood pressure monitoring was used in 68% and internal jugular venous access in 44%. Urological intervention (prophylactic ureteric stents) occurred in 24%. Interventional radiology (internal iliac artery catheters) was used in 53% with balloon inflation in 94%. Inadvertent sheath displacement occurred in one case. A Pfannensteil incision was used in 50%, midline in 47% and high transverse in 3%. Varying degrees of placental separation occurred during surgery: complete 41%, partial 18%; none 41%. Surgical diagnosis was acute 82%, increta 6% and percreta 12%. With placenta percreta, infiltration was most commonly to the bladder, followed by urovesical fold and pelvic sidewall. Caesarean hysterectomy occurred in 53% delayed hysterectomy in 6% and the uterus was preserved in 41%.

Mean estimated blood loss was 2559 mL [500-12000], with 62% sustaining postpartum haemorrhage (PPH) >1000 mL and 41% >2000 mL. Intraoperative red cell transfusion occurred in 38% (mean 5.1 U [1-14]). Fresh frozen plasma was transfused in 35%, platelets in 18% and cryoprecipitate in 9%: tranexamic acid was used in 21%. Intraoperative cell salvage was used in 59% cases: mean collection volume 1987 mL [250-6327]; mean transfused volume 509 mL [0-1748]. Mean surgical time was 248 min [75-615]. Emergency return to theatre for PPH occurred in 6%. Three women (9%) were admitted to critical care (mean stay 23 h). Mean hospital postoperative stay was 8 days [3-41]. There were no maternal deaths.

**Discussion:** Our findings are similar to others, although primary GA rates were lower (6% vs. 26%). The incidence of PPH was similar (41% vs. 39%) with a higher caesarean hysterectomy rate (53% vs. 30%). Although our internal iliac balloon inflation rate was higher (94% vs. 71%), there were fewer complications. Conversion from neuraxial to GA was made in approximately half of parturients, but was not associated with adverse maternal outcome.

**References**
1. MBRRACE-UK. Saving Lives, Improving Mothers’ Care National Perinatal Epidemiology Unit, University of Oxford 2014

P12 Carbetocin for elective caesarean delivery: impact on use of second-line uterotonic
LS Meshykhi, M Nel, C Papageorghiou
Anaesthetics, Hillingdon Hospital, London, UK

**Introduction:** Current NICE guidance recommends use of oxytocin 5 U by slow intravenous injection for prophylaxis in the context of caesarean delivery. A Cochrane review has addressed the use of carbetocin, a longer-acting oxytocin derivative, in the prevention of postpartum haemorrhage (PPH) and concluded that use of carbetocin resulted in a reduction in the need for further uterotonic compared with oxytocin for those undergoing a caesarean but not for vaginal delivery. Carbetocin was introduced in our institution as part of an enhanced recovery programme for elective caesarean delivery. We performed a service evaluation looking at the impact that the introduction of carbetocin has had on our use of second line uterotonics.

**Methods:** Local audit committee approval was obtained. Data was gathered retrospectively using the Euroking® database. 889 patients undergoing elective caesarean delivery between May 2013 and November 2015 were included. Patients were grouped according to first line intravenous uterotonics used: either oxytocin 5 U or carbetocin 100 µg. The primary outcome measured was use of second-line uterotonics. The other outcome measured was estimated blood loss (EBL). Data were compared with chi squared and unpaired t-tests using a statistical software package.

**Results:** There were 425 patients in the carbetocin group and 464 in the oxytocin group. Second-line uterotonics was higher in the oxytocin group when compared to the carbetocin group (17.5% vs 4.7%, RR 3.72). No significant difference was observed in EBL between the carbetocin and oxytocin groups (570±257 mL vs 590±303 mL; P=0.3).

**Table:** Carbetocin versus oxytocin

<table>
<thead>
<tr>
<th></th>
<th>Carbetocin group</th>
<th>Oxytocin group</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>One additional uterotic</td>
<td>16/425</td>
<td>68/464</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>More than one additional uterotic</td>
<td>4</td>
<td>13</td>
<td>0.04</td>
</tr>
<tr>
<td>Estimated blood volume (mL)</td>
<td>570 ± 257</td>
<td>590 ± 303</td>
<td>0.30</td>
</tr>
</tbody>
</table>

Data are number or mean ± SD.

**Discussion:** Carbetocin, given as first-line treatment in elective caesarean delivery, is associated with a reduction in the need for second-line uterotonics, with no difference in EBL when compared to oxytocin. The increased cost of using carbetocin as a first-line treatment needs to be counterbalanced against the reduced exposure to additional medication and their side effects if using oxytocin only.

**References**
P13 Carbetocin use following caesarean section: a clinical audit of current practice
P Reid, J McEwan, D Growcott
Department of Anaesthetics, Basingstoke and North Hampshire Hospital, Basingstoke, UK

Introduction: There is increasing evidence for the use of carbetocin to prevent postpartum haemorrhage (PPH) following caesarean section (CS). A 2012 Cochrane review identified that carbetocin use was associated with lower rates of PPH in both elective and emergency CS. This led to a change in our hospital guidelines with a move from Syntocinon (5 U with a 10 U/h infusion for 4 h in high-risk cases) to carbetocin (100 mg over 1 min) as the primary uterotonic during both elective and emergency CS. The audit standard from this guideline is that carbetocin should be used in 100% CS unless contraindicated. We audited compliance with this standard, as well as rates of major PPH and blood product usage before and after the guideline changed.

Methods: In part 1 of the audit, we conducted a retrospective review of uterotonic use in all CS from September–October 2015 using the anaesthetic charts to get a snapshot of current practice. In part 2, a further retrospective review of notes was undertaken comparing the number of major PPH before the guideline change to carbetocin (February–August 2014) and after (February–August 2015). The numbers of elective and emergency CSs was provided by the hospital Maternal Records department. Electronic transfusion records were used to ascertain blood product use in our maternity unit (including labour ward, antenatal ward and postnatal ward). Case note analysis was used to identify uterotonic drug used and estimated blood loss in cases of major PPH.

Results: Part 1: 76 sets of notes were analysed. Carbetocin was given in 74 cases (94.7%). In two cases, a Syntocinon bolus was used, and in two cases, nothing was documented. There was no difference across category of CS, grade of anaesthetist or whether the case was in or out of hours. Part 2: In February–August 2014, there were 324 CS. Ten of these women had a major PPH. A total of 56 units of packed red blood cells were transfused on our maternity unit in this time period. In February–August 2015, there were 330 CSs. Fifteen of these women had a major PPH. 46 units of packed red blood cells were transfused in our maternity unit (an 18% reduction). Of the 15 cases of major PPH from the later group, only five had received carbetocin. Estimated blood loss ranged from 1.5-1.8 L. None of these patients required transfusion. Of the 10 who did not receive carbetocin, estimated blood loss ranged 1.5-2.6 L. This group required a total of nine units of packed red blood cells, 8 units of cryoprecipitate and 1 unit of platelets. No patient had a contraindication to carbetocin.

Discussion: This audit demonstrates that we are close to our standard of 100% carbetocin use. Whilst there was an increase in the incidence of PPH since the introduction of carbetocin in our hospital guideline, there was also an 18% reduction in transfusion rate of packed red blood cells. The reduced transfusion rate may be an effect of the carbetocin, but with small numbers it is difficult to draw firm conclusions.

Reference

P14 Incidence of and factors associated with severe postpartum haemorrhage after elective caesarean section in a UK tertiary hospital
M Rabic, S Sebastian, J Edwards
Department of Anaesthesia, Royal Stoke University Hospital, Stoke-on-Trent, UK

Introduction: Postpartum haemorrhage (PPH) remains a common cause maternal death and morbidity. Blood loss of more than 1500 mL within 24 h of delivery is generally considered as severe PPH. The causes of PPH are heterogeneous due to uterine atony being the leading cause. The general incidence of major PPH requiring blood transfusion or resulting in coagulopathy is 0.5–1%. The incidence and causative factors of PPH following caesarean section (CS) have been reported only in few studies. This study aimed to detect the incidence of severe PPH after elective CS in the Royal Stoke University Hospital maternity unit and also to find out any obvious risk factors or associations with its development.

Methods: We have a database of patients with PPH of over 1500 mL. All patients with severe PPH during a 24-month period from September 2012 to September 2014 were identified and segregated into elective CS, non-elective CS and vaginal delivery groups for analysis. For women who had severe PPH after elective CS, further details were sought from case notes and electronic records to find out any risk factors for or associations with PPH. Need for ethical approval for this project was waived by hospital R&D department.

Results: A total of 3185 CS were performed during the study period. Among elective CS patients who had severe PPH, the main indications for CS were previous CS (32%), abnormal placenta (16%) and fetal malpresentation (29%). The cause of PPH was uterine atony in 20 cases (64.5%). Among predictable risk factors, six patients (19%) had abnormal placenta. Four patients (13%) had a previous traumatic delivery or PPH.

Table: Comparison of elective and emergency CS

<table>
<thead>
<tr>
<th>Type of CS</th>
<th>Number of CS</th>
<th>PPH &gt;1500 mL</th>
<th>Patients receiving blood transfusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elective</td>
<td>1366</td>
<td>31 (2.3%)</td>
<td>10 (0.73%)</td>
</tr>
<tr>
<td>Non-elective</td>
<td>1819</td>
<td>62 (3.4%)</td>
<td>24 (1.3%)</td>
</tr>
</tbody>
</table>

Data are number (%)

Discussion: Our data show that severe PPH after elective CS is uncommon at 2.3% which is lower than previously reported. The accuracy of our data depend on prompt identification of severe PPH and its documentation in the database. In most of the cases PPH is determined by visual assessment which could be inaccurate. In the elective CS group, only one patient with adherent placenta praevia needed a blood transfusion of more than three units. This supports our unit’s practice of performing group and save only for patients at risk of bleeding when elective CS is planned.

References
P15 Interventional radiology procedures for emergency and elective obstetric cases: a reduction in blood loss versus potential complications

K Livingstone, B McCraith, A Jenkins
Anaesthetic Department, QEUH, Glasgow, UK

Introduction: A previous case series has demonstrated that interventional radiology (IR) can lead to reduced blood loss during placental pathology caesarean section (CS) but not to a reduced requirement for CS. After discussion with obstetricians and interventional radiologists within our health board (NHS GGC), we were interested to see if these findings extended to emergency cases and also what complications might arise from IR procedures in both emergency and elective case settings.

Methods: Across two tertiary obstetric units (6000 deliveries/year each), we undertook a five year retrospective analysis of obstetric cases requiring IR input. Patients were identified using theatre/critical care admissions systems and a casenote review was then done. Collected data included mode of delivery, cause of haemorrhage, blood loss, transfusion requirements, cell salvage use, balloon occlusion, use of embolisation techniques and maternal/fetal complications, morbidity and mortality.

Results: Twenty-eight cases were reviewed: seven emergency CS, 18 elective CS and three vaginal deliveries. Underlying diagnoses were: placenta percreta (n=11), placenta accreta (n=5), placenta praevia (n=3), placental abruption (n=1), uterine fibroids (n=2) and postpartum haemorrhage from other causes (n=6). Sheaths were sited electively in 17 cases and as an emergency in 11. Balloons were inserted in 17 cases and inflated in 12. Mean inflation time was 53.9 min. Sixteen patients required arterial embolisation. Mean blood loss was 6069 mL (range 300 - 17000 mL). Mean blood transfusion was 6.9 units (range 0-34). Cell salvage occurred in 12 elective patients (mean salvage return 1266 mL, range 0-3330 mL). Fourteen patients required hysterectomy. Immediate complications occurred in four cases: pain (n=1), non-target embolisation (n=1) and fetal bradycardia requiring expedited delivery (n=2). Later complications were noted in five cases, including thrombus distal to sheath (n=3), PTE (n=1), CVA (n=1) and acute kidney injury (n=1). There was no fetal or maternal mortality.

Discussion: The overall hysterectomy rate was 50%. Even in spite of IR input, the mean blood loss and transfusion requirements for these cases was still high. Cell salvage occurred in less than half of patients but yielded a good blood return when utilised. IR can be a life saving measure, particularly in the emergency setting when other surgical techniques have failed. It can, however, be associated with short and long term complications that the patient should be made aware of, if possible prior to the procedure.

Reference

P16 Major obstetric haemorrhage management in placental pathology cases

K Livingstone, E McGrady*
Anaesthetic Department, QEUH, Glasgow, UK, *Anaesthetic Department, Royal Infirmary, Glasgow, UK

Introduction: Placental localisation guidelines for women with a previous caesarean section allow for anticipation of major blood loss in the context of planned delivery, facilitating the use of cell salvage and interventional radiology (IR). The aim of this is to decrease maternal morbidity and mortality. We reviewed the management of such cases within our department, a tertiary obstetric unit (6000 deliveries/annum).

Methods: Using a labour ward database detailing major obstetric haemorrhage (MOH) cases >2500 mL, We undertook a two year retrospective analysis of cases where there was an underlying diagnosis of placenta percreta, increta, accreta or praevia. Cases were analysed for information, including: timing of delivery, blood loss (EBL), resuscitative measures, consultant presence at delivery, further surgical intervention and post procedure location.

Results: Eight cases were reviewed. Three were diagnosed/suspected placenta percreta. Five were praevia cases, of which four were diagnosed antenatally. All were delivered by caesarean section. All had both consultant obstetrician and anaesthetic involvement at delivery. There was no maternal mortality.

Table: Cases of placental pathology

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Delivery day/time</th>
<th>EBL (mL)</th>
<th>IR</th>
<th>Cell used</th>
<th>salvage</th>
<th>Further surgery</th>
<th>Post-op location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Known percreta</td>
<td>Wed 11.46</td>
<td>5000</td>
<td>Yes</td>
<td>Yes</td>
<td>Hysterectomy</td>
<td>ICU</td>
<td></td>
</tr>
<tr>
<td>Known praevia</td>
<td>Tue 12.10</td>
<td>4000</td>
<td>No</td>
<td>No</td>
<td>Intrauterine balloon</td>
<td>HDU</td>
<td></td>
</tr>
<tr>
<td>Known praevia</td>
<td>Thu 18.00</td>
<td>4500</td>
<td>No</td>
<td>No</td>
<td>Nil</td>
<td>HDU</td>
<td></td>
</tr>
<tr>
<td>Unknown praevia</td>
<td>Thu 05.56</td>
<td>12000</td>
<td>No</td>
<td>No</td>
<td>Hysterectomy</td>
<td>ICU</td>
<td></td>
</tr>
<tr>
<td>Known praevia</td>
<td>Sat 07.50</td>
<td>3500</td>
<td>No</td>
<td>No</td>
<td>Intrauterine balloon</td>
<td>HDU</td>
<td></td>
</tr>
<tr>
<td>Known percreta</td>
<td>Wed 09.40</td>
<td>8600</td>
<td>No</td>
<td>Yes</td>
<td>Hysterectomy</td>
<td>HDU</td>
<td></td>
</tr>
<tr>
<td>Known percreta</td>
<td>Mon 11.59</td>
<td>8000</td>
<td>Yes</td>
<td>Yes</td>
<td>Arterial ligation</td>
<td>HDU</td>
<td></td>
</tr>
<tr>
<td>Known praevia</td>
<td>Sun 14.00</td>
<td>2700</td>
<td>No</td>
<td>Yes</td>
<td>Nil</td>
<td>HDU</td>
<td></td>
</tr>
</tbody>
</table>

Discussion: Placenta percreta cases have been underrepresented as only cases of >2500 mL EBL were analysed. We are a tertiary referral centre for placental pathology cases, therefore the elective management of these includes IR and cell salvage services. This is not mirrored in emergency or unanticipated cases. Of note, even in spite of these measures being undertaken, blood loss and maternal morbidity may still be high.

Reference
P17 Management of postpartum haemorrhage related anaemia with ferric carboxymaltose

TA Cope, CJ Ralph
Anaesthetics, Royal Cornwall Hospital Trust, Truro, UK

**Introduction:** Antenatal anaemia is common and can be exacerbated by postpartum haemorrhage (PPH). Iron deficiency anaemia (IDA), as a result of reduced iron stores can lead to an increase in morbidity secondary to cardiovascular failure, a higher risk of PPH from uterine atony and puerperal sepsis. Peripartum anaemia is associated with an increased length of hospital stay and requirement for allogeneic blood transfusion. IDA secondary to PPH has historically been treated with oral iron replacement and blood transfusion. Poor compliance, side effects, and length of time required to increase iron stores confer limited success with oral iron supplementation, and allogeneic blood products have morbidity associated with their use. Blood conservation and utilising alternatives to allogeneic blood, such as iron and autologous blood, can lead to a reduction in blood transfusion. Intravenous administration of iron provides a greater and more rapid replacement of iron stores compared to oral iron. Ferric carboxymaltose (Ferrinject®), which has a much lower risk of allergic reactions compared to iron dextran, can be given postpartum as a single dose.

**Methods:** Six months of data were analysed of women referred to the blood conservation team following PPH. Each received Ferrinject 400 mg. Data included haemoglobin (Hb) on admission, at referral and at follow-up.

**Results:** Eighty women received intravenous iron replacement in the postpartum period. Nine women required allogeneic blood transfusion, and four required a second dose of intravenous iron. Six women were below the restrictive transfusion trigger of <70g/L, of whom three received a blood transfusion. Of those that received Ferrinject (n=3), mean referral Hb was 66.3g/L, with a mean increase in Hb of 53 g/L. Sixteen patients underwent caesarean section (CS), eleven as an emergency. Mean PPH was 1231 mL, with a referral Hb of 82.3g/L and a mean increase of 21.8 g/L and four received autologous blood, with a mean [range] re-infusion volume of 474 mL [163-950 mL].

<table>
<thead>
<tr>
<th>Table: Blood loss and haemoglobin values (mean [range])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean blood loss (mL)</td>
</tr>
<tr>
<td>1034 [350-5000]</td>
</tr>
</tbody>
</table>

**Discussion:** The results suggest that Ferrinject is a safe and convenient treatment of postpartum anaemia with a discernible increase of Hb >20g/L increasing to >40g/L in those below the transfusion threshold. Its ease of administration, single-dose regimen and favourable side effect profile make it a good method of replacing postpartum iron stores and provide a means of reducing blood transfusion.

**References**

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P18 Postpartum haemorrhage: is it nice to follow NICE?

Z Gaballa, S Sukumaran, P Rose, R Harris
Obstetrics & Gynaecology, Warwick Hospital, Warwick, UK

**Introduction:** Postpartum haemorrhage (PPH) is defined as loss of 500 mL or more of blood from the genital tract within 24 h of delivery. The National Institute for Health and Care Excellence (NICE) guidelines on intrapartum care for healthy women and babies recommends the use of oxytocin 10 U by intramuscular injection with the birth of the anterior shoulder or immediately after the birth of the baby. The local guidelines in our trust were changed from intramuscular Syntometrine (oxytocin 5U/ergometrine 500 μg) to oxytocin 10 U in August 2015. An increase in the number of women with PPH was highlighted via incident reporting systems and so we decided to audit our practice after introduction of oxytocin for third stage management.

**Methods:** The number of women with blood loss >500 mL were identified from the birth register, incident reporting system and the maternity health care records. We excluded women with PPH after operative vaginal deliveries to exclude trauma as a contributory factor.

**Results:** In June-July 2015, 16 (6.7%) women had a PPH ranging from 600-3200 mL. After introduction of oxytocin 10 U, 42 (11.7%) women had a PPH between August and October. Guidelines were changed back to Syntometrine at the end of October and 13 (5.4%) women had PPH in November and December ranging from 600-2000 mL.

**Table:** PPH and third stage management

<table>
<thead>
<tr>
<th>Month</th>
<th>No of PPH</th>
<th>Range (mL)</th>
<th>Third stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>June - July</td>
<td>16</td>
<td>600 - 3200</td>
<td>Syntometrine (6 had oxytocin)</td>
</tr>
<tr>
<td>Aug - Oct</td>
<td>42</td>
<td>550 - 3660</td>
<td>Oxytocin 10 U</td>
</tr>
<tr>
<td>Nov - Dec</td>
<td>13</td>
<td>600 - 2000</td>
<td>Syntometrine</td>
</tr>
</tbody>
</table>

**Discussion:** An almost 50% increase in the rate of PPH was noticed after intramuscular oxytocin 10 U was introduced for the third stage of labour. The conclusion from a recent Cochrane review is that prophylactic oxytocin reduces the risk of PPH >500 mL and the need for therapeutic uterotonic. However, our audit has shown that prophylactic oxytocin alone has increased the PPH rate by around 50%. Though NICE guidelines recommend the use of oxytocin, our audit has demonstrated that Syntometrine decreases the risk of PPH and its associated morbidity together with the cost of managing PPH including blood transfusion.

**References**
P19 A review of maternal sepsis care admissions in a tertiary hospital over three years: can we do better?
K Richardson, K Grailey, S Wray
Anaesthetics, The Royal London Hospital, London, UK

Introduction: The first MBRRACE-UK report into maternal deaths 2010-2012 showed almost a quarter of women who died had sepsis. Over the past 12 years we have observed an increasing incidence of maternal sepsis requiring intensive care (ICU) admission on our unit (Fig). Prompt recognition, rapid intervention and early expert involvement are paramount to improve morbidity and mortality due to sepsis. The Sepsis Six bundle has been shown to reduce mortality and possibly ICU length of stay.1 In this service evaluation we reviewed our unit’s compliance with the Sepsis Six bundle within one hour.

Methods: Having obtained trust audit approval, we conducted a retrospective notes review of all ICU admissions due to maternal sepsis between 2012-2014 using the ICNARC database, electronic patient records and patient notes.

Results: Fifteen patients were admitted to ICU with maternal sepsis between January 2012 and December 2014. There were no maternal deaths. We were able to obtain 11/15 patient notes. Three patients were excluded as two were transfers from other units and one had incomplete notes. Only 25% of patients had completed all of the Sepsis Six bundle within the first hour. Intravenous antibiotics and fluids were given in 87.5% of patients, blood cultures and lactate were done in 75%, oxygen was only given in 62.5% and urine output measured in 50%. Time to consultant input ranged from 2-56 h with a median time of 7 h.

Figure: Incidence of sepsis admissions to ICU/1000 deliveries

Discussion: Poor compliance to the Sepsis Six bundle may be one of the possible reasons why maternal sepsis admissions to ICU are increasing. Our unit is now developing a Trust-wide maternal sepsis policy which provides a clear pathway for early recognition and management of sepsis. We are also implementing STOP (Sepsis Treatment Optimising Patients) boxes, which will also raise sepsis awareness. The pathway will provide an audit tool to audit future practice.

Reference

P20 Accidental dural puncture in a large tertiary obstetric department: quality improvement of services, patient follow-up and outcomes over the course of one full year
KL Pearson, S Chapman, L Dubiel
Anaesthetic Department, Ninewells Hospital, Dundee, UK

Introduction: Accidental dural puncture continues to be a significant cause of morbidity in parturients yet there remains a lack of consensus on standard management strategy.1 Our tertiary centre experienced an incidence spike with 18 reported post-dural puncture headaches (PDPH) over two months highlighting major issues in our previously ad hoc follow-up with difficulties monitoring individual patients, management and discharge. We analysed this spike to produce a comprehensive package of patient follow-up, symptom evaluation and improve outcomes. We present our experience implementing step-wise improvements during 2015.

Methods: Initial analysis led directly to development and drafting of a novel follow-up form via a local anaesthesia group. Subsequent quality improvement (QI) PDSA cycles included: beta-testing form; roll out to department with dedicated box containing blank forms, information leaflets, specific follow-up guidance; introducing structured user feedback; raising awareness at local obstetric anaesthetic forum. MBRRACE-UK publication2 in 2015 altered our service plans in-line with guidance for management to include prolonged patient follow-up and GP notification. We analysed 2015 data and assessed adherence to best practice guidance.

Results: There were 19 completed forms during 2015. Three cases were excluded from analysis: one confirmed meningitis and two arbitrated not indicative of PDPH. Mean ±SD patient age was 32 ±5.8 years and body mass index 26 ±4.7 kg/m². All cases were performed by trainee anaesthetists with 12 (75%) occurring outside of normal working hours and multiple attempts made in 10 (63%). Median (IQR [range]) headache development was day 1 (1-2 [0-8]) with median headache duration 5 (3.75-5.5 [1-8]) days. Seven (44%) patients experienced neurological sequelae: 25% visual, 29% auditory disturbance and 6% paraesthesia. Of these, only two (29%) were radiologically imaged. Blood patches attempted in nine (56%) patients of which median day performed was five (4-6 [2-7]). Eight (89%) were successful on first attempt with one requiring a second patch. All those receiving a blood patch demonstrated full resolution of symptoms: 75% immediately; 100% within 48 h. One-week follow-up was achieved in all 16 cases with one-month follow-up successful in 14 (88%). GP letters were sent out in 15 (94%) cases.

Discussion: We successfully formalised and improved local follow-up of this patient group with excellent adherence to MBRRACE-UK guidance. In our cohort, PDPH recovery was expedited in those receiving an epidural blood patch, irrespective of timing. An ongoing QI project, further areas of improvement identified via analysis are currently being addressed including: highlighting importance of investigation and imaging in those with neurological sequelae; timely GP notification; early consultant input and extended review.

References
P21 Audit of enoxaparin prescription (timing and dose) post caesarean section
B Og McAlary, E O’Kane, R Laird
Anaesthetics, Altnagelvin Hospital, Derry, UK

Introduction: Caesarean section (CS) is a major risk factor for venous thromboembolism (VTE). Elective CS, doubles the VTE risk compared to those delivered vaginally. In the UK there were 64 maternal deaths from VTE between 2009-2013. Guidelines provided by the Royal College of Obstetricians and Gynaecologists and from the centre for maternal and child enquiries (CMACE) advise administration of enoxaparin 4 h postoperatively or 6 h post removal of epidural catheter. They suggest all patients to be weighed in third trimester and enoxaparin prescribed according to this weight. Our aim was to audit this practice in our local department.

Methods: We identified 49 random patients who underwent a CS over a 3-month period. Information on booking weight, term weight, emergency or elective CS, enoxaparin dose, time of enoxaparin prescription and difference between prescribed and administration time were collected.

Results: In total, 31 (63%) patients were weighed at term. 13.3% of the emergency cases and 85.3% of the elective cases. According to term weight, 71% had correct dose of enoxaparin. 36% had a change in weight from booking clinic that required an increased dose of enoxaparin at term. There was an average discrepancy of 40 min between prescription and administration time with a range from 0-6 h. Only 4% of patients received enoxaparin at 4 h postoperatively with 92% of patients receiving enoxaparin <6 h post operatively.

Figure: Timing of postoperative enoxaparin

Discussion: New guidelines released MBRRACE-UK in 2015 suggest women should be weighed following delivery and enoxaparin dose adjusted. Following the results, new guidelines will be implemented in our hospital that women are weighed in the third trimester and following delivery to ensure an adequate dose of enoxaparin is prescribed. All staff have been informed to ensure enoxaparin is given 4 h postoperatively or 6 h following removal of an epidural catheter. After women are weighed post delivery, obstetric staff should prescribe enoxaparin according to new weight. The dose of enoxaparin prescribed has been added to the World Health Organisation (WHO) surgical checklist signout, with nursing staff informed of exact time of administration.

References
2. MBRRACE Saving lives, improving mothers’ care. 2015. https://www.bepu.ox.ac.uk/mbrrace-uk/reports

P22 Does the dural puncture rate change whilst trainees learn to perform obstetric epidurals?
JA Fasham, EJ Drake, J Coghill, JR Sneyd
Anaesthesia, Derriford Hospital, Plymouth, UK

Introduction: Recent published data, from our institution, suggest that trainee obstetric epidural success rate does not change after their tenth obstetric epidural. It is currently unknown whether dural puncture rate changes as the procedure is learned.

Methods: Obstetric epidural data were collective prospectively between January 1996 and December 2011. Data on all epidurals for trainees learning obstetric epidural analgesia were extracted from the obstetric anaesthesia database. Information on whether the epidural produced successful analgesia and any complication e.g. dural puncture was collected for each subsequent epidural for each novice obstetric anaesthetic trainee. The data were explored to understand the relationship between dural puncture rate and the progression of experience.

Results: During the study period, 81 trainees new to obstetrics undertook 10 557 epidural attempts (median 119, range 46–395 attempts per trainee). There were 87 dural punctures (incidence 0.83%). The average number of dural punctures was 1.1 per trainee (range 0-6).

Figure: The percentage of trainees at each subsequent epidural attempt who are yet to perform a dural tap (solid line) plotted with an increasing cumulative total of dural taps performed by all the trainees (dashed line).

Discussion: The incidence of dural puncture, in this study, is consistent with previous literature. From the linearity of the two graphs in the Figure it can be concluded that the probability of the trainee doing a dural puncture does not change with each attempt. There is no increase in the rate of dural punctures in the first 10 epidurals. In contrast, success rates increase until constant after attempt 10. The first 10 epidural attempts are less likely to produce good analgesia but the trainee is more likely to put the Tuohy needle through the dura than for subsequent attempts.

References
P23 Epidural test dose in obstetric population in the presence of a dural breach: a case series
RP Kaur, S Gowrie-Mohan, K King, N Goetze
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Introduction: Catheter aspiration and administration of a test dose are designed to help detect a misplacement of an epidural catheter in the subarachnoid, subdural or intravenous space, but they are not without limitations. Inadvertent dural puncture is not always consistent with spontaneous leak of cerebrospinal fluid (CSF). A UK survey of obstetric epidural test doses observed that in labour the epidural test dose is used by 90%. However, a large variation was revealed in drugs and dose. In case of epidural catheter lying next to an unrecognised dural breach, high spinal may occur with second or third bolus.

Case series: We present our results of a case series of 15 patients who sustained a recognised dural puncture. The intrathecal catheter was removed in all cases and epidural was resited in lumbar space above or below. A test dose of 0.1% bupivacaine with fentanyl 2 µg/mL 10 mL was administered. We prospectively collected data on pain scores (visual analogue scale 0-10), motor block (Bromage score) and blood pressure after every epidural top-up these patients received. After delivery, all patients developed post-dural puncture headache (PDPH). Thirteen patients received an epidural blood patch while two patients with mild PDPH improved with conservative management. In labour, all except one had a pain score of 4 or less within 5 min and all had a pain score of 3 or less within 10 min. Heavy legs were noted by six patients and complete motor block occurred in one patient. After a third top-up, six patients developed a complete motor block. No patient suffered total spinal block.

Discussion: Our case series demonstrates that if there is an unrecognised dural tear adjacent to an epidural catheter, a test dose consisting of 10 mL of 0.1% bupivacaine with fentanyl 2 µg/mL is safe but likely to give rise to quicker onset of analgesia and denser than expected motor block. Therefore, we conclude that if during the administration of a test dose, quicker onset of analgesia and denser than expected motor block ensues, the subsequent top-ups should be administered more carefully, preferably in the presence of anaesthetist.

References

P24 Failed intubations in obstetric anaesthesia: patient or staff factors?
RL Freedman, S Paramanathan, DN Lucas, PN Robinson
Anaesthetics, Northwick Park Hospital, Harrow, UK

Introduction: General anaesthesia in obstetrics is less frequently performed due to the widespread use of neuraxial techniques. Training opportunities are therefore reducing. New OAA/DAS guidelines advise how to proceed in the event of a failed tracheal intubation in an obstetric patient. The guidelines suggest important steps for pre-theatre preparation and team planning but may not prevent inexperienced trainees from encountering difficult intubation scenarios.

Methods: Twenty years of obstetric general anaesthetics in a district general hospital with 6000 births per annum were reviewed. The departmental logbooks were reviewed and case notes collected for patients documented to have had a failed intubation in labour ward theatres.

Results: Six cases of failed intubation were identified over the 20 year period from 1995 until 2015. The indications for general anaesthesia were failed epidural top-up (n=1), postpartum haemorrhage (n=1), elective caesarean section for placenta praevia (n=1) and patient request (n=3); 2 emergency caesarean section, 1 elective caesarean section. In five cases a second anaesthetist was able to intubate the patient, in one case using a video laryngoscope and in another a fibreoptic intubation technique. In the remaining patient, help was not sought, the patient was woken and a regional anaesthetic technique used. In three cases a laryngeal mask airway was used to maintain oxygenation after the failed intubation attempt, until the second anaesthetist arrived. Airway assessments had been documented in all patients and were not predictive of subsequent difficulty.

Discussion: Difficult or failed intubation occurred six times in 20 years in our hospital, marking a very low incidence. Despite great emphasis placed on pre-operative airway assessment, it was not helpful in our cases. A second anaesthetist was able to intubate the patient in the majority of cases, sometimes using advanced techniques. This highlights two areas; firstly the important role of human factors impacting a clinician's performance in a stressful situation, secondly the value of having an additional anaesthetist readily available. Given the infrequency of obstetric general anaesthesia, the presence of a second anaesthetist during obstetric general anaesthesia should be encouraged. In addition, advanced airway equipment must be immediately available and familiar to all labour ward anaesthetists. Simulation training and skills drills are essential for anaesthetists covering labour ward to develop and retain the technical and non-technical skills required to manage difficult and failed intubations in obstetric patients.

References
P25 Making the Sepsis Six count on a high-risk pregnancy unit: delivering an improvement in sepsis care

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*Obstetrics, The Royal London Hospital, London, UK

Introduction: There has been no statistically significant change in the rate of indirect death from sepsis, or the trend in direct death from genital tract sepsis since the CMACE report of 2011 and MBRACE-UK 2014. Overall sepsis (combined direct and indirect deaths) is the second highest cause of peripartum death. Early recognition and management is paramount. Application of the Surviving Sepsis Campaign’s “Sepsis Six” (giving high flow oxygen, taking blood cultures, intravenous fluid resuscitation, checking lactate, monitoring urine output, administering antibiotics) within an hour of the recognition of severe sepsis reduces mortality. We wanted to know if the Sepsis Six was being addressed in our department.

Methods: In our high-risk pregnancy unit, with Trust audit approval, we conducted a retrospective casenote review of all peripartum sepsis cases admitted to the Adult Critical Care Unit (ACCU) and the Obstetric High Dependency Unit (HDU) for the 16-month period June 2013-September 2014. We audited the availability of paper notes, whether Sepsis Six elements were considered and performed in timely fashion.

Results: Thirty-two patients were admitted to HDU with sepsis, (one twice), and two patients to ACCU, totalling 35 episodes of sepsis. Eight cases had no notes available, 13 were missing crucial periods of documentation. Of the remaining 14 sets of complete notes only antibiotics were mentioned in 100% of plans, but only 50% given within one hour. Other elements were similarly mentioned to be done in documentation, but not achieved in timely fashion, with a mean of 59% (range 37-100%) being documented as having been applied within one hour of being requested.

Discussion: There is inadequate documentation surrounding sepsis, poor filing and retention of notes in a vulnerable cohort of patients. Performance of Sepsis Six is potentially under-reported if not documented, or in missing notes, but it highlights a lack of recognition of the importance of the Sepsis Six and timely management of sepsis. Informal interviewing of staff showed low awareness of Sepsis Six and implementation barriers including access to resources such as blood culture bottles and antibiotic guidelines. This spurned a service improvement project. A proforma was adapted for a peripartum patients from Trust policy to support recognition and management of sepsis. Trolleys were introduced in three clinical areas containing all the required equipment for the Sepsis Six. Departmental antibiotic guidelines were rewritten and included with patient tracking tools to aid future audit. We appointed departmental champions for departmental teaching. Re-audit of Sepsis Six post trolley introduction will be conducted in the coming year.

References

P26 The development of a protocolised pathway and checklist for the management of post-dural puncture headache following an audit of current practice

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Introduction: Post-dural puncture headache (PDPH) is a complication of neuraxial blockade but, with appropriate and timely management, morbidity can be minimized. Management is often initially conservative, including patient education about headache after childbirth and simple analgesia ahead of epidural blood patch (EBP) being offered if symptoms fail to improve. National recommendations in 2014 suggested that follow-up of parturients could be improved by the use of standardised pathways. Following a favourable audit of our adherence to local clinical guidelines for PDPH, we designed a protocolised pathway and checklist for the management and follow-up of these parturients.

Methods: After local audit committee approval, we searched our maternity database for parturients between 2011 and 2014 where PDPH was a possible diagnosis. Case notes were analysed for confirmed diagnoses of PDPH and details of management including incidence and timing of EBP, volume of injectate and use of follow-up education. Following the preliminary audit phase, a multi-disciplinary departmental consultation was carried out and a novel management pathway and checklist were devised based on comprehensive patient information, communication, and timely medical intervention according to protocolised pathways as recommended by MBRACE. A re-audit was conducted following pathway implementation.

Results: The pre-pathway baseline audit identified nine parturients in whom the diagnosis of PDPH was confirmed. Six parturients went on to receive an EBP. We found that the timing of blood patch conformed to local standards in 86% of cases and the volume of blood injected conformed to 71% of cases. With no formal protocol for post-discharge follow up in place, telephone follow up was sporadic, as was post procedural communication to patient or GP. Re-audit following pathway implementation identified twelve parturients with PDPH. 100% received an information leaflet and 50% had an EBP. 100% of those who had an EBP were followed up clinic and/or by phone call post-discharge. 100% of women who had EBP had a letter sent to their GP.

Discussion: Before the pathway, audit results showed good adherence to clinical standards based on published research, but with room for improvement in post headache follow-up. We now have a standardised pathway of care for all parturients with a headache after neuraxial block. GPs, patients and the electronic patient record are all updated as standard and parturients are offered a six-week follow-up appointment in the anaesthetic clinic which facilitates ongoing debrief. Since implementation, our EBP rate has reduced which may reflect better adherence to our management pathway. We have also significantly improved the nature and quality of communication and follow up for this group of parturients.

Reference
P27 Anaesthesia for category 1 caesarean section: time for a top-up?

D Leslie, R Jones, M Oliver
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Introduction: There is considerable evidence to show that regional anaesthesia (RA) is safer than general anaesthesia (GA) in obstetrics. GA is used disproportionately for category 1 caesarean section (CS) due to time constraints. The Royal College of Anaesthetists recommend that >50% of category 1 CS are performed under regional anaesthesia. Topping-up labour epidurals is often avoided due to a perceived time constraints.

Methods: Data were obtained for 293 patients undergoing category 1 CS in University Hospital of Wales between July 2013 and May 2015. Data were incomplete for five patients and so 288 patients were included. Choice of anaesthetic, indication for CS, time from decision to deliver to knife-to-skin (KTS) (i.e. time to provide anaesthesia), and blood loss were analysed. Time differences between anaesthetic technique were analysed using the Mann-Whitney test.

Results: GA was used in 18.4% and RA in 81.6% of category 1 CS. Of the RA cases, 69% were spinal, 30% epidural top-ups and 1% combined spinal-epidural. Median times for decision-to-KTS and blood loss are shown in the table. GA was significantly faster than both spinal and epidural top-up (P<0.05), but there was no significant difference between spinal and epidural top-up (P=0.12). Fetal distress was the leading indication for CS in all groups. GA was used disproportionately where CS was performed due to haemorrhage.

<table>
<thead>
<tr>
<th>Anaesthetic technique</th>
<th>Decision-to-KTS time (min)</th>
<th>Blood loss (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GA</td>
<td>14</td>
<td>625</td>
</tr>
<tr>
<td>Spinal</td>
<td>32</td>
<td>500</td>
</tr>
<tr>
<td>Epidural top-up</td>
<td>25</td>
<td>500</td>
</tr>
</tbody>
</table>

Data are median values

Discussion: GA remains the fastest technique for category 1 CS. There does not appear to be any time difference between spinal and epidural top-up. Obstetric preferences often dictate that GA is used in cases of greater urgency or for specific obstetric patologies. Multidisciplinary communication is key to providing the most appropriate anaesthetic. There appears to be scope for improving the time taken to establish RA for category 1 CS, perhaps through adoption of rapid-sequence RA techniques.

Reference


P28 Categorisation of caesarean section: a difference of opinion?

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The Selwyn Crawford Department of Anaesthesia, Birmingham Women’s Hospital, Birmingham, UK

Introduction: A classification system for the urgency of caesarean section (CS) was introduced in 2000 to facilitate communication between healthcare professionals. NICE used this classification system to outline auditable standards against which the performance of a delivery suite can be evaluated. These auditable standards are frequently used as targets, and may be used to assess individual performance should they not be achieved. This culture introduces additional pressure to a situation where the stakes are already high, potentially affecting decision making and performance. This pressure may originate from, and affect all members of the multidisciplinary team (MDT). Anecdotally, the perception of the urgency of CS often varies amongst different members of the MDT.

Methods: We conducted a survey at a large teaching hospital. Respondents were given 10 short vignettes adapted from the original paper by Lucas et al. They were asked to categorise the urgency of caesarean section (1–4), and state the type of anaesthetic they would expect (A-D), the latter responses were converted to 1–4 to allow mean values to be calculated. Questionnaires were completed anonymously and independently by anaesthetists, obstetricians, and midwives of all grades, as well as theatre staff.

Results: A total number of 53 responses were obtained, (anaesthetists n=18, obstetricians n=14, midwives n=11, theatre staff n=10). The mean response for each question was collated to give an overall mean categorization of CS, as well as the mean mode of anaesthesia. The results demonstrate that vignettes were categorised as least urgent by anaesthetists (1.63) compared with obstetricians (1.58), theatre staff (1.58) and midwives (1.38). Furthermore, when considering the mode of anaesthesia, this was again categorised as least urgent by anaesthetists (2.43) compared with obstetricians (2.24), theatre staff (2.14) and midwives (2.08). When the responses were divided by seniority of responder, consultants classified both the category of CS and the mode of anaesthesia as less urgent than senior, and in turn junior trainees.

Discussion: The results suggest that categorisation of the urgency of CS, and the mode of anaesthesia for CS varies amongst the MDT. Regional anaesthesia (RA) is widely accepted to be safer than general anaesthesia (GA) for CS. Discrepancy in the classification of urgency of CS between specialties may lead to pressure on the anaesthetist to deliver a faster mode of anaesthesia. This could affect performance leading to failure of RA, or affect decision-making resulting in GA when a safer alternative may be appropriate. Our results show that junior anaesthetists and obstetricians perceived the clinical vignettes to be more urgent, which may lead to an increased risk of adverse events should GA proceed unnecessarily.

References

**P29 Category 1 urgency within the Robson caesarean section groups: a pilot study**

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Introduction: The Robson groups are 12 mutually-exclusive groups used to classify women having caesarean section (CS), based on the characteristics of the pregnancy, labour and obstetric factors. This system has been used to identify the largest groups for measures designed to reduce the incidence of CS. We wished to assess whether the proportion of category-1 CS might be different between Robson groups, which could allow targeted risk-management strategies.

Methods: We used anonymised information on CS performed between 2005-14 from the St Michael’s Hospital maternity database. We classified cases by Robson CS group and Lucas urgency category. This did not require ethical committee approval according to the HRA decision tree.

Results: The Table gives urgency in nonelective CS for Robson groups excluding 2b and 4b (which are defined as not in labour). Some groups are combined for reasons of space. There was a significant difference from expected frequencies (P < 0.001, chi-squared).

<table>
<thead>
<tr>
<th>Group</th>
<th>Cat 1</th>
<th>Cat 1 / Cat 1-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>5865</td>
<td>1366</td>
</tr>
<tr>
<td>1</td>
<td>1199</td>
<td>277</td>
</tr>
<tr>
<td>2a</td>
<td>173</td>
<td>67</td>
</tr>
<tr>
<td>3</td>
<td>182</td>
<td>81</td>
</tr>
<tr>
<td>4a</td>
<td>621</td>
<td>109</td>
</tr>
<tr>
<td>5</td>
<td>849</td>
<td>122</td>
</tr>
<tr>
<td>6 &amp; 7</td>
<td>880</td>
<td>172</td>
</tr>
<tr>
<td>8 &amp; 9</td>
<td>811</td>
<td>174</td>
</tr>
</tbody>
</table>

Data are number or percentage

Discussion: Our analysis shows differences in the proportion of category-1 CS between Robson groups. The higher proportion in parous women and spontaneously laboring nullipara (Groups 1, 3, 4a), and the lower proportion in previous CS and breech (Groups 5-7), is counterintuitive. This merits further investigation, which we plan to do using a larger database.

References

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**P30 Do we need routine anti-emetics as part of an enhanced recovery bundle following elective caesarean section?**

R Hart, S Hannah, C Greenhalgh

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Introduction: Enhanced recovery after surgery (ERAS) is a concept which aims to provide high quality pre-, intra- and postoperative care to facilitate rapid recovery and hospital discharge. In recent years this approach has been applied to elective caesarean section. In our unit regional anaesthesia with the addition of intrathecal diamorphine is utilised for the majority of caesarean sections. This is in line with an ERAS model of care as it allows powerful post-operative analgesia with minimal supplemental parenteral opioids. In our unit, providing there are no complications, we aim to have our patients intravenous fluids down at the end of surgery, eating and drinking in recovery and urinary catheter out within six hours. A potential limitation to this is post operative nausea and vomiting (PONV) as a complication of intrathecal diamorphine. We conducted a snapshot audit to determine our baseline rate of PONV and question whether anti emetics should be administered routinely to reduce this common complication in line with an ERAS model of care.

Methods: All patients following elective caesarean section with a regional technique were audited over a two-week period. We analysed patient case notes in recovery to determine whether: anti-emetics were given in theatre routinely, patient suffered PONV in recovery, anti-emetic given in recovery and whether patients managed to eat and drink in recovery.

Results: We collected data from 50 patients following elective caesarean section. Anti-emetics were given routinely to 14 (28%) of patients. PONV in recovery occurred in 13 patients, making our baseline PONV rate 26%. Despite this, 45 patients (90%) were able to eat and drink before leaving recovery. Of the 14 patients who received PONV prophylaxis in theatre 23% suffered PONV in recovery despite this, which is similar to our baseline rate.

Discussion: It is clear that PONV is prevalent in our patients following elective caesarean section under spinal anaesthetic. It is not yet clear whether this impacts on our ability to deliver an ERAS model of care. It is reassuring that despite our PONV rate the vast majority of our patients were still able to eat and drink in recovery. Our unit is in the process of including routine PONV prophylaxis as part of our ERAS bundle. We are uncertain of the merits of this given that our data would suggest no difference in PONV rates, however our sample size is small. In order to quantify this further data collection will recommence next month following the introduction of routine anti-emetic use. This will allow us to compare PONV rates and determine whether this practice should continue to allow reduction of this important and common complications which may delay patient recovery.
P31 Immediate birth: an analysis of women undergoing time critical birth in a tertiary referral obstetric hospital
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Introduction: A request by obstetricians for immediate birth may be due to life-threatening fetal or maternal conditions or a combination of both. In order to facilitate rapid safe birth, hospitals often have an emergency code system for these time-critical emergencies. In our institution an emergency “Code Green” activates the system for immediate birth, usually occurring by caesarean section (CS). The aim of this study was to record the number of Code Green CS, their indications, type of anaesthesia used, decision to delivery interval (DDI), and maternal and neonatal outcomes.

Methods: After institutional ethics approval, electronic records and case notes for all Code Green births between 1/1/2013 and 31/12/2014 were analysed. Demographic, obstetric, maternal and neonatal data were collected. DDI based on anaesthesia type was assessed using Kruskal-Wallis one-way analysis of variance and Dunns’ method for multiple comparisons.

Results: 14 115 women gave birth between 2013-2014. 387 women underwent Code Green births of which 322 (83%) were by CS. The mean±SD age, gestation and body mass index for women undergoing Code Green CS was 32±8.3 years, 39±3.8 weeks, 26±5.5 kg/m², respectively. The most common indication for Code Green CS was prolonged fetal bradycardia (>5 min) (n=204, 53%), but cord prolapse (n=17, 4%) was the most rapid DDI (median [IQR] 14 [13-16] vs 17 [14-23] min (P=0.005) for the total group). Epidural top-up was the commonest anaesthesia method (Table). 8% of women undergoing neuraxial anaesthesia were converted to general anaesthesia (GA). 62% of cases occurred after-hours (17:00pm-06:59am) with 1 in 3 women having a GA.

Table: Anaesthetic technique and DDI

<table>
<thead>
<tr>
<th>Anaesthetic technique</th>
<th>DDI (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GA (initial, n=83)</td>
<td>14[12-16]</td>
</tr>
<tr>
<td>Epidural top-up (n=146)</td>
<td>16[14-19]*</td>
</tr>
<tr>
<td>Conversion to GA (n=20)</td>
<td>20[15-23]*</td>
</tr>
<tr>
<td>Spinal (n=65)</td>
<td>25[22-29]**</td>
</tr>
<tr>
<td>Combined spinal-epidural (n=8)</td>
<td>31[30-37]**</td>
</tr>
</tbody>
</table>

Data are median [IQR], *P<0.05 compared with GA, †P<0.05 compared with epidural

Of the 103 GAs there was one failed intubation (1%) (successful ventilation) and one dental injury. 11 (3.4%) women were admitted to high dependency or intensive care units: there were no maternal deaths. Babies born by CS with a DDI interval >30 min were less likely to have a time to have a respirator >1 min (16.7% vs 22.6%, P<0.001), but more likely to have a hospital stay of >3 days (60.0% vs 38.9%, P<0.05).

Discussion: Immediate CS is a common emergency. DDI is fastest with GA. Epidural anaesthesia only slightly prolongs DDI. Neuraxial failure and failure to intubate the trachea were important complications. DDI bears little relationship to short-term neonatal respiratory morbidity, most likely due to shorter DDI in more at-risk fetuses. Rapid DDI can be achieved with an integrated emergency response system.

Reference
P33 Is mean body temperature a cause of shivering during elective caesarean section under spinal anaesthesia? A pilot study

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Introduction: Shivering complicates up to 47% of elective caesarean sections under spinal anaesthesia. 1 It is an unpleasant experience which can prevent monitoring of vital signs and hinder early maternal-neonatal bonding. The cause of shivering is unclear but it may be a normal thermoregulatory mechanism. This study aimed to find out if body temperature changes are related to shivering during elective caesarean section under spinal anaesthesia.

Methods: Body temperature (core ($T_C$) and skin ($T_{sk}$)) and shivering were recorded during elective caesarean section under combined spinal epidural anaesthesia from 12 patients. Mean body temperature ($T_B$) was calculated using the formula of Burton ($T_B = 0.64T_C + 0.36T_{sk}$). 2 Comparisons were made between patients who did and did not shiver with repeated measures two-way ANOVA.

Results: Three of 12 women shivered and the mean (SD) onset was 40 (15) min after induction. $T_B$ differed between those who shivered and those who did not ($P < 0.001$).

![Figure: Mean $T_B$ (SD) relative to baseline during caesarean section of shiverers (filled) and non-shiverers (unfilled). Induction occurred at 0 min. The dashed line indicates the mean onset of shivering. *indicate differences between shiverers and non-shiverers ($P < 0.05$).](image)

Discussion: The results suggest that shivering during elective caesarean section under spinal anaesthesia is a normal thermoregulatory response. In those who shivered $T_{sk}$ did not vary significantly from baseline and therefore the reduction in $T_B$ is likely due to a reduction in metabolic rate rather than increased cutaneous heat loss. Further work is required to establish why $T_B$ decreases in some patients but not in others.

References

P34 Patient perspectives of enhanced recovery: the development of a ‘patient passport’ and an evaluation of its impact on mothers’ experiences

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Anaesthesia, St George’s Hospital, London, UK

Introduction: Mother’s views should be at the centre of all enhanced recovery pathway (ERP) design processes and patient education about forthcoming hospital experience is key to success. 3 Surgical consultations are short and contain large amounts of critical information so both verbal and written information is pivotal. The effectiveness of this can be measured in terms of readability, comprehensibility and communicative effectiveness. 2

Methods: Women who had previously undergone caesarean section were extensively consulted during the development of an ERP patient passport. This focus group had experienced mixed perioperative outcomes and they provided crucial feedback on content, communicative effectiveness, readability and comprehensibility. Other assessors included obstetricians, midwives, pharmacists and our Trust’s patient information department.

Results: Forty women undergoing elective caesarean sections in September 2015 received the ERP patient passport during their pre-assessment and used it throughout their hospital stay. Mothers were asked to complete a questionnaire for feedback. Thirty four women responded (response rate of 85%)

Table: Feedback on various aspects of the patient passport

<table>
<thead>
<tr>
<th>Feedback Question</th>
<th>Yes</th>
<th>No</th>
<th>Don’t know</th>
<th>Not answered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did the passport help you achieve control over your recovery process?</td>
<td>82%</td>
<td>6%</td>
<td>12%</td>
<td>0</td>
</tr>
<tr>
<td>Did it improve your experience while in hospital?</td>
<td>79%</td>
<td>6%</td>
<td>12%</td>
<td>3%</td>
</tr>
<tr>
<td>Was it a useful document during your recovery?</td>
<td>82%</td>
<td>6%</td>
<td>9%</td>
<td>3%</td>
</tr>
<tr>
<td>Did the passport contain too much information?</td>
<td>3%</td>
<td>97%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Did the passport contain the right amount of information?</td>
<td>97%</td>
<td>3%</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

In addition, during this period, routinely collected data suggested that 84% mothers drank within 2 h, 80% ate within 4 h, 84% had catheters removed as per protocol and 46% were discharged on the first postoperative day. All achieved targets were improved from previous data.

Discussion: Feedback about the passport was extremely positive. Women found it informative and helpful, especially in terms of setting recovery targets. Based on their suggestions, ERP prompts on the anaesthetic chart and on the handover board on the ward have been introduced. Our questionnaire demonstrates that mothers are receptive to information when presented in a locally relevant manner. Such practices can be shared amongst networks of hospitals with shared infrastructures in order to improve maternal outcomes and satisfaction after surgery.

References
P35 Switching to propofol for general anaesthetic caesarean section: one institution’s experience

CA Battle, NA Muchatuta
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Introduction: Thiopental has historically been the induction agent of choice in general anaesthesia (GA) for caesarean section (CS). However unfamiliarity with thiopental in modern practice has been implicated in the increased incidence of awareness being reported in obstetric anaesthesia. The cost and availability of thiopental are additional concerns, as is the potential for drug errors during reconstitution. With agreement from the neonatologists, our hospital changed from thiopental to propofol for GA CS in January 2014. We conducted this study to investigate any potential neonatal and maternal impact.

Methods: All GA CSs over a four-year period were included (thiopental group in the two years before January 2014, propofol group in the two years after). Retrospective data collection was used to detect any difference in neonatal or maternal outcomes. Data analysed with t-test or chi-squared test as appropriate.

Results: We identified 189 cases: 106 in the thiopental group, 83 in the propofol group. Interim analysis compares 78 thiopental cases with 48 propofol cases.

Table: Comparison of thiopental and propofol

<table>
<thead>
<tr>
<th></th>
<th>Thiopental</th>
<th>Propofol</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apgar score &lt;7 at 1 min</td>
<td>45.9%</td>
<td>53.3%</td>
<td>0.6</td>
</tr>
<tr>
<td>UA pH &lt;7.20</td>
<td>33.9%</td>
<td>26.5%</td>
<td>0.5</td>
</tr>
<tr>
<td>NICU admission at term</td>
<td>27.1%</td>
<td>9.4%</td>
<td>0.1</td>
</tr>
<tr>
<td>MAP rise &gt;20% from baseline</td>
<td>25.7%</td>
<td>4.4%</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>MAP fall &lt;20% from baseline</td>
<td>56.3%</td>
<td>55.6%</td>
<td>0.8</td>
</tr>
<tr>
<td>Nausea</td>
<td>9.2%</td>
<td>26.7%</td>
<td></td>
</tr>
</tbody>
</table>

UA: umbilical artery; MAP: mean arterial pressure

There were no cases of accidental awareness or failed intubation in either group.

Discussion: There was no significant difference in neonatal outcome between the two groups in terms of Apgar score <7 at 1 min, UA pH <7.20. Whilst NICU admission at term was reduced in the propofol group, this was not statistically significant at the time of interim analysis. Induction with propofol tended to result in anaesthesia which was more cardioaistable, with significantly lower rates of exaggerated hypertension, which could prove useful in cases such as preeclampsia. The higher rates of nausea in the propofol group was surprising but confounding factors include opioid and nitrous oxide use.

References

P36 A four year review of eclampsia managed in the intensive care unit: lessons learnt

AU Otegbeye, OK Idowu
Anaesthesia and Intensive Care Medicine, University College Hospital, Ibadan, Nigeria

Introduction: Eclampsia is a clinical condition seen in obstetrics. It is diagnosed when women with preeclampsia develop fits. It is an obstetric emergency seen in 1.7/1000 births in Nigeria. Mortality is high accounting for 25% of maternal mortality. This is a retrospective criteria based clinical audit which evaluated women admitted into the intensive care unit (ICU) with eclampsia. The objective was to identify causes of mortality and evaluate the outcome of ICU interventions.

Methods: Patients admitted to the ICU between April 2011 and April 2014 were evaluated using their case notes and treatment charts. Variables studied include patient characteristics, type of eclampsia, antenatal booking status, Glasgow Coma Scale (GCS) on admission. Interventions like use of mannitol, transfusion, mechanical ventilation were also analysed. Outcome was either death or discharged. The variables were analysed to see if they had a relationship with outcome. SPSS v20 was used for analysis. Chi-square was used to determine prognosis and a P value <.05 was considered significant.

Results: A total of 83 patients were admitted to ICU. Mean age was 31.5 years. Fifty-nine women (71.1%) had antepartum eclampsia, 24 (28.9%) had postpartum eclampsia. Fifty-three women (63.9%) were discharged to the ward while 30 (36.1%) died. Mortality was more common in the unbooked patients (79.5%) and in the age group 26-35 years (51.8%). Admitting GCS was 3-7 in 20 (26.7%), 8-12 in 28 (37.3%) and 13-15 in 37 (22.5%). All patients received magnesium sulphate. The use of mannitol, mechanical ventilation, blood transfusion were all found to have an influence on the outcome. Autopsy showed intracerebral hemorrhage as a leading cause of death.

Discussion: This study shows the trend of eclampsia in Nigerian women. It shows there’s high mortality despite specialized care. Mortality was higher in the unbooked population. Centers are advised to draw a protocol to determine ICU admission and optimise care. Research should continue into reducing mortality.

Reference
P37 Anaesthetic management of twin deliveries at a tertiary care centre: a service provision project

N Hyndman, M Molloy
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Introduction: Twin pregnancies contribute to 2-3% of births. Twin birth is associated with a higher risk of adverse perinatal and maternal outcomes when compared to singleton birth. It was noted that our unit had no current guideline for the management of twin deliveries. Anecdotal evidence of delays in involvement of the anaesthetic team leading to unnecessary challenges in care had been highlighted on occasion. We undertook analysis of the current local practice in the management of twin deliveries on labour ward where the likelihood of operative delivery is high, with the aim of facilitating the production of joint obstetric and anaesthetic guidelines for intrapartum management of twin pregnancy.

Methods: Just over 100 women have twin pregnancy delivered in our unit per year. Retrospective data were gathered from all twin deliveries occurring over a one-year period. Analysis was conducted to establish the most common modes of delivery, indications for caesarean section, anaesthetic involvement, mode of analgesia and anaesthesia and location of delivery.

Results: The mode of delivery was evenly distributed across elective caesarean sections, emergency caesarean sections and vaginal delivery. Five women required emergency caesarean section for the second twin. Indications for caesarean section were varied: most commonly documented as multiple pregnancy for elective caesarean section. All vaginal twin deliveries were performed in theatre. Spinal anaesthesia was the most common form of anaesthetic for all categories of caesarean delivery. 61% of women who delivered vaginally had an epidural inserted for their labour but only 18% of women undergoing emergency operative delivery had established epidural anaesthesia.

Discussion: The management of twin delivery on labour ward in our unit has followed agreed consensus that all should be delivered in theatre. The low number of epidural anaesthetics for emergency caesarean delivery may reflect either epidural anaesthesia not used in labour or conversion to spinal or GA if insufficient time for epidural anaesthesia to be established. We would support anaesthetic involvement in all twin deliveries with provision of epidural anaesthesia early avoiding delay and risk of general anaesthesia if operative delivery was required as an emergency. We have contributed to new draft guidelines and initiated a prospective audit on the anaesthetic involvement, interventions, maternal and perinatal outcomes to delineate our role for all twin deliveries.

References

P38 Analgesic requirements and pain experience after caesarean section under neuraxial anaesthesia in women with preeclampsia

AT Dennis, S Mulligan*
Department of Anaesthesia, The Royal Women’s Hospital, Parkville, Australia, *University of Melbourne, Australia

Introduction: Caesarean section (CS) is a common mode of birth in women with preeclampsia (PE). There is no literature about postoperative pain following CS in PE and little information on safety and efficacy of analgesics used in PE. Non-steroidal anti-inflammatory drugs (NSAIDs) should be used with caution in other hypertensive adults and there are case reports of NSAIDs causing acute hypertension and death in PE. It is theorised that analgesics which reduce the seizure threshold (tramadol, pethidine), should not be administered in PE due to seizure risk. Magnesium sulphate is used to treat and prevent seizures in PE and may also have some analgesic properties when administered systemically. Acute pain management guidelines fail to differentiate between healthy pregnant (HP) woman and PE women. This means clinicians either follow guidelines which may not be appropriate for PE women or they individualise their management with little clinical guidance. We hypothesised that women with PE have a different pain experience and different pain management compared to HP women. As a first step we aimed to determine the current practice of analgesic administration and pain experience after CS in PE compared with HP (ASA I) women.

Methods: After institutional ethics approval, we conducted a single centre (tertiary referral, 7400 births/year) one-year retrospective case-control study determining analgesic administration, adherence to departmental postoperative pain protocol (strict regular paracetamol/oxycodone slow release/NSAIDs + as required tramadol and immediate release oxycodone for 48 h) and pain experience after CS in women with PE compared with HP women. Key inclusions for all were women having spinal anaesthesia, not in labour, no prior abdominal surgery, having first CS and surgery ≤ 60 min.

Results: 62 women were included in the study; 21 cases (PE) and 41 controls (HP). Groups were matched for age, body mass index, gravidity, parity, duration of surgery and previous surgical history. Cases had a shorter gestation compared with controls (31.7±3.0 vs 38.5±1.1 weeks P<0.001). Cases received more intrathecal bupivacaine (mean difference 0.4 mg) and in the first 6 h after CS received (mean±SD, % or median [IQR]), less oxycodone (11.5±3.9mg vs 14.3±5.1mg, P<0.031), less often received parecoxib (43% vs 100%, P<0.001), and reported less maximum pain scores (0 (0, 5) vs 4 (3.6), P<0.005). Pain management protocol was followed in 78% of HP women and 43% of women with PE (P=0.023).

Discussion: This study suggests that women with PE experience less pain in the first 6 h after CS despite receiving less analgesia. The effect of an earlier gestation, different prophyllactic and acute treatment analgesia, differing intrathecal bupivacaine doses and the use of magnesium sulphate in PE may influence pain experience and analgesia requirement after CS. Further research needs to explore these findings and to assist with the development of specific guidelines for the postoperative management in PE women.

Reference
**P39 Dosing spinal anaesthesia for very preterm caesarean section: ongoing uncertainty**

NJ Tweed, E Lewis

*Anaesthetics, Singleton Hospital, Swansea, Swansea, UK*

**Introduction**: In our department, which handles approximately 3500 deliveries a year, anaesthesia was provided for 21 operative deliveries at >30 weeks of gestation over a one-year period. A recent retrospective study shows higher rates of general anaesthesia for such cases, however, it is still generally accepted that regional anaesthesia is safer for mothers, with only poor quality evidence available regarding fetal outcome. It has been suggested that increase doses are required for effective spinal anaesthesia in pre-term mothers, however, specific dose guidance is not available.

**Methods**: Cases were found using the delivery suite registry, and included all births <30 weeks of gestation. If operative delivery was performed the obstetric anaesthesia database was used to identify the anaesthesia provided. Finally, notes were requested for patients who had spinal anaesthesia to confirm the dose of hyperbaric bupivacaine used.

**Results**: For 21 operative deliveries before 30 weeks of gestation, the initial mode of anaesthesia was general anaesthesia for 43%, spinal for 48% and combined spinal-epidural for 9%. This compares to an overall rate of 15% under general anaesthesia, and 85% under regional anaesthesia. Examination of 16 subsequent spinal anaesthetics for caesareans at <30 weeks showed two general anaesthetics due to failure of block, compared to nine failed blocks out of 331 in one year of category 1-3 caesarean sections. A two-tailed chi-squared test had a P value of 0.029 suggesting that this represents a significant difference in failure rate between the two groups. For the records available, the average dose of 0.5% hyperbaric bupivacaine was 2.6 mL.

**Discussion**: The dose required for pure spinal anaesthesia, or the starting dose for a combined spinal-epidural anaesthesia technique is not clear, and we have shown a higher failure rate with standard doses. Although increased doses are required, no specific doses have been suggested. Given that obstetric anaesthetists are regularly treating such patients, an OAAC approved survey of consultant obstetric anaesthetists current practice may be a way ascertain the optimal for spinal anaesthesia for pre-term caesarean sections.

**References**


**P40 Estimation of maternal cardiovascular risk using the modified World Health Organisation risk classification and correlation with outcomes**

RA JadHAV, O Lubeigt, B Reeve

*Anaesthesia, Golden Jubilee National hospital, Glasgow, UK*

**Introduction**: Cardiac pathology is the leading indirect cause of maternal mortality. There are several approaches available to stratify maternal cardiovascular risk including the CARPREG risk score, ZAHARA predictors and WHO classification. Our centre is a tertiary heart and lung centre in an isolated site and only high cardiac risk patients deliver at this centre. The recommended risk evaluation tool is the modified WHO risk classification.

**Methods**: After approval from the hospital audit department, we reviewed the case notes of all parturients who delivered at our centre between August 2008 and July 2015. We retrospectively assigned each patient a risk score between 1 and 4 using the criteria set out in the WHO classification. We then corroborated the risk score with overall outcome in the patients. Risk category 4 was defined as extreme, pregnancy contraindicated; category 3 very high risk; category 2 moderate risk; and category 1 low risk.

**Results**: Twenty-four patients met the criteria. The range of diagnoses were a mix of congenital heart disease, valvular heart disease, cardiomyopathies, and pulmonary hypertension. Nine patients were assigned a risk of 4, ten patients a risk of 3, and two patients a risk of 2. We were unable to assign a score to three patients because they did not fit into the WHO criteria because their initial presentation of cardiac disease was at advanced gestation, and they had no pre-existing morbidity, nor any known cardiac risk factors or symptoms. Of the nine patients in WHO risk category 4, one died three years later from VF arrest, two had subsequent valvular surgery, one was being considered for surgery at the time of writing, and five made a full recovery. Of the 10 patients in WHO risk category 3, one had valvular surgery and pacemaker insertion, one had valvular surgery with ASD repair, one was being considered for surgery at the time of writing, one had an emergency aortic coarctation repair, two had cardiovascular which precipitated delivery, one required cardiac transplant post delivery and three made a full recovery. Both patients assigned a risk score of 2 made a full recovery. Of the three patients in whom it was not possible to assign risk, one required cardiac transplant, one died postpartum, and one made a full recovery.

**Discussion**: Although the WHO classification is recommended, our results show that risk assignment does not necessarily correlate with overall outcomes. There is much overlap in outcomes for risk scores 3 and 4. Two out of three patients in whom it was not possible to assign a risk score in this classification had significant outcomes of death and cardiac transplant. The recommended WHO risk stratification tool used in this context for estimating maternal cardiovascular risk, may not be a good predictor of overall outcome.

**References**

P41 Maternal morbidity: an analysis of high dependency unit care in pregnant or recently pregnant women

AT Dennis, E Chambers*
Department of Anaesthesia, The Royal Women’s Hospital, Parkville, Australia, *The University of Melbourne, Australia

Introduction: Pregnancy is a time when women may become critically unwell with estimates of one intensive care unit (ICU) admission for every 370 births. The main causes of critical care admissions are hypertension and obstetric haemorrhage. Maternal mortality rates have been decreasing worldwide but maternal morbidity remains unreported. Best estimates suggest that 1 in 200 women suffer a significant complication of pregnancy. High dependency unit (HDU) care is an important level of care between standard (low acuity) ward care and intensive unit (high acuity) care. The aim of this study was to determine the number of obstetric women receiving HDU care (1 nursing staff: 2 patients) in our purpose built unit, the major reasons for obstetric admissions to HDU and to assess the interventions received.

Methods: After institutional ethics approval, a retrospective analysis (July 1 2008–June 30 2013) was performed of the HDU database at a tertiary referral obstetric hospital (>7000 births/year). This period corresponded with colocation of this hospital with a tertiary referral adult non-obstetric hospital.

Results: There were 31 848 births and 632 women admitted to HDU (~1 in 50 births). 55% of women were transferred from the postoperative care unit to HDU. The main reason for admission was obstetric haemorrhage (Table). The commonest monitoring intervention was intra-arterial blood pressure monitoring (45%) with only 36 (6%) women receiving a central venous catheter. The mean ± SD stay in HDU was 35 ± 42.9 h with 610 (97%) women being transferred from HDU to lower acuity care and only 22 (3%) women requiring transfer to higher acuity care (coronary care unit or ICU). There were no maternal deaths. 103 (16%) women were admitted for postoperative monitoring due to complicated surgery, miscellaneous medical or surgical conditions or because of pre-existing other conditions.

Table: Obstetric HDU admission diagnosis

<table>
<thead>
<tr>
<th>Category</th>
<th>n</th>
<th>Rate per 1000 births</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstetric haemorrhage</td>
<td>248</td>
<td>7.8</td>
</tr>
<tr>
<td>Hypertension</td>
<td>87</td>
<td>2.7</td>
</tr>
<tr>
<td>Cardiac disease</td>
<td>52</td>
<td>1.6</td>
</tr>
<tr>
<td>Sepsis</td>
<td>49</td>
<td>1.5</td>
</tr>
<tr>
<td>Early pregnancy complications</td>
<td>35</td>
<td>1.1</td>
</tr>
<tr>
<td>Neurological conditions</td>
<td>20</td>
<td>0.6</td>
</tr>
<tr>
<td>Anaesthetic complications</td>
<td>14</td>
<td>0.4</td>
</tr>
<tr>
<td>Thrombotic conditions</td>
<td>13</td>
<td>0.4</td>
</tr>
<tr>
<td>Acute pulmonary oedema</td>
<td>11</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Discussion: Our data suggest that HDU admission is seven times more common than admission to ICU but maternal morbidity leading to admission is similar in both settings. Most women are discharged within a short time period to standard ward based care. HDU has an important role in safely managing higher risk women. Hospital-based educational programs need to focus on these major causes of morbidity, their diagnosis and optimal management.

Reference

P42 Service evaluation: failed attendance at the antenatal anaesthetic assessment clinic

DA Wotherspoon, JA Pickett, ME Jones
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Introduction: Missed appointments, known as “Did Not Attend” (DNA), at hospital outpatient clinics are a significant financial burden to the NHS. We carried out a service evaluation of DNAs at our Antenatal Anaesthetic Assessment Clinic (AAAC). The DNA rates in this context are unknown but in the fourth quarter of 2014-15 the DNA rate for first outpatients appointment in England was 8.4%.

Methods: Following institutional approval, the evaluation ran for 10 months from September 2014. Two-hundred-and-seventy-two patients were scheduled to attend the AAAC. Names of non-attenders were collected and reasons for non-attendance were sought from the anaesthetist and departmental secretary. Computer records were used to obtain reason for referral.

Results: There were 60 non-attenders out of 272 scheduled patients: nine could not attend and 51 DNA, giving a DNA rate of 18.8%. Of DNAs, no reason was found in 37 cases (13.6%), while nine parturients (3.3%) had already delivered and three (1.1%) were intending to deliver elsewhere. One patient did not receive a letter and another had received one in error (0.4% each). For the 37 DNAs with no cause identified, we looked at reason for referral and compared all appointments offered with numbers that DNA within each category.

Table: Indications for referral and DNA rates

<table>
<thead>
<tr>
<th>Reason for referral</th>
<th>Clinic appointments offered</th>
<th>Did Not Attends</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI &gt; 40</td>
<td>70 (25.7%)</td>
<td>14 (20.0%)</td>
</tr>
<tr>
<td>Musculoskeletal</td>
<td>60 (22.1%)</td>
<td>10 (16.7%)</td>
</tr>
<tr>
<td>Previous anaesthesia</td>
<td>42 (15.4%)</td>
<td>4 (9.5%)</td>
</tr>
<tr>
<td>Neurological</td>
<td>33 (12.1%)</td>
<td>1 (3.0%)</td>
</tr>
<tr>
<td>Haematological</td>
<td>31 (11.4%)</td>
<td>2 (6.5%)</td>
</tr>
<tr>
<td>Cardiac</td>
<td>16 (5.9%)</td>
<td>1 (6.3%)</td>
</tr>
<tr>
<td>Respiratory</td>
<td>7 (2.6%)</td>
<td>1 (14.3%)</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>7 (2.6%)</td>
<td>2 (28.6%)</td>
</tr>
<tr>
<td>Allergy</td>
<td>4 (1.5%)</td>
<td>2 (50.0%)</td>
</tr>
<tr>
<td>Hepatic</td>
<td>2 (0.7%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Total</td>
<td>272 (100.0%)</td>
<td>37 (13.6%)</td>
</tr>
</tbody>
</table>

Discussion: Our clinics involve relatively small patient numbers but nonetheless our evaluation showed that at 18.8% our DNA rate was higher than general outpatient data from NHS England. This may have been confounded by a major change in our computer system in 2014 or may relate to specific AAAC factors. Subsequently we have introduced processes to try to reduce DNA rates including: checking digital notes of each booked parturient a week before clinic to identify those delivered, telephone reminders a week in advance and co-ordinating the clinic appointment on the same day as other antenatal appointments where possible. Our DNA rate for July to December 2015 was 9.0%. It would be useful to further investigate reasons for not attending. The DNA rate in our evaluation was generally higher for conditions that may not be perceived as medically important e.g obesity and musculoskeletal. Multidisciplinary obesity in pregnancy clinics may encourage better attendance in this particular area.

Reference
P43 The influence of booking body mass index on method of delivery, anaesthetic intervention and risk of general anaesthetic in women undergoing induction of labour

A Anwar, P Yoxall
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Introduction: Obesity is a major public health concern with over half of childbearing aged women overweight or obese in the UK. Maternal obesity carries numerous maternal and fetal complications during pregnancy and is a risk factor for anaesthesia related mortality. The incidence of complications such as caesarean section (CS), preeclampsia, induction of labour (IOL) and stillbirth is increased in women with a higher body mass index (BMI). Compared to spontaneous labour, women undergoing IOL are at increased risk of CS. This audit examines the association of booking BMI on the method of delivery, requirement of anaesthetic intervention and risk of general anaesthetic in women undergoing IOL.

Methods: This is a retrospective study based on 298 women who underwent IOL over a three-month period. Data were collected from the Medway Maternity System and anaesthetic charts. Patients were categorised according to their booking BMI. Modes of delivery and anaesthetic outcomes were compared and data were subjected to logistic regression analysis using the R statistical software package. The likelihood ratio (LR) was calculated with 95% confidence intervals (CI).

Results: The likelihood of women needing anaesthetic intervention was 0.99-1.06 indicating increasing BMI alone was not a risk factor for anaesthetic intervention during IOL. We found that BMI did not increase the probability of CS with a likelihood ratio of 1.00-1.08. Those women undergoing CS following a failed IOL were not at greater risk of having general compared to a regional anaesthesia.

Discussion: The most common indication for CS is failure to progress following IOL. Studies show CS are strongly related to a low admission Bishop score. Although BMI is known to be an independent risk factor for CS; this was not evident in the women undergoing IOL in this study. This suggests other factors, such as a low Bishop score, may play a more important role leading to CS, the need for anaesthetic intervention and general anaesthetic in comparison to an increased BMI.

References

Figure: Booking BMI and outcomes in IOL

P44 The prone position in preeclampsia

AT Dennis, L Hardy, L Leeton
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Introduction: The prone position (PP) is where a person lies horizontally with chest down & back up. With appropriate pillows it is safe for pregnant women. It is used in allied health fields for relaxation and massage in pregnancy. This position almost completely relieves uterine compression of abdominal vessels. In non-pregnant critically ill adults respiratory mechanics are also improved. Despite these advantages, the PP is rarely used in medical settings in pregnancy and there is little information about the PP in preeclampsia (PE). A new unified theory of PE proposes that the development of high blood pressure (BP) in PE is a response to fetal growth demands and is driven by an imbalance between maternal oxygen supply (which may be caused by inadequate blood flow to the utero-placental unit) and fetal oxygen demands. We hypothesise that the PP in women with PE will reduce BP by relieving compression of blood vessels thereby reducing abdominal vascular resistance and improving blood flow. This study aimed to test this idea and assess feasibility of the PP in pregnant women.

Methods: After ethics approval, consent and trial registration (ACTRN: 1261500160538) 62 women (50 healthy term pregnant (HP) and 12 PE) had their resting BP, heart rate (HR), oxygen saturation (SpO2), respiratory rate (RR), fetal heart rate (FHR) and comfort levels measured in two positions: left lateral and PP. Sample size (12 PE) was based on a clinically useful 10 mmHg drop in systolic BP from lateral to PP (power 80%, 5% type I risk, two-tailed t-tests).

Results: All 62 women found the PP acceptable. Mean ± SD age, gestation and body mass index were similar for HP and PE women (33 ± 4.1 vs 31 ± 3.7 years, 38 ± 1.0 vs 36 ± 3.7 weeks, 27 ± 3.2 vs 32 ± 5.9 kg/m2 respectively. 44% HP and 50% PE women preferred PP to lateral.

Table: Maternal variables in HP & PE when left lateral or prone

<table>
<thead>
<tr>
<th>Group</th>
<th>Variable</th>
<th>Left Lateral</th>
<th>Prone</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP n=50</td>
<td>SBP (mmHg)</td>
<td>112 ± 7.2</td>
<td>108 ± 12.9</td>
</tr>
<tr>
<td></td>
<td>DBP (mmHg)</td>
<td>70 ± 5.8</td>
<td>70 ± 10.8</td>
</tr>
<tr>
<td></td>
<td>HR (beats/min)</td>
<td>75 ± 8.6</td>
<td>85 ± 12.2</td>
</tr>
<tr>
<td></td>
<td>SpO2 (%)</td>
<td>98 ± 0.8</td>
<td>98 ± 0.7</td>
</tr>
<tr>
<td></td>
<td>RR (breaths/min)</td>
<td>17 ± 2.9</td>
<td>17 ± 2.9</td>
</tr>
<tr>
<td></td>
<td>FHR (beats/min)</td>
<td>137 ± 10.0</td>
<td>138 ± 9.0</td>
</tr>
<tr>
<td>PE n=12</td>
<td>SBP (mmHg)</td>
<td>149 ± 5.9</td>
<td>143 ± 9.7*</td>
</tr>
<tr>
<td></td>
<td>DBP (mmHg)</td>
<td>96 ± 6.9</td>
<td>94 ± 8.0</td>
</tr>
<tr>
<td></td>
<td>HR (beats/min)</td>
<td>80 ± 11.2</td>
<td>85 ± 13.5</td>
</tr>
<tr>
<td></td>
<td>SpO2 (%)</td>
<td>98 ± 0.9</td>
<td>98 ± 0.6</td>
</tr>
<tr>
<td></td>
<td>RR (breaths/min)</td>
<td>18 ± 3.7</td>
<td>17 ± 3.1</td>
</tr>
<tr>
<td></td>
<td>FHR (beats/min)</td>
<td>139 ± 7.8</td>
<td>142 ± 10.5</td>
</tr>
</tbody>
</table>

*P=0.044, Data are mean ± SD, S: systolic; D: diastolic

Discussion: The prone position is feasible and comfortable in pregnant women including those at term. The prone position may reduce SBP in women with PE without obvious adverse effects and may be an acute treatment for PE. Randomised controlled trials are needed. Pregnancy should not be a contraindication to the prone position.

Reference
1. Dennis A, Castro J. Haemodynamics and hypertension - is a unified theory of pre-eclampsia possible? Anaesthesia 2014;69:1183-9
P45 A national survey of anaesthetic trainee views on neonatal life support in obstetric practice
R Ayyash, L Molus, F Pearson, S Cope, M Millar, G Lear
Anaesthetics, Sunderland Royal Hospital, Sunderland, UK

Introduction: Postgraduate training has moved from time-based to competency-based assessment. The provision of neonatal airway management and resuscitation are key core competencies outlined in the Royal College of Anaesthetists trainee curriculum. Despite this, a recent case in our Trust highlighted a lack of skills amongst anaesthetic trainees when faced with a neonatal airway emergency. This prompted us to investigate if this was a more widespread issue as formal training tailored to anaesthetic practice does not appear to be commonplace. We conducted a survey to assess the degree of anaesthetic trainee confidence in the provision of neonatal life support (NLS) during obstetric practice and determine if there is a requirement for neonatal resuscitation training.

Methods: We created an online survey with question profiles carefully selected to retrieve the information with respect to our aims. The survey was distributed nationally to anaesthetic trainees of all grades. Results were analysed descriptively.

Results: We received responses from 310 anaesthetic trainees at various stages of their training (28% core, 33% intermediate, 28% higher and 11% advanced). Responses with respect to differing experiences and confidence in the management of NLS are broken down below:

a) Provision of NLS: 92% of respondents did not receive training as part of the obstetric departmental induction.

b) Method of teaching: from those respondents who received NLS teaching at induction, 9% received this in the form of lecture, 47% manikin based simulation and 56% as a combination of both method.

c) Involvement with newborn resuscitation: 65% of respondents had never been faced with such a situation. 24% were involved on 1 or 2 occasions, whilst 10% with 3 or more incidents.

d) Familiarity with NLS algorithm: 69% of respondents reported familiarity with the NLS algorithm.

e) Confidence in neonatal resuscitation management: 51% of respondents were not at all confident in the provision of NLS. The remaining 48% of respondents attributed confidence of varying degree to previous experience or participation at NLS/APLS/EPLS courses, as either candidates or faculty.

f) Training: 92% felt that NLS training should be part of the obstetric anaesthetic induction, ideally through a combination of lecture and manikin based simulation.

Discussion: The results highlighted a significant lack of formal NLS training, specifically airway management, for anaesthetic trainees undertaking obstetric placements. Given the current limited training opportunities and infrequent exposure to neonatal resuscitation, it is not surprising that trainees report a lack of confidence when considering best practice in such clinical scenarios. We are piloting a local education programme for neonatal airway management, in collaboration with neonatologists, and obstetric and paediatric anaesthetists in January 2016, to achieve these competencies and improve trainee confidence.

Reference

P46 Anaesthetic experience before basic level obstetric anaesthesia module: should CT2 trainees work unsupervised?
SA Hannah, N Logan, E McGready
Princess Royal Maternity Unit, Glasgow Royal Infirmary, Glasgow, UK

Introduction: For core-level anaesthetic trainees, the thought of their first rotation to obstetric anaesthesia can be a daunting one. One way of preparing trainees for the challenges of an obstetric anaesthesia rotation is to provide adequate general anaesthetic training in the 12-21 months preceding their basic level obstetric module. In addition, trainees must complete an Initial Assessment of Competency in Obstetric Anaesthesia (IACOA) before working unsupervised. The timing of this assessment is variable but usually completed immediately before their rotation. This survey aims to capture trainee anaesthetic experience, with particular reference to rapid-sequence induction (RSI), before their first obstetric rotation.

Methods: We surveyed 11 Core Trainee Two (CT2) anaesthetists at the end of their first rotation in obstetric anaesthesia. Trainees were given a paper survey to complete with the following questions: How many months anaesthetic training have you completed prior to the start of your obstetric attachment? Did you pass your IACOA before your first shift? How many solo/unsupervised GA cases have you performed on the general rota before your attachment? How many RSIs have you performed? How many unsupervised RSIs have you performed? Data were collated into a spreadsheet and statistical analysis performed.

Results: Trainees had a median [IQR] of 15 [12-21] months anaesthetic experience before their block. Six trainees (55%) had completed their IACOA before the block; five (45%) had not, but they had done so before working unsupervised/overnight. Most trainees had completed a reasonable median number of RSI’s before their block (n=35); however, only a small number of these were unsupervised (n=6).

Table: Experience of anaesthetic CT2s

<table>
<thead>
<tr>
<th>Months experience</th>
<th>Solo cases</th>
<th>Solo GAs</th>
<th>RSIs</th>
<th>Solo RSIs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>17.5</td>
<td>70.8</td>
<td>7.3</td>
<td>33</td>
</tr>
<tr>
<td>Median</td>
<td>15</td>
<td>50</td>
<td>4.5</td>
<td>35</td>
</tr>
<tr>
<td>Mode</td>
<td>12</td>
<td>0</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>IQR</td>
<td>12-21</td>
<td>22-86</td>
<td>0-8</td>
<td>23-41</td>
</tr>
</tbody>
</table>

Discussion: This survey shows trainees can enter their basic level obstetric module with little unsupervised general anaesthetic experience. The number of unsupervised RSIs undertaken (median 6) is concerning, with two anaesthetists never having done any. Failed intubation in obstetrics is ten times more common than in the general surgical population. A category-1 caesarean section, often undertaken out of hours, in a population with a high risk of failed intubation and accidental awareness, is not the place for trainees to be undertaking their first solo RSI. The focus should be on increasing the number of unsupervised cases, particularly RSIs that trainees do before going on the obstetric rota, if CT2s continue to work unsupervised in obstetrics.

Reference
P47 Human factor training for the multidisciplinary team

SC Monks, K Maclemman
Anesthesia, St Mary’s Hospital, Manchester, UK

Introduction: It is well recognised that suboptimal teamwork and communication can result in poor patient outcomes. The Confidential Enquiry into Maternal and Child Health (CMACE) and subsequently the Mothers and Babies: Reducing the risk through audits and Confidential Enquiries across the UK (MBRRACE-UK) reports1,2 recognise the importance of robust communication and teamwork. Studies have shown that simulation results in improved clinical management, communication skills, and reduced anxiety in individuals faced with a real-life emergency, compared with those taught with lecture format.3 Clear, structured communication aids improve team performance and efficiency.

Methods: In collaboration with education midwives, anaesthetists and obstetricians, annual lectured based mandatory training in our hospital was radically changed. Human factor training was introduced for all in the form of an introductory lecture covering situational awareness, decision making, and closed-loop communication. Following this, groups rotated around three simulation stations on the delivery suite, using their equipment with birthing manikins and role-plays.

Results: Eighty-four participants were surveyed over a 6-month period; 75 midwives, two research midwives, five healthcare assistants and two consultant obstetricians. For 88% of participants the topic of human factors was an entirely new concept, with 99% of participants describing this as something that would change their practice. Participants commented that the most useful aspects were training in improved communication strategies and learning about the decision-making process, with 75% specifically commenting that they would adopt closed-loop communication in their clinical practice. 92% of midwives and both obstetricians had previously undertaken some simulation training compared with only 20% of healthcare assistants. All found the simulation component useful for their clinical practice. 98% of participants preferred the new format of mandatory training to the previous lecture format.

Discussion: Simulation training is common in many obstetric units in the form of courses, but human factors training is often lacking. Knowledge of and training in human factors is an essential tool to improve team working and patient safety in emergency situations. Highlighting the importance of closed-loop communication and effective team working to all members of the obstetric team should lead to improved patient outcomes at the time of obstetric emergencies. We would advocate the introduction of human factor training to all multidisciplinary obstetric training programmes.

References

P48 Impact of night shifts on fatigue and cognitive function of healthcare professionals on the maternity unit

M Salman, R Monteiro, SM Yentis
Magill Department of Anaesthesia, Chelsea and Westminster Hospital, London, UK

Introduction: Fatigue is a recognised occupational hazard in healthcare.1 Staff working in the labour ward (LW) are often faced with a stochastic workload, high physical and mental burdens, and tasks that require vigilance and swift decision-making. Fatigue may cause reduced alertness and failure of attention with significant implications for both patient and operator safety. We studied the effects of acute fatigue on members of the LW team after a 12.5-h night shift.

Methods: After R&D approval, REC exemption and informed consent, participants provided demographic data and recorded their pre and post-shift perceived state of alertness and fatigue using the Karolinska Sleepiness Scale (KSS, 1=extremely alert to 9=very sleepy) and the Sarn-Perelli Fatigue Scale (SPS, 1=fully alert to 7=completely exhausted). Cognitive testing was with a touch screen tablet using selected tests from the Cambridge Neuropsychological Test Automated Battery (CANTAB) and included Rapid Visual Information Processing, RVP (sustained attention), Attention Switching Task, AST (executive function), and Paired Associate Learning, PAL (visual/episodic memory). Participants also recorded their perceived workload intensity using the NASA-TLX Index tool (range 0-100).

Results: Five anaesthetists (ST3-7), two midwives and two obstetricians (ST4-7) participated in this study. Mean [range] age of participants was 34 [31-40] years. Mean ± SD [range] self-reported sleep was 36.3 ± 50.2 [0-150] min and rest 57.7 ± 67.7 [0-210] min. Pre- and post-shift sleepiness and fatigue are shown in the table. There was a positive correlation between the NASA TLX task load scores and the increase in SPS scores post-shift (P=0.017). There was a borderline statistically significant increase in AST Median Reaction Latency (median latency of response) (P=0.05) but no statistically significant change in other tested outcomes.

Table: Pre and post-shift sleepiness and fatigue

<table>
<thead>
<tr>
<th></th>
<th>Pre-shift</th>
<th>Post-shift</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSS</td>
<td>3.4 ± 1.3 [1-5]</td>
<td>6.7 ± 1.8 [3-9]</td>
<td>0.008</td>
</tr>
<tr>
<td>SPS</td>
<td>2.8 ± 1.4 [1-6]</td>
<td>5.3 ± 1.5 [2-7]</td>
<td>0.012</td>
</tr>
<tr>
<td>NASA Task load index score</td>
<td>-</td>
<td>47.8 ±25.7 [10.8-94.1]</td>
<td></td>
</tr>
</tbody>
</table>

Data are mean ± SD [range]

Discussion: Sleepiness and fatigue increased significantly after a 12.5 h night shift. Reaction time showed a borderline increase but no significant change was detected in memory or sustained attention. Higher workloads were associated with an increase in post-shift fatigue scores. These findings highlight the need to implement simple strategies such as napping during long work shifts which has demonstrated some evidence in improvement of cognitive performance.2

References
P49 Obstetric emergency training in a rural South African hospital: simple measures improve knowledge
RS Monteiro, P Letchworth, J Evans, M Anderson, S Duffy
Magill Department of Anaesthesia & Maternity Department, Chelsea and Westminster Hospital, London, UK

Introduction: The 6th Report on the Confidential Enquiries into Maternal Deaths in South Africa reported an institutional maternal mortality rate of 154 per 100 000 live births in 2011-2013. It concluded that a key contributor to preventable maternal deaths was substandard care related to knowledge and skill of health care providers (HCPs); it was recommended that obstetric skills and drills training should be performed regularly. We evaluated the effects of a structured multidisciplinary training course covering obstetric and neonatal emergencies on the knowledge of HCPs working in Madwaleni District Hospital, a 180 bedded hospital in the Eastern Cape, South Africa.

Methods: Over a one-week period in December 2015, a multidisciplinary team delivered two 2-day courses covering obstetric emergencies including massive haemorrhage, hypertensive emergencies and neonatal and basic life support. Teaching methods included lectures, workshops, skills teaching and simulation. Quantitative and qualitative feedback was sought through an evaluation survey and a pre- and post-course multiple choice questionnaire (MCQ). Two MCQ papers testing knowledge covered in the course were used; participants were randomly allocated to complete one test before the course, and the other after the course. Data were analysed with a two-tailed paired t-test.

Results: Twenty-eight midwives, nurses and support workers attended the courses. Full course evaluations (survey, pre- and post-course MCQs) were available for 21 participants. Content was rated as 4.64/5 and feedback was positive. There was a significant increase between pre- and post-course MCQ score (P<0.001) and mean score increased from 7.80/15 to 9.25/15 (Fig).

Figure: Mean (SD) MCQ scores pre- and post-course

Discussion: Using the Kirkpatrick four level model of evaluation of training effectiveness, the course led to positive feedback (level 1) and a significant improvement in knowledge demonstrated by test scores (level 2). Improvements in teamwork, confidence and motivation were apparent watching the simulated scenarios, suggesting a change in behaviour may occur (level 3). We believe further investment in HCP training is warranted, and may lead to the desired improvements in patient outcome (level 4).

References

P50 SAFE obstetrics course: education aimed at reducing maternal mortality in Zambia
EL Coley, R Colhoun*, P Bonnett*
Anaesthesia, University Teaching Hospital, Lusaka, Zambia, *Anaesthesia, Sheffield Hospitals NHS Trust, Sheffield, UK

Introduction: Maternal mortality in Zambia remains unacceptably high at 280 per 100 000 live births. Despite significant progress there is still work to be done to reduce maternal mortality in line with the World Health Organisation’s (WHO) Millennium Development Goals. The Lancet Commission on Global Surgery also highlighted the international lack of anaesthesia capacity. In an effort to reduce mortality and improved anaesthetic care through education, we have delivered the Lifebox and the AAGBI’s SAFE (Safe Anaesthesia From Education) obstetric anaesthesia courses to the majority of anaesthetic providers within Zambia.

Methods: Zambian and UK-based clinicians formed a joint faculty to deliver the courses. The one-day Lifebox course promotes the WHO surgical checklist and emphasises the importance of pulse oximeter monitoring. The three-day SAFE obstetric anaesthesia course aims to improve the safety of obstetric anaesthetic care provision and employs lectures, simulation and workshops to deliver teaching. Participants were asked to complete a pre-course and post-course multiple choice question (MCQ) test and a simulated scenario test. Pre and post-course test scores were analysed using paired students t-test for statistical significance.

Results: A total of 124 Zambian anaesthetic providers attended the combined LifeboxSAFE obstetrics anaesthesia courses over a period of two years; participants were a mixture of physicians and clinical officers (specialist nurses). Scores of all participants improved following education with statistically significant improvement in all test areas (P<0.001) (Fig).

Figure: Pre and post course scores

Discussion: We have demonstrated that the courses delivered are effective in improving skills and knowledge of the participants who attend. Our long-term aim is to establish a sustainable programme of SAFE anaesthetic courses, delivered by Zambian clinicians, to run on a twice-yearly basis. Funding for this has been secured from the Zambian Ministry of Health. It is hoped that widespread training amongst anaesthetic providers will help to reduce maternal mortality attributable to anaesthetic causes.

References
1. World Health Organisation.
P51 Using OAA-DAS guidelines to aid decision making following failed intubation at caesarean section

NA Muchatuta, R McKendry
Department of Anaesthesia, St Michael's Hospital, University Hospitals Bristol, Bristol, UK

Introduction: Failed intubation is reported to be higher in obstetrics than in the general population, and is complicated by the need to balance the safety of the mother against that of the fetus. When given an identical scenario of failed intubation during general anaesthetic caesarean section (GACS), obstetric anaesthetists can be split 50:50 by the decision whether to wake the patient up or proceed with the surgery. The 2015 OAA/DAS guidelines include a tool (Table 1) to help aid decision making after failed intubation during GACS. We wanted to assess how practicable these tools are.

Methods: Three scenarios of failed intubation during GACS were presented to anaesthetists who cover labour ward; they had to decide whether to wake the patient up or to proceed with the surgery for each one. They also completed a questionnaire to reveal how easy they found it to make the decision, and how confident they were that their decision was correct. They repeated this process for each scenario using the OAA/DAS tool, and also a simplified wake-vs-proceed visual analogue scale (VAS) tool that we devised which is based upon the OAA/DAS guidelines.

Results: Results are from 31 anaesthetists (ST3 to consultant).

Table: Scores on whether to proceed or wake up at failed intubation

|                           | No tool | VAS tool | OAA/DAS tool
|---------------------------|---------|----------|---------------
| Easy to make a decision   | 2.3 (57%) | 2.7 (53%) | 2.6 (52%)     |
| Confident the decision is correct | 2.9 (58%) | 3.0 (60%) | 3.0 (60%)     |
| Happy to use in real GACS | 3.4 (68%) | 3.5 (70%) | 4.0 (80%)     |

Data are mean score (%) on a 1-5 Likert scale.

47% and 50% of respondents changed their original decision to wake up or proceed in at least one scenario after using the VAS tool and the table respectively.

Discussion: Although many respondents found the OAA/DAS table and the VAS version useful in identifying factors that might influence the wake up vs proceed decision, their key concern was the lack of weighting given to each factor. Most (87%) cited quality of the airway as the main determinant of whether to proceed with surgery, followed by the degree of maternal compromise (74%), body mass index (48%) and fetal concerns (35%). Many respondents reported in the free text that the full OAA/DAS table would be difficult to follow in an emergency. Following this study, we are designing a new VAS version of the OAA/DAS table that begins with 'gateway' questions regarding quality of the airway and the maternal condition before considering other factors. We will compare this with the OAA/DAS table in simulated failed intubation following GACS.

References

P52 Keeping babies with mum in the ICU; a survey of practice in Scottish adult intensive care units

AL Capek, K Lake, K Litchfield, T Quasim
Anaesthetics, Glasgow Royal Infirmary, Glasgow, UK

Introduction: National guidance suggests that when providing critical care for obstetric patients it is "delivered equitably, always remembering the goal of keeping mother and baby together unless precluded by clinical indication." Having aimed to provide this standard for patients within our own unit we encountered differing opinion on its delivery and problems with responsibility of care for the baby. This project aims to find out current practice around Scotland with a view to drafting a policy within our own unit in line with this.

Methods: A telephone survey was conducted of thirteen Scottish intensive care units. The charge nurse on duty was asked the following: (1) Would you allow a neonate into ICU to visit an unwell mother? (2) Do you have a local policy on this? (3) Do you have any other thoughts on the matter?

Results: The response rate was 100%.

Table: Policies of Scottish intensive care units

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baby allowed into unit?</td>
<td>Unconditional - 3</td>
<td>Conditional - 10</td>
</tr>
<tr>
<td>Local policy?</td>
<td>0</td>
<td>13</td>
</tr>
</tbody>
</table>

Common themes from question 3 were: ICU nurses should have no responsibility for the baby; baby only allowed in if mother awake and stable; concerns surrounding infection risk to and from baby (though difficult to quantify); mothers should be nursed in a side-room to facilitate neonatal visits.

Discussion: Within Scottish ICUs it is common to keep babies with their mothers but this is done on a case by case basis driving inconsistency in practice locally and nationally. It is difficult to instigate hard and fast rules; but while risks to and from the neonate within adult ICU are unknown the benefits of keeping mother and baby together are well documented. We advocate a pragmatic but formalised policy, which encourages mother-baby contact within critical care wherever possible. Good practice points should include:

- baby to visit mother whenever she is awake and alert enough to interact with it or be aware of its presence
- mother to be nursed in a side-room wherever possible
- baby should always be accompanied in ICU by a midwife (if admitted) or a family member (if discharged)
- baby should not stay in ICU overnight
- in event of baby becoming unwell, on-call neonatologist should be contacted. ICU staff should take no responsibility for neonate
- if concern regarding infection to or from the neonate, on-call microbiology or neonatal staff should be contacted
- local unit arrangements should be made to promote breast-feeding support and safe storage of expressed milk
- ultimate decision to allow neonatal visit resides with consultant and nurse in charge of ICU

Reference
P53 Labour analgesia for patients under the age of 16: an OAA approved survey

SM May, Z Hussein, S Das, A Man
Department of Anaesthesia, North Middlesex University Hospital, London, UK

Introduction: In England and Wales, data from the Office for National Statistics show that there were 5421 conceptions under the age of 16 of which 2181 resulted in maternities in 2012.1 Considering that there are 151 obstetric led units in England, the frequency of an individual anaesthetist providing analgesia or even inserting an epidural in this age group of patient would be potentially very low. A literature review found no guidelines or evidence for labour analgesia in this age group. Our survey set out to determine the current clinical practice of labour analgesia for patients under the age of 16 and to ascertain whether obstetric units are set up to deal with the unique challenges these patients might present to the obstetric anaesthetist.

Methods: We conducted an OAA approved survey, sent electronically to 201 UK lead obstetric anaesthetists in February 2015. Questions examined the experience of offering different modes of analgesia and the service provision to labouring patients under the age of 16.

Results: The completed response rate for our survey was 65.2% (131/201). 100% of responders felt competent to insert an epidural for this age group. 91% lead anaesthetists said their unit did not have a local guideline for teenage labour analgesia and only 4% were aware if their midwives received training to manage labour analgesia for teenage pregnancy. 84.7% said labour analgesia offered should be the same as women over the age of 16.

Table: Number of epidurals inserted for labour analgesia in patients under the age of 16 in the last 12 months.

<table>
<thead>
<tr>
<th>Number epidurals inserted</th>
<th>Number of lead anaesthetists</th>
</tr>
</thead>
<tbody>
<tr>
<td>more than 10</td>
<td>0</td>
</tr>
<tr>
<td>6-10</td>
<td>2</td>
</tr>
<tr>
<td>1-5</td>
<td>30</td>
</tr>
<tr>
<td>none</td>
<td>65</td>
</tr>
<tr>
<td>do not know</td>
<td>33</td>
</tr>
</tbody>
</table>

Discussion: Despite low exposure to epidural insertion for this age group, all lead anaesthetists felt competent to insert an epidural. This would suggest that from a technical aspect for epidural insertion the opinion is that there is no difference between an adult and a pregnant teenager under the age of 16. However, pain relief in the under 16 population can potentially be complex due to multiple psychological and social factors. The majority of units did not have local guidelines to support these patients in labour. We suggest an area for improvement would be the development of guidelines and training for staff to better support this group of patients rather than defaulting to adult protocols.

References

P54 Management of failed spinal component of combined spinal-epidural anaesthesia: a national survey

S Soltanifar, N Green
Anaesthetic Department, Ashford and St Peter’s NHS Foundation Trust, Surrey, UK

Introduction: Combined spinal-epidural (CSE) is a widely used technique in obstetric anaesthesia. There is limited evidence to guide the management of failure of the spinal component, despite this being reported in up to 5% of cases.1

Methods: A 10-question online survey was sent to all 1556 UK members of the OAA to determine the scope of use of CSEs in obstetric practice and also to ascertain anaesthetic management of failure to obtain cerebrospinal fluid (CSF) during the spinal component.

Results: The survey received 711 responses, giving a response rate of 46%. Consultants made up 77% of respondents and of these 60% had in excess of 10 years experience in obstetric anaesthesia. The most popular indications for CSE were elective caesarean delivery (34%) and late labour analgesia (31%). A broad range of further indications including maternal, obstetric and surgical reasons were highlighted. The most popular technique was use of a dedicated needle-through-needle (NTN) CSE set with locking spinal needle (37%) followed by freehand NTN (32%) and then single shot spinal followed by separate epidural (19%). The most popular management options for failure to obtain CSF when the spinal needle was inserted were to abandon the spinal and site the epidural catheter only (31%), resite the Tuohy needle and retry the NTN spinal (27%), site epidural catheter and attempt single shot spinal at a caudal interspace (21%), abandon NTN attempt and site single shot spinal followed by epidural (8%). The majority (62%) of respondents indicated they would never consider siting a separate spinal cephalad to an in situ epidural catheter. Concern about damage to the epidural catheter was the most popular reason for this view. 99% of respondents had never seen an epidural catheter damaged by a spinal needle. Only 3.8% of respondents had a local policy for the management of failed spinal component of a CSE.

Discussion: The survey has highlighted that CSEs are widely used for a diverse range of indications in obstetric anaesthesia in the UK. The majority of respondents would not perform a separate spinal at a more cephalad interspace to an in situ epidural catheter due to the perceived risk of catheter damage. A recent study demonstrated that damage to the catheter by a spinal needle should not be possible.2 We propose that a cephalad separate spinal may be a valid management strategy for failure to obtain CSF during the spinal component of CSE and that local guidelines should exist to guide management of this common occurrence.

References
P55 OAA survey of partners in theatres
C Watts, S Al-Rawi, P Mackie, R Lewis
Shackleton Department of Anaesthesia, University Hospital Southampton NHSFT, Southampton, UK

Introduction: The presence of a partner in theatre has been shown to be beneficial to both patient and partner.1 However, it has also been shown that partner anxiety is high during a caesarean section (CS). The OAA / AAGBI joint guidance for provision of obstetric services published in June 2013 acknowledges that most units in the UK allow partners into the operating theatre for CS; it does not specify when during the operation partners are invited into theatre and in our experience this can vary between units. The guidance suggests standards of practice which includes local written guidelines; staff identified to look after the partner in theatre and the provision of information to partners.2

Methods: An OAA approved electronic survey was sent to all obstetric leads in the UK. One reminder was sent and data collection was locked at the end of the collection period.

Results: A response rate of 73% from a wide range of units was received. All units allowed partners in for regional anaesthesia, with the majority of these being before commencing regional anaesthesia. A small number of units allowed partners to be present when providing general anaesthesia. The large majority of units did not have a local written guideline, a leaflet for the patient’s partner or a member of staff formally identified to look after the partner.

Discussion: Increased partner anxiety during CS has been reported in partners not present during neuraxial anaesthesia.3 This survey shows that formal arrangements to facilitate the presence of a partner during anaesthesia are rare. It seems increasingly common to allow partners into theatre before establishing regional anaesthesia; however, much concern was expressed from units that do not allow this regarding problems that could occur. Common benefits expressed included reduced anxiety for both mother and partner, improved communication and bonding. Most frequent risks identified were staff distraction, dестerilisation of equipment and partners fainting.

References

P56 Oral intake in labour: a survey of departmental guidelines
AD Combeer, EL Combeer*
Department of Anaesthesia, Epsom & St Helier University Hospitals NHS Trust, Carshalton, UK. *Department of Anaesthesia, Frimley Health NHS Foundation Trust, Frimley, UK

Introduction: NICE guidance states women may drink during labour and eat a light diet “unless they have received opioids or they develop risk factors that make a general anaesthetic more likely”,1 but does not state what these potential risk factors are. A Cochrane review supports this stance but none of the included studies addressed high-risk parturients. Obstetric units have therefore developed their own guidelines with great variation in content.2 This OAA-approved national survey of such guidelines sought to highlight this variation and to determine whether there is any consensus on what constitutes a risk factor for general anaesthesia.

Methods: An OAA-approved survey was sent electronically in September 2014 to all lead obstetric anaesthetists. Identification of possible risk factors for anaesthesia was made from previously published audit data.3

Results: 205 questionnaires were successfully sent with a response rate of 53.7%. 83.3% of units had guidelines on oral intake in labour. NICE guidance for low-risk women was followed in only 62%. 43% of units did not follow NICE guidance for women who had received opioids. Oral intake for women at higher risk of obstetric surgical intervention showed variation with many units appearing not to specify certain high-risk groups. There was little consensus regarding obesity and oral intake: almost half of units do not identify body mass index as a risk factor in their guidance (Table).

Table: BMI at which oral intake is restricted
<table>
<thead>
<tr>
<th>BMI cut off (kg/m2)</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>Other</th>
<th>No restriction</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of units</td>
<td>2</td>
<td>12</td>
<td>23</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>44</td>
</tr>
</tbody>
</table>

Discussion: This survey shows a lack of clear national guidance on what constitutes high risk for anaesthesia in labour, poor application of NICE guidance regarding low-risk parturients, with wide local variation concerning when oral intake should be restricted, what would trigger such restriction and the extent of that restriction. Further discussion with national, multidisciplinary consensus should be encouraged.

References
P57 Rapid sequence induction for caesarean section: a survey of practice
NA Stewart, M Pachucki†, H Davies†, L Herbert†, N Kellie†, H Parker†, S Muddle
Anaesthetics, Gloucestershire Royal Hospital, Gloucester, UK; †Anaesthetics, Cheltenham Hospital, Cheltenham, UK;
Anaesthetics, Severn Anaesthetic Deanery, UK
Introduction: The OAA and DAS have published the first national guidelines for the management of difficult and failed tracheal intubation in obstetrics.¹-² We assessed current obstetric anaesthetic practice in relation to the new guidelines.
Methods: In November 2015 we distributed questionnaires to anaesthetists with regular obstetric anaesthesia commitments in six hospitals with maternity units in our deanery. We asked about individual practice of performing rapid sequence induction (RSI), in particular drugs and equipment used, pre-oxygenation, wake up, communication with team members and standard operating procedures (SOP) in each institution.
Results: 108 responses were received from 154 questionnaires (70% response rate). In our region, propofol is the preferred choice (68%) for obstetric RSI, with thiopental used as the alternative. 89% of respondents use suxamethonium for muscle relaxation, but 77% said they would use rocuronium in place of suxamethonium, if available. Interestingly, only 26% have sugammadex ready when using rocuronium. Of the 63% that use an opioid during induction, 24% use alfentanil, 31% use fentanyl and 8% only in the case of preeclampsia. A large majority, (94%) routinely administer sodium citrate before an RSI. Following a failed tracheal intubation, 44% wake a woman up in the supine head up position. Only half of the respondents knew if there was a SOP for obstetric RSI available in their institution. The remaining questions were:
Table: Responses to obstetric RSI questionnaire

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you routinely vocalise plans a,b,c and if ‘wake up’ is an option to your assistant/team?</td>
<td>47%</td>
</tr>
<tr>
<td>Would you routinely use a video laryngoscope as your first choice for a rapid sequence induction in obstetrics?</td>
<td>34%</td>
</tr>
<tr>
<td>Would you be happy to use face mask ventilation during a rapid sequence induction in obstetrics?</td>
<td>69%</td>
</tr>
<tr>
<td>Have you ever used nasal cannula for a rapid sequence induction (on top of pre-oxygenation via face mask) to maintain bulk oxygen flow during attempted intubation?</td>
<td>21%</td>
</tr>
</tbody>
</table>

Discussion: Clinical guidelines can take up to three years to be implemented.³ Our results show there are institutional (availability of new equipment and drugs) and personal barriers (awareness and acceptance) to change. Less than 50% routinely vocalise their airway plan to team members, and even less are prepared to use video laryngoscopy as their first choice during intubation. It would be interesting to see if practice changes in light of the recently published guidelines.

References

P58 Survey of CTG interpretation and training amongst obstetric anaesthetists
S Jafari, K Du, E Evans
Anaesthesia, St George's Hospital, London, UK
Introduction: A cardiotocograph (CTG) records fetal heart rate (FHR) either measured from a transducer on the abdomen or a probe on the fetal scalp. Possible effects of regional blockade during labour on the fetus which can be detected by CTG have been described.¹ It is essential that anaesthetists have adequate knowledge of intrapartum fetal assessment in order to comply with the Royal College of Anaesthetists guidance on competency-based training requirements.² There is currently no standardised CTG training module or methodology available for anaesthetists. This survey aimed to explore the level of knowledge and to quantify the extent of CTG training amongst OAA members.
Methods: We conducted an OAA approved, national survey, sent electronically to 1722 OAA members. Questions examined how confident respondents were in interpreting CTG, whether they had seen regional block affecting CTG in their clinical practice, and what training, if any, in analysing CTGs they had received. Respondents were also asked to give feedback on which training modalities might best address any deficits in knowledge.
Results: 692 responses were received (40.2% response rate). The majority of respondents were consultants (74.8%). 89.4% of respondents agreed that obstetric anaesthetists should have basic knowledge to interpret CTG but only 57% had any confidence in basic CTG analysis. 55.6% of respondents had undergone training sessions on how to analyse CTG. Of the 44.4% who had not received training, 77.1% would like to be trained. The sort of training felt to be most valuable in clinical practice was during rounds (31%), lectures (26.9%) and courses (23.2%).
Discussion: Most anaesthetists commented that basic knowledge of CTG is essential to allow an understanding of urgency of caesarean sections, crisis management, prioritisation of workload and aid communication between labour ward teams. While obstetricians always maintain the primary responsibility for making clinical decisions based on CTG abnormalities in obstetric emergencies, it is essential that we understand the obstetric context of our anaesthetic practice. Our survey respondents suggested an OAA approved e-learning module would be an innovative learning tool but the value of integrated learning with obstetricians and midwives during clinical work on the delivery suite cannot be underestimated. As the role of anaesthetists expands into the realms of perioperative medicine, obstetrics cannot lag too far behind.

References
P59 Survey on consent and counselling following blood transfusion under general anaesthesia in obstetrics
P Stevens, R Swanton
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Introduction: Whilst blood transfusion in the UK is generally safe and often life-saving we suspected that across the country patients who receive a blood transfusion under general anaesthetic may not always be told they have received a transfusion and may receive little in the way of information or counselling afterwards. We hoped to identify current practice regarding consent for blood transfusion both pre- and postoperatively. Recent court cases have emphasised patients' right to information regarding both their treatment and treatment options¹ and there are guidelines stating "patients transfused when it is not possible to obtain prior consent should be provided with information retrospectively."²

Methods: A survey was created, approved by the OAA and distributed electronically to 205 Lead Obstetric Anaesthetists in UK units via the OAA survey system.

Results: 111 completed responses were obtained (54% response rate). 66% of respondents worked in a unit with a policy regarding consenting of patients for blood transfusion. Although 74% of respondents felt that all patients undergoing caesarean section should be consented for the possibility of blood transfusion only 39% believed this actually occurred in their unit. Only 11% of units had a policy regarding counselling a woman that she may not donate blood in the future and only 12% had a policy for counselling a mother regarding the risks and benefits of a transfusion received under general anaesthesia. 77% indicated that they would like to have access to an information sheet that could be given to patients who had received a blood transfusion under general anaesthesia explaining what had happened, that they could no longer donate blood and the associated risks and benefits of that transfusion.

Discussion: Given the current emphasis on giving patients sufficient information to allow them to be fully informed about their treatment and alternative treatment options we were surprised that only 74% of respondents felt patients undergoing caesarean section should be consented for the possibility of blood transfusion and that in practise this occurred in only 39% of cases. Very few respondents had a policy for counselling women regarding blood transfusion following general anaesthesia and many felt an information sheet for this would be helpful. One respondent informed us that an information sheet does exist³ but we suspect it is not widely known. We believe there is a need for an information sheet specifically relating to blood transfusion in obstetrics that could be given to mothers.

References
2. Joint UK Blood Transfusion and Tissue Transplantation Services Professional Advisory Committee Transfusion Handbook Ch4.4
3. NHS Blood and Transplant. Information for patients who have received an unexpected blood transfusion. http://hospital.blood.co.uk/media/2379/a6cc8e12-34b6-4494-baad-03fa381bb1e4.pdf

P60 The impact of NAP5 on obstetric anaesthesia: an OAA approved UK survey
SD Patel, M Columb*, Y Liu†, R Fernando
Anaesthetics, University College London Hospital, London, UK, †Anaesthetics, University Hospital of South Manchester, Manchester, UK, *Anaesthetics, Luton and Dunstable University Hospital, Luton, UK

Introduction: The findings of the 5th National Audit Project (NAP5) investigating accidental awareness under general anaesthesia (AAGA) have recently been released.¹ Obstetrics was the most markedly over-represented surgical specialty, with the incidence of AAGA found to be 1:670 when general anaesthesia was used for caesarean section. The aim of this survey was to evaluate the impact of NAP5 findings on obstetric general anaesthesia practice.

Methods: Following OAA audit committee approval, all 1372 UK consultant members were invited to complete an electronic survey using the OAA online submission system. Questions explored obstetric general anaesthesia practice before and after the release of NAP5, and examined if recommendations were being implemented into routine clinical practice. Results were analysed using difference in proportions with 95% confidence intervals and exact two-sided mid-P values; P<0.05 was regarded as statistically significant.

Results: There were 540 responses (39.4% response rate). Key findings are summarised in the table. Following the NAP5 findings, 15% of respondents would increase the dose of induction agent used in obstetrics to reduce risk of AAGA. Nineteen percent would now increase the minimum alveolar concentration (MAC) of volatileused during caesarean section, with most of these respondents (63%) aiming to achieve this between induction of anaesthesia and delivery. Approximately two-thirds (65%) of respondents now implement a strategy to reduce the risk of latent drug errors, the most common being to keep induction agents and antibiotics in separate locations.

Table: Impact of NAP5 on obstetric general anaesthesia

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Before NAP5 (%)</th>
<th>After NAP5 (%)</th>
<th>Difference</th>
<th>Exact mid-P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thiopentone as induction agent</td>
<td>89</td>
<td>73</td>
<td>-16 [-21 to -11]</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Propofol as induction agent</td>
<td>11</td>
<td>27</td>
<td>16 [11 to 21]</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Incorporation of opioid at induction</td>
<td>20</td>
<td>30</td>
<td>10 [6 to 16]</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Preparation of an extra syringe of IV induction agent in the event of airway difficulty</td>
<td>19</td>
<td>37</td>
<td>18 [12 to 23]</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Use of depth of anaesthesia monitor routinely</td>
<td>1</td>
<td>11</td>
<td>9 [7 to 12]</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Inclusion of AAGA always as part of consent</td>
<td>17</td>
<td>29</td>
<td>11 [6 to 16]</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Discussion: Our results show that obstetric general anaesthesia practice is evolving following the release of NAP5. Traditional techniques are being superseded by those previously considered controversial, most notably the use of propofol and opioids at induction. It is encouraging that recommendations from NAP5 are being implemented, however, the clinical impact for both mother and foetus has yet to be determined.

Reference
P61 Uptake of influenza vaccination by labour ward staff

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*School of Public Health, University of Sydney, Australia

Introduction: Uptake of influenza vaccination by NHS staff is poor, prompting debate into whether vaccination should be mandatory. As parturients are high-risk for influenza, we investigated vaccination uptake by labour ward staff together with their experiences and views.

Methods: With R&D approval and REC exemption, we gave questionnaires to anaesthetists and operating department practitioners (ODP) covering labour ward, obstetricians and midwives (20 per group) and recorded uptake of influenza vaccination, experiences of external pressure, and views on mandatory vaccination. Data were compared with Fisher’s exact, Kruskal-Wallis and Mann-Whitney U-tests.

Results: Respective mean±SD age (years since qualifying) were: anaesthetists 37.3±6.6 (13.0±7.0); ODPs 41.4±11.8 (12.3±12.2); obstetricians 36.4±8.4 (12.1±8.6); midwives 32.2±9.0 (7.5±8.5). All midwives and 50-65% of others were female. Vaccination rates were: anaesthetists 45%; ODPs 35%; midwives 50%; obstetricians 70% (P>0.05). The Figure shows experiences of external pressure to take the vaccine. Median (IQR [range]) scores for the statement "I support mandatory influenza vaccination" were: anaesthetists 4 (0-6.3 [0-10]); ODPs 4 (2.8-8.0); obstetricians 8 (5-8.0-10); and midwives 7.5 (4.3-9.0 [0-10]) (P=0.006 for anaesthetists/ODPs vs obstetricians/midwives).

Discussion: We found higher vaccination rates in obstetricians than other groups (though P>0.05). There was considerable vaccination pressure on staff, mostly from the Trust; midwives consistently felt this most (though P>0.05). Obstetricians/midwives supported mandatory influenza vaccination more than anaesthetists/ODPs, though with polarisation of views on both sides. Overall, one might expect staff based primarily in maternity care to be more aware of the risks of influenza in this group than those covering other areas. Arguments for and against mandatory vaccination continue to rage; we found that vaccination uptake in the groups studied remained below the current 75% NHS target.1

Reference

P62 Development of a labour ward teaching programme for the use of ultrasound for central neuraxial blockade

B Bellew, P Kamath, S Nizar, V Sodhi
Department of Anaesthesia, Queen Charlotte’s and Chelsea Hospital, London, UK

Introduction: Ultrasound (US) is a useful clinical and teaching tool when performing lumbar central neuraxial blockade (CNB). It provides useful information such as depth to the epidural space, intervertebral level and location of the midline and can be invaluable for technically challenging cases, for example patients with obesity or scoliosis. A recent systematic review concluded that there is robust evidence supporting the role of neuraxial ultrasound in improving the precision and efficacy of neuraxial anaesthetic techniques.1 After implementing a local teaching programme for anaesthetists with little or no experience with US for CNB, we conducted a service evaluation study to determine its usefulness for patients undergoing elective caesarean section (CS).

Methods: After obtaining trust audit committee approval, patients for elective CS underwent an US before CNB by newly trained anaesthetists with US for CNB. The depth to the epidural space via paramedian and midline approaches, actual needle depth to the epidural space and number of needle passes were recorded. Before scanning patients, anaesthetists with little or no experience with US for CNB were given a small group workshop tutorial in ultrasound with the use of a model lumbar spine delivered by an expert within the department, followed by self-directed learning.2,3 Afterwards, they performed three US scans each for CNB supervised by an expert before scanning patients independently. All anaesthetists were able to perform US for CNB independently within two weeks.

Results: Forty-two patients had an US scan performed by nine newly trained anaesthetists. Mean (± standard deviation) body mass index of the patients was 27 ± 7.37 kg/m². All epidurals were performed via the midline approach. The mean difference in depth to the epidural space between the midline approach via scan and actual needle depth was 0.39 ± 0.29 cm. The mean difference in depth to the epidural space between the paramedian approach via scan and actual needle depth was 0.28 ± 0.2 cm. The epidural space was obtained at first attempt in 39 out of 42 (92.9%) patients.

Discussion: Our results are comparable to that reported in a recent systematic review. In the review, thirteen studies reported an excellent correlation between measured ultrasound depth and needle insertion depth to the epidural space. The mean difference between the two measurements was 0.3 cm or less.1 Implementation of a local teaching programme involving focused learning with expert supervision can develop competence and confidence in the use of US for CNB within a short timeframe. We suggest that routine use of US for CNB is feasible.

References
3. USRA. http://www.usra.ca/vspine.php
P63 Flow characteristics of Luer/non-Luer spinal needles

RS Monteiro, A Filiai*, SW Choi†, D Bogod*, SM Yentis
Magill Department of Anaesthesia, Chelsea and Westminster Hospital, London, UK, *Department of Anaesthesia, Nottingham University Hospitals, Nottingham, UK, †Department of Anaesthesiology, University of Hong Kong, Hong Kong

Introduction: Previous work has shown a variation in the time to first appearance of cerebrospinal fluid (CSF) in the hub between manufacturers of non-Luer spinal needles. No study has looked at the differences in CSF flow between Luer and non-Luer needles of the same manufacturer. We sought to assess this in 25-gauge and 27-gauge spinal needles.

Methods: Fluid of a similar composition to CSF was synthesised and pressurised to 35 cmH₂O to simulate opening pressure in the sitting position. A spinal needle was introduced through a self-sealing bung, and the time to first appearance of CSF in the hub measured using a stopwatch and video recorder with freeze-frame. This was performed using 25-gauge and 27-gauge Luer and non-Luer needles from four commonly used manufacturers (Vygon, B Braun, Pajunk (Surety hubs) BD (Univia hub)), 90 mm and 120 mm long, resulting in comparison between 14 Luer and non-Luer needles in total (B Braun 25-gauge 120mm and BD 27-gauge 120 mm needles unavailable). This was repeated eight times for each needle type in a random order. Luer and non-Luer needles from each manufacturer were compared using an unpaired t-test.

Results: Seven of the 14 needle types showed no significant difference in time to first appearance of CSF between the Luer and non-Luer version. The Table shows the needles that had a significant difference in time to first appearance of CSF between the Luer and non-Luer version.

Table: Time (seconds) to first CSF for Luer and non-Luer spinal needles

<table>
<thead>
<tr>
<th>Needle</th>
<th>Luer</th>
<th>Non-Luer</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>25G 90mm B Braun</td>
<td>0.56 (0.23)</td>
<td>0.22 (0.17)</td>
<td>0.0046</td>
</tr>
<tr>
<td>25G 120mm BD</td>
<td>0.97 (0.24)</td>
<td>1.30 (0.27)</td>
<td>0.025</td>
</tr>
<tr>
<td>27G 90mm Vygon</td>
<td>1.05 (0.17)</td>
<td>1.52 (0.34)</td>
<td>0.038</td>
</tr>
<tr>
<td>27G 90mm B Braun</td>
<td>2.34 (0.18)</td>
<td>0.43 (0.25)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>27G 90mm Pajunk</td>
<td>0.79 (0.14)</td>
<td>1.50 (0.41)</td>
<td>0.004</td>
</tr>
<tr>
<td>27G 120mm B Braun</td>
<td>3.14 (0.72)</td>
<td>0.99 (0.26)</td>
<td>0.001</td>
</tr>
<tr>
<td>27G 120mm Pajunk</td>
<td>1.65 (0.72)</td>
<td>2.99 (0.71)</td>
<td>0.0021</td>
</tr>
</tbody>
</table>

Discussion: Changing from the Luer to non-Luer versions of spinal needles may have differences beyond the hub design and connection. In particular, the time to first appearance of CSF significantly increased in four of the above needles; this could lead to failure to recognise location of the subarachnoid space if the delay is not anticipated.

Reference

P64 GlideScope® video laryngoscopy is better than direct laryngoscopy in a simulated difficult obstetric airway

A Kurvey, V Betharia, G McNamara, A Bewlay, M Pimblett*, K Scullion*
Anaesthetics, Lancashire Teaching Hospitals NHS Foundation Trust, Preston, UK, *Lancashire Simulation Centre, Lancashire Teaching Hospitals NHS Foundation Trust, Preston, UK

Introduction: General anaesthesia in obstetrics can be challenging with a failed intubation rate of 1 in 300, as opposed to 1 in 1000 in the non-obstetric population. The new OAA/DAS guidelines recommend use of an alternative laryngoscope in case of difficult intubation. The purpose of our study was to compare the GlideScope® video laryngoscope (GVL) against direct laryngoscopy (DL) with regards to time taken and success rate for intubation in simulated easy and difficult airways.

Methods: We conducted a prospective cross over study in a University Teaching Hospital. The Laerdal Simman essential, a high fidelity simulator manikin, was modified to represent a full-term pregnant woman. Two airway scenarios were created, an easy airway (Grade 1) and a difficult airway (Grade 3). Participants were sequentially asked to intubate with a standard Macintosh laryngoscope and GVL, making a total of four scenarios per participant. A computerised software programme was used to calculate the time taken to intubate and number of intubation attempts. Time to intubate was calculated as time the face mask was taken off until the first confirmed ventilated breath. After two unsuccessful attempts, the intubation was declared as failed.

Results: In total 30 anaesthetists participated in this study comprising of consultants (21%), specialty trainees (ST-3) (43%) and core trainees (CT1-2) (17%).

Table: Comparison of GlideScope with direct laryngoscopy

<table>
<thead>
<tr>
<th></th>
<th>GLS</th>
<th>DL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 1</td>
<td>n=30</td>
<td>n=30</td>
</tr>
<tr>
<td>Time to intubate (s)</td>
<td>32.2 (18.4-44.2)</td>
<td>35.1 (25.5-47.3)</td>
</tr>
<tr>
<td>Grade 3</td>
<td>n=30</td>
<td>n=30</td>
</tr>
<tr>
<td>Time to intubate (s)</td>
<td>29 (66.7%)</td>
<td>29 (96.7%)</td>
</tr>
</tbody>
</table>

Discussion: GVL proved to be significantly quicker with a much higher success rate for difficult airway (Grade 3). Median time to intubate with GVL was 33 seconds as opposed to 40 seconds with DL. But more importantly successful intubation was achieved in only 66% of the cases with DL, as against 97% with GVL. In view of these results and in keeping with the new OAA/DAS guidelines, we advocate use of GVL as the choice of laryngoscope for difficult obstetric airway. We recommend that all anaesthetists covering obstetrics must be familiar with using GVL and all obstetric units must have a GVL available for use in cases of difficult airway.

Reference
P65 Impact of changing from 16- to 18-gauge Tuohy needles for labour analgesia in a large district general hospital

D Helme, A Roberts, J Stevens, P Richardson, E Morgan  
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Introduction: There is compelling evidence that the use of narrow-gauge epidural needles reduces the risk or severity of post-dural puncture headache (PDPH) and requirement for epidural blood patch (EBP).1,2 Our department opted to change from using 16- to 18-gauge Tuohy needles for labour analgesia in February 2014. We present the impact this transition.

Methods: At the time of transition, a new accidental dural puncture (ADP) and PDPH data collection folder was introduced, along with more stringent follow-up procedures. This folder and the local obstetric anaesthesia logbook and database were prospectively reviewed over a 20-month period from February 2014 to October 2015 (18-gauge group) and outcomes compared with retrospective data of equivalent duration (16-gauge group) from the database. ADP and PDPH rates, time to initial presentation of headache and the requirement for first and subsequent EBP were analysed. All patients who suffered ADP with an 18-gauge needle had daily inpatient review, telephonic review post discharge and were offered follow-up in clinic at six weeks post delivery.

Results: All patients suffering ADP with an 18-gauge Tuohy needle were symptom-free at 6 week follow up.

Table: Comparison of 16- and 18 gauge Tuohy needles

<table>
<thead>
<tr>
<th></th>
<th>16-gauge group (n=1433)</th>
<th>18-gauge group (n=1413)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADP</td>
<td>28 (2%)</td>
<td>28 (2%)</td>
<td>0.9</td>
</tr>
<tr>
<td>PDPH</td>
<td>17/28 (61%)</td>
<td>20/28 (71%)</td>
<td>0.7</td>
</tr>
<tr>
<td>Time to headache</td>
<td>70 [56-82]</td>
<td>86 [84-120]</td>
<td>0.011</td>
</tr>
<tr>
<td>Required EBP</td>
<td>13/28 (46%)</td>
<td>15/28 (54%)</td>
<td>0.8</td>
</tr>
<tr>
<td>Required 2nd EBP</td>
<td>6/13 (46%)</td>
<td>0/15 (0)</td>
<td>0.005</td>
</tr>
</tbody>
</table>

Data are number (%) or median [IQR].

Discussion: Introducing new equipment for provision of neuraxial labour analgesia did not result in an increased rate of ADP. Conversely, there was no reduction in ADP or PDPH rate or in requirement for EBP as seen in previous studies.1,3 However, consistent with Russell3, we have demonstrated a clear reduction in PDPH morbidity, with successful resolution of symptoms after single EBP in all cases. We also found that time to PDPH presentation was significantly longer in women with an 18-gauge compared to a 16-gauge needle, possibly representing slower or reduced leak of cerebrospinal fluid that may be more amenable to curative treatment with a single EBP. Changing from 16-gauge to 18-gauge Tuohy needles for labour analgesia has led to a reduction in morbidity associated with accidental dural puncture in our unit.

References
1. Sadashiviah J, McLure H. 18-G Tuohy needle can reduce the incidence of severe post dural puncture headache; Anaesthesia; 2009; 64; 1379–80
2. OAA. NOAD reports 1999: P76, 80, 120: Headaches. http://www.ooa-anaes.ac.uk/ui/content/content.aspx?id=97
3. Russell IF. A prospective controlled study of continuous spinal analgesia versus repeat epidural analgesia after accidental dural puncture in labour; Int J Obstet Anesth; 2012; 21; 7-16

P66 Inadvertent perioperative hypothermia in obstetric theatres: a complete audit cycle

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Introduction: Hypothermia is defined as a core temperature of below 36°C and is a common perioperative complication. NICE issued guidelines on the prevention of perioperative hypothermia, however these exclude obstetrics.1 The Inditherm warming mattress was reviewed by NICE who concluded it was an effective intervention for patients at risk of perioperative hypothermia.2 Following the introduction of the Inditherm in our obstetric theatres, we wanted to re-audit perioperative warming against NICE guidelines.

Methods: Following local audit registration a prospective audit of digitally collected data for all obstetric cases was conducted in our tertiary obstetric centre. Details of demographics, perioperative warming methods and temperatures were collected. The results from this audit were compared to three previous audits over the past four years, where no active warming (2011), forced air warming (FAW) (2012) and Inditherm (2013) were used, completing an audit cycle. Data analysis was conducted using SPSS Statistics.

Results: Data were collected for 231 cases done in the one-month audit period. The demographics of the four audits were comparable. Active warming was used in 90.5% of patients (Inditherm in 87.4% and FAW in 5.6%). Fluids were warmed by enflow in 6.1% and warming cabinet in 95.7% of patients. The odds of a hypothermic event in the elective caesarean sections (n=58) was significantly higher; over three times that in the emergency caesarean cases (n=106), OR 3.7, P<0.001. Of those that became hypothermic 7.8% received FAW, 13.4% were discharged from recovery hypothermic.

Figure: Percentage of hypothermic postoperative patients

Discussion: Despite the use of active warming in 90.5% of patients, hypothermia rates were higher than in the two previous audits but have improved since audit 2011 where no active warming was used. Rates of perioperative hypothermia need to improve and we are considering introducing the enflow inline fluid warming system in all patients, and then re-auditing.

References
P67 LockIt Plus reduces the rate of failed epidural analgesia and increases maternal satisfaction
S Bampoe, PM Odor, C Johnston, E Evans
Department of Obstetric Anaesthesia, St. George's Hospital, London, UK

Introduction: Epidural analgesia is an effective method of pain relief in labour. Migration of the epidural catheter out of the epidural space is a cause of failure of analgesia and catheters are secured using different methods in order to prevent this. Following the results of a randomised trial1 conducted by our research group which showed the superiority of the LockIt Plus device in preventing catheter migration, we initiated a quality improvement program designed to validate and translate the results of this trial into clinical practice, with the intention of reducing the rate of epidural re-site and improving maternal satisfaction.

Methods: The LockIt Plus device was introduced in three phases, each lasting three months. During PDSC Cycle 1, Tegaderm dressings were exclusively used to secure catheters and baseline measurements were recorded. A departmental presentation was given explaining the research results and putative benefits of LockIt Plus application. Contemporaneously, anaesthetists were provided with sample devices to familiarise themselves with their use. During PDSC Cycle 2, a constant stock of devices was placed on the epidural trolley to encourage anaesthetists to use the new device. Uptake was very good amongst anaesthetists but not universal. Following discussions with the manufacturers of our epidural packs, the LockIt Plus was inserted directly into the sterile packs in order to further encourage usage during PDSC Cycle 3. Following each PDSC cycle, we analysed a database of prospectively collected epidural related data including the total number of epidurals performed, the total number of re-sites and also maternal satisfaction scores.

Results: 1260 epidurals were performed during the project period. 467 were performed during PDSC cycle 1, with 31 epidurals re-sited giving a baseline re-site proportion of 7.11% with 74.4% of mothers describing their epidural as “excellent” on a three-point scale of excellent, satisfactory or unsatisfactory. During PDSC Cycle 2, 390 procedures were performed with 15 re-sites giving a re-site proportion of 4.0%, with 75.5% of mothers describing their epidural as “excellent”. In PDSC cycle 3, 403 epidurals were performed with 14 re-sites, resulting in a re-site proportion of 3.5%, with 77.8% of mothers describing their epidural as “excellent”. The reduction in re-site proportion from 7.11% to 3.5% during the project period represents a 49% reduction in re-site rate following the introduction of the Lock-It Plus to the labour ward.

Discussion: LockIt Plus has been shown to reduce catheter migration when compared to other commonly used catheter fixation methods. Using quality improvement methodology we were able to translate the reduction in catheter migration with the LockIt Plus, as shown in our group’s randomised trial, into a clinically significant reduction of failed epidural analgesia as measured by epidural re-site proportion. This reduction correlated with increased maternal satisfaction following the introduction of LockIt Plus into routine clinical practice.

Reference

P68 Minimal benefit of cell salvage with estimated blood loss of less than one litre at caesarean section: a service evaluation in a tertiary centre
S Yeung, V Karthikeyan, I Wrench
Anaesthesia, Jessop Wing, Royal Hallamshire Hospital, Sheffield, UK

Introduction: The use of cell saver blood has been accepted in many specialties, such as cardiac surgery.2 Its use and subsequent benefit in obstetrics is being investigated. We have reviewed the use of salvaged blood in our centre to establish whether cell salvage is beneficial in obstetric surgery. In particular, we focused on the volume of salvaged blood returned and the potential difference to postoperative haemoglobin (Hb).

Methods: We reviewed data from 241 patients for whom the cell saver was set up between April 2014 and February 2015 during obstetric surgery. The patient’s estimated blood loss (EBL), volume of cell saver blood returned, preoperative Hb and day 1 postoperative Hb were collected. Seventy-one patients did not have an estimated blood loss recorded and were not included in this service evaluation. The remaining 170 patients were divided into 4 groups by EBL: <1 L with salvaged blood returned; <1 L without salvaged blood returned; 1-3 L; and >5 L. Cell saver blood was returned to 102 patients.

Results: Data from 170 patients were analysed, and the results are shown in the table.

Table: Blood loss, transfusion and haemoglobin

<table>
<thead>
<tr>
<th>Blood loss (L)</th>
<th>n Transfused</th>
<th>Blood returned (mL)</th>
<th>Preop Hb (g/L)</th>
<th>Postop Hb (g/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1*</td>
<td>68</td>
<td>4</td>
<td>0</td>
<td>116 (11)</td>
</tr>
<tr>
<td>&lt;1**</td>
<td>46</td>
<td>6</td>
<td>261 (93)</td>
<td>114 (14)</td>
</tr>
<tr>
<td>1-3</td>
<td>51</td>
<td>6</td>
<td>369 (166)</td>
<td>113 (14)</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>5</td>
<td>499 (382)</td>
<td>110 (12)</td>
</tr>
</tbody>
</table>

Data are mean and (SD). *No salvaged blood returned. **Salvaged blood returned

Discussion: Those with an EBL <1 L who received salvaged blood had no or minimal change in Hb compared to those who did not. The average blood volume in a term parturient is 7 L,2 so that 260 mL of salvaged blood, with a haematocrit of approximately 50%, would elevate Hb by no more than 5 g/L. This contribution becomes more significant with larger blood loss. The benefits of salvaged blood, in surgery where significant blood loss is expected, may not apply to parturients with <1 L blood loss who are not anaemic. However, the regular use of cell saver technology in our obstetric unit remains crucial in keeping the team up-to-date with the skills required. Further studies evaluating the cost-effectiveness of cell salvage in obstetrics are warranted.

References
P69 Pre-puncture ultrasound imaging of the lumbar region in elective caesarean section cases
K Suri Mohanram, M Tennant, S Pokhrel
Anaesthetics, James Cook University Hospital, Middlesbrough, UK

Introduction: Ultrasound (US) imaging of the back before spinal or epidural techniques has been associated with better success rate and better patient satisfaction. The aim of this project was to pilot US scanning in elective caesarean sections in order to improve quality and safety of regional anaesthesia in pregnant patients. This was the introduction phase of US technique in obstetric anaesthesia in our unit.

Methods: We scanned the backs of 20 women scheduled for elective caesarean section. Once we positioned the patient for spinal anaesthesia, we scanned their back by placing the probe longitudinally to identify the sacral-lumbar junction, the widest inter-lumbar space and the depth of the dura from skin. Then we rotated the probe to the transverse plane at the widest space to identify the midline and again the depth of dura from skin. Finally we marked the skin overlying the optimal site for needle insertion with the end of a sterile needle sheath.

Results: All our performers except one had attended formal US course. Average time taken to scan was 4.6 min. There was no technical difficulty in viewing the anatomical structures or marking the puncture point. In all cases except one, spinal anaesthesia was performed at the same marked point. There was no failure of spinal anaesthesia.

Discussion: There is good evidence that anatomical method of assessing inter-lumbar space based on Tuffier's line is not always accurate. In inappropriately high interspace may be chosen for spinal anaesthesia because of increased lumbar lordosis and fat deposition on the iliac crests.

References

P70 Spread of a pump delivered epidural bolus compared to a manual syringe bolus
M Fleet, P Kamath, JP Campbell, GM Stocks
Department of Anaesthesia, Queen Charlotte's and Chelsea Hospital, London, UK

Introduction: When using patient-controlled epidural analgesia (PCEA) in labour rescue boluses are sometimes required to correct a poorly functioning epidural and can be administered via a bolus setting on a PCEA pump. Some anaesthetists believe a manual bolus using a syringe is more effective. The aim of this study was to seek evidence to support this observation by examining the difference in spread of local anaesthetic (LA) from a multi-hole epidural catheter using a PCEA pump bolus and a manual syringe bolus.

Methods: Methylene blue 10 mg was injected into a 500 mL bag of epidural mixture (0.1% levobupivacaine and fentanyl 2 µg/mL). Two epidural catheters, a 20-gauge (Braun) and an 18-gauge (Portex), were suspended 3 cm above an absorbent sheet. Two trainees and a midwife were asked to administer a 10 mL epidural bolus as they would in the clinical environment. This was timed and mean flow rates calculated. The spread from the centre point of the epidural catheter to the furthest point of LA was measured for each of the epidural catheter holes. The experiment was repeated with a physician bolus from a CADD PCEA epidural pump set at a rate of 250 mL/h.

Results: For all three clinicians a syringe bolus produced a spray of LA from all holes of the catheter, compared to droplet formation, which ran down the catheter tubing from the PCEA pump. The highest mean flow rate achieved was 20 mL/min by trainee 2 and the lowest was 4 mL/min by the PCEA pump. Similar results were obtained from the 18-gauge catheter.

Figure: Spread (cm) from each epidural catheter hole (20-gauge Braun) and mean flow rates.

Discussion: Variability in the pattern of flow from a multi-hole epidural catheter has been described for both epidural pumps and syringe tops. A greater area of LA spread is achieved when using a manual syringe bolus compared to a pump bolus. When using PCEA for labour analgesia a manual syringe bolus may be a more effective technique to rescue a poorly functioning epidural catheter than a pump bolus.

References
P71 Waiting for CSF: how long is enough?
RS Monteiro, M Cox, SM Yentis
Magill Department of Anaesthesia, Chelsea and Westminster Hospital, London, UK
Introduction: Location of the subarachnoid space is confirmed with appearance of cerebrospinal fluid (CSF) in the hub of a spinal needle. However, we have noticed that anaesthetists vary in when they attach the syringe of local anaesthetic. Textbooks’ advice also varies (e.g. “when CSF appears”1; “free-flow of CSF to the hub”2; “freely-dripping”3). We investigated common practice in a single centre, and the time spent waiting for CSF at these points.
Methods: In Part 1, 24 anaesthetists who regularly perform spinal anaesthesia were asked to indicate on a picture of a spinal needle hub the point at which they allow CSF to reach before connecting the syringe, and their reasons. In Part 2, fluid of a similar composition to CSF was pressurised to 50 cmH2O to simulate CSF pressure when upright. A spinal needle was introduced through a self-sealing bung and the time taken for fluid to reach the four points identified in Part 1 was recorded. This was repeated 10 times with five 25-G and five 27-G 90mm Whitacre needles in random order. We also examined the effect on residual air of introducing a syringe into the hub when fluid had reached the four identified points.
Results: Anaesthetists indicated four different points reached by CSF at which they attached the syringe to the spinal needle hub: first appearance (1 (4%)); the midpoint of the hub (12 (50%)); the end of the hub (10 (42%)); and after a drop had fallen (1 (4%)). The most commonly sited reason (10 (45%)) for the last two points was in order to avoid injecting air into the subarachnoid space. The times taken for fluid to reach the four points are shown in the Figure. CSF was required to reach the midpoint of the hub to prevent the presence of air when the syringe was inserted.

![Figure: Mean (SD) time taken for ‘CSF’ to reach four points with a 25-G (dark) and 27-G (light) spinal needle.](image)

Discussion: The difference between waiting for CSF to reach the midpoint of the hub versus freely-dripping may lead to an additional 15 seconds in which the spinal needle must be held still in the subarachnoid space. As well as leading to potential delay, this may increase the risk of moving the needle tip from its desired location. Furthermore, there was no advantage in waiting for CSF to pass beyond the midpoint in terms of eliminating air. We conclude that anaesthetists performing spinal anaesthesia commonly wait unnecessarily long before attaching the syringe to the spinal needle, and that this should be done when CSF reaches the midpoint of the hub.

References

P72 A repeat audit of parturients desire for information about rare complications of regional anaesthesia
EV Plunkett, K Cullis
Selwyn Crawford Department of Anaesthesia, Birmingham Women’s Hospital, Birmingham, UK
Introduction: GMC guidance on consent gives advice regarding the amount of information that should be shared with patients.1 A previous audit in our department showed that a majority (73%) of patients being consented for regional anaesthesia did not wish to receive information about rare risks. Our departmental practice when consenting for regional anaesthesia is to inform all patients about common side effects and complications (>1:1000) and ask if they wish to know about rare complications (≤1:10 000). The frequency of risks is quoted from the Obstetric Anaesthetists Association Epidural Information Card,2 and the consent process is documented with the aid of check boxes. In 2010 we performed a follow up audit which showed that only 16% of patients wished to hear information about rare risks. Five years on, we sought to repeat the audit again, wondering if recent legal cases might have changed practice.
Methods: A retrospective review of all anaesthetic charts of patients who had regional anaesthesia on our delivery suite in November 2015 was performed. Data were collected regarding the procedure and the documentation of consent.
Results: 305 charts were reviewed. Three charts were excluded due to missing information. Of the 81% of patients who were asked if they wished to be told about rare risks, 33% said yes. The breakdown of this according to regional procedure and urgency and type of case can be seen in the Table.

<table>
<thead>
<tr>
<th>Procedure Type</th>
<th>Yes</th>
<th>No</th>
<th>Not asked given rare risks</th>
<th>Not documented</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall (n=302)</td>
<td>82</td>
<td>164</td>
<td>39</td>
<td>17</td>
</tr>
<tr>
<td>Spinal (n=166)</td>
<td>45</td>
<td>92</td>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>Epidural (n=122)</td>
<td>32</td>
<td>67</td>
<td>16</td>
<td>7</td>
</tr>
<tr>
<td>CSE (n=14)</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Elective theatre case (n=65)</td>
<td>17</td>
<td>38</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Emergency theatre cases (n=104)</td>
<td>29</td>
<td>55</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>Labour analgesia (n=133)</td>
<td>36</td>
<td>71</td>
<td>19</td>
<td>7</td>
</tr>
</tbody>
</table>

Discussion: This audit has shown a change from previous audits, with a doubling of the proportion of women wishing to know about rare risks, compared with 2010. This may be related to a change in patient expectations and/or a change in the way that the question is phrased. The results have prompted a review of our consent process.

References
P73 An evaluation of postpartum analgesia requirements: development of pre-packaged discharge analgesia for enhanced recovery

TW Ng, R Mangwiro, CK Rajani, N Patel
Anesthesia, University College Hospital, London, UK

Introduction: Management of acute postpartum pain is important in reducing maternal morbidity, hospital length of stay, and improving patient satisfaction. To facilitate the implementation of an enhanced recovery programme, we evaluated postpartum analgesia requirements by investigating whether or not pre-packaged discharge analgesia should include pre-filled doses of oral morphine, alongside our current regimen of regular paracetamol and ibuprofen.

Methods: Data from deliveries that required anaesthetic intervention were collected over a 2-week period in June 2015. Parameters collected included mode of delivery (spontaneous vaginal delivery (SVD), SVD plus other procedure, e.g., repair of perineal tear (SVD+), instrumental delivery (ID), elective or emergency caesarean section (El/Em CS), type of anaesthetic intervention, type and amount of analgesia received, and length of stay.

Results: Ninety-five parturients required anaesthetic intervention. Over 50% of SVD women did not require regular analgesia following delivery, compared with 100% of those having a CS. By day 3 postpartum, 10% of those who had an El CS and 5% of Em CS required additional as required opioid analgesia. Although analgesic requirements were initially lower in the El CS group (9.2 mg) compared with the Em CS group (18.7 mg), opioid consumption was higher in the elective group from Day 1 onwards.

Figure: Mean as required opioid usage following delivery

Discussion: Initial opioid analgesic requirement was lower in the El CS than the Em CS group, which could reflect the administration of intrathecal diamorphine in this group. By contrast, women who had an El CS needed oral morphine more often than those who had an Em CS from Day 1. However, the majority of women do not require opioid analgesia after two days. The results indicate that additional opioid analgesia should be considered in the enhanced recovery programme, given the aim to discharge within 24 h following CS. We will re-evaluate post-operative analgesia requirements and patient satisfaction following its implementation.

Reference

P74 Anaesthetic involvement in provision of second trimester medical termination of pregnancy

A Abu-Arefeh, A Wise
Anaesthesia, Royal Infirmary of Edinburgh, Edinburgh, UK

Introduction: In 2014, 11 475 terminations occurred in Scotland and 80% of these were medically managed. A WHO review of second trimester terminations found one study comparing medical to surgical techniques, showing a lower risk of adverse events with surgical termination. A large Finnish study found that 6% of medical terminations of pregnancy (MTOP) required surgical intervention. RCOG guidelines suggest that local rates of manual removal of placenta (MRP) and evacuation of retained products of conception (PERC) following MTOP should be quoted where possible. Anaesthetic involvement in MTOP cases in our unit utilise the on-call obstetric anaesthesia team, increasing strain on labour ward services. We aimed to ascertain the extent of this.

Methods: Ethical approval was deemed not required by the local research ethics service for a retrospective case note analysis to determine anaesthetic input required for second trimester MTOP at our unit in 2014. MTOP due to fetal abnormalities were identified through the trust-wide computerised healthcare information system, and those for social reasons were identified by reviewing patients transferred to labour ward for continuation of MTOP. Electronic and paper case notes were reviewed. In addition to morbidity, the requirement for medical, surgical and anaesthetic input were noted.

Results: 134 patients underwent social MTOP during 2014, of which 17 (12.7%) were transferred to labour ward. Nine of those (53%) required surgical intervention (six MRP and three ERPC). One self-discharged before treatment, three had a spinal anaesthetic, three a general anaesthetic (GA) and information was absent for two. Morbidity in this group included two HDU admissions. 77 patients underwent MTOP for fetal abnormality. Nine (11.7%) required anaesthetic involvement, one epidural analgesia, five MRP and three ERPC, which compromised six GA, one spinal and one where information was absent. Morbidity included two HDU admissions.

Discussion: Women undergoing MTOP for social reasons in our unit had a 6.7% risk of requiring surgical intervention, a figure consistent with previously published reports. However if they required transfer to labour ward for continuation of the procedure for any reason this rises to 53%. Those presenting for MTOP for fetal abnormality have a 11.7% risk of requiring anaesthetic input. Women should be informed of these complication rates and service configuration for labour ward staffing should recognise the potential workload associated with MTOP procedures.

References
**P75 Comparing need for anaesthetist-assisted boluses between patient-controlled epidural analgesia and midwife-led top-ups: midwives do it better than machines**

S Nizar, K Richardson, S Kale, GM Stocks  
Anaesthetic Department, Queen Charlotte’s and Chelsea Hospital, London, UK

**Introduction:** Compared to epidural infusions, patient-controlled epidural analgesia (PCEA) has been shown to reduce motor block, unilateral block, breakthrough pain and rescue analgesia requirements. However, there are few data comparing PCEA with midwife-led top-ups. Last year, we changed our method of labour analgesia maintenance from midwife-led top-ups using syringes to PCEA using a CADD pump. In this service evaluation we recorded anaesthetist assisted boluses (AAB) before and after this change in women receiving combined spinal-epidural analgesia for labour and using 0.1% L-bupivacaine with fentanyl 2 µg/mL for epidural maintenance.

**Methods:** Having obtained trust Caldicott Guardian approval for this service evaluation, we prospectively collected data on AAB and patient satisfaction for women using two PCEA regimens and compared it with previous audit data using midwife led top-ups. Data were collected during routine follow-up on the day after delivery by direct questioning of mothers and analysed using the chi square test. Significance was P<0.05.

**Results:** Using a PCEA regimen of 9 mL boluses with a 30 min lockout 21.3% required AAB for inadequate analgesia (Table). A reduction in lockout time to 15 min made no difference to this rate. Comparing this with our previous audit with midwife-led top-ups using 10 mL boluses, significantly fewer patients required AAB (8.3%, P=0.0003). Both PCEA regimens achieved a satisfaction rate of 97% compared to 94.2% for midwife led top-ups.

**Table:** Comparison of PCEA with midwife-led top-ups

<table>
<thead>
<tr>
<th>PCEA regimen</th>
<th>30 min lockout (n=62)</th>
<th>15 min lockout (n=61)</th>
<th>Midwife top-ups (n=1003)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number requiring AAB (%)</td>
<td>13/62 (21.3%)</td>
<td>13/61 (21.3%)</td>
<td>83/1003 (8.3%)</td>
<td>0.0003</td>
</tr>
<tr>
<td>Patient satisfaction (%)</td>
<td>97%</td>
<td>97%</td>
<td>94.2%</td>
<td>0.24</td>
</tr>
</tbody>
</table>

**Discussion:** Compared to midwife-led top-ups, we observed a large increase for AAB using PCEA which was not improved following a reduction in the lockout time. Despite this, overall maternal satisfaction has remained similar. The increase in demand for anaesthetic activity with PCEA regimens may be due to a poorer spread of local anaesthetic when delivered as a bolus from a pump compared to that by a midwife. Alternatively, fixed pump settings may provide less flexibility for midwives to troubleshoot and manage labour epidurals independently resulting in more calls to the anaesthetist.

**References**


**P76 Evaluation of the use of remifentanil patient-controlled analgesia at the Simpson's Centre for Reproductive Health between June 2011 and October 2014**

A Wise, MV Thomas  
Simpson’s Centre for Reproductive Health, Royal Infirmary of Edinburgh, Edinburgh, UK

**Introduction:** Remifentanil patient-controlled analgesia (remi-PCA) is available at our centre for labour analgesia. The aim of the study was to determine the current standard of remi-PCA being service delivered with respect to safety, efficacy and viability.

**Methods:** After ethical approval, the controlled drug book on the labour ward was reviewed to identify patients who had received remi-PCA between June 2011 and October 2014. The remi-PCA guideline was examined and relevant data collected from electronic and paper case notes.

**Results:** Sixty-one cases of remi-PCA use during labour were identified over the 41-month period, compared to approximately 6750 epidurals, from 23 850 deliveries. The main indication for use was contraindication to epidural analgesia, due to: maternal coagulopathy (42%), known spinal problems (18%), maternal sepsis (18%), and allergy to local anaesthetics (3%). The remaining indications were: failure of epidural analgesia (17%) and patient preference (3%).

Safety: Oxygen desaturation occurred in 21% but in all instances responded to breath prompting and low-flow oxygen. No serious adverse events occurred and in no case was remi-PCA stopped due to complications. A small number of women received remi-PCA within 4 h of previous opioid use (8%).

Viability: Several problems were identified including pump setup errors and malfunction, venous access difficulties and inconsistent use of the remi-PCA chart. Delays in delivery of remi-PCA were linked to anaesthetist availability and prior opioid use.

Efficacy: A positive analgesic effect was noted in 94%. However, negative comments concerning ineffective pain relief, mismatch of lock-out time with contraction frequency and side effects were also noted in 26%. The dosing regimen was adjusted in 38% and use was supplemented with Entonox in 48%. Accurate assessment of maternal anaesthetic effect and satisfaction was not possible from the notes or chart.

**Discussion:** The remi-PCA service provided appears to be a safe labour analgesia option. However, the infrequency of its use presents problems with maintaining staff competence. Over the time period studied there was no robust method for assessing maternal satisfaction or efficacy directly, or for following up these patients. The following changes have been instituted as a result of this evaluation: aiming to provide remi-PCA in the same timeframe that epidural analgesia is provided, highlighting the use of the appropriate chart and increasing compliance with guidelines through formal and informal education to user groups (anaesthetists and midwives), using contemporaneous pain scores and ensuring robust follow-up of patients to assess efficacy and morbidity. Further evaluation of this service is recommended once these changes have become established.

**Reference**

P77 High- versus low-dose transversus abdominis plane block for analgesia post-caesarean delivery: a meta-analysis

S Sodha*, S Habib*, S Ng, B Carvalho†, P Sultan
Anaesthetics, University College Hospital, London, UK, *Anaesthesia, Duke University School of Medicine, North Carolina, USA, †Anaesthesia, Stanford University School of Medicine, California, USA

Introduction: Local anaesthetic (LA) toxicity is a potential risk with transversus abdominis plane (TAP) blocks for caesarean delivery (CD). The optimum LA dose balancing efficacy without causing toxicity remains unclear. This meta-analysis compares high dose (HD) versus low dose (LD) TAP blocks on postoperative pain outcomes after elective CD.

Methods: A literature search (5 databases) was performed to identify randomised controlled trials (RCTs) examining post CD analgesia of HD TAP blocks (>50mg bupivacaine equivalents per side) or LD TAP blocks (<50mg per side) compared to controls. Primary outcome was 24 h opioid consumption (morphine equivalents) and secondary outcomes included: post-operative pain scores at rest and on movement at 6 and 24 h. Mean difference (MD) and 95% confidence intervals were calculated using random effects modelling. HD and LD subgroups were compared using a Q test.

Results: 16 RCTs were included (1045 women; TAP group n=472; control group n=573). There was no difference in 24 h opioid consumption between high and low dose groups (Fig. 1). 6 h pain scores were decreased compared with control in both TAP groups at rest (HD MD -11.11 [-19.38 to -2.84], P=0.008; LD MD -13.94 [-25.88 to -2.00], P=0.02) but were not different between HD and LD groups (P=0.70). 6 h pain scores on movement were not statistically different in either TAP group compared with control (HD MD -12.53 [-31.13 to 6.07], P=0.19; LD MD -17.36 [-38.41 to 3.69], P=0.11), or between HD and LD groups (P=0.74). 24 h pain scores at rest were not improved in HD or LD groups compared to control (HD MD -5.37 [-14.74 to 4.00], P=0.26; LD MD -6.36 [-10.96 to 1.69], P=0.15) and there was no difference between HD and LD groups (P=0.90). 24 h pain scores on movement did not differ in both groups compared to control (HD MD -5.02 [-21.46 to 11.41], P=0.55; LD MD -13.21 [-32.41 to 5.99], P=0.18) and there was no difference between HD and LD groups (P=0.53).

Discussion: This study demonstrates that LD TAP blocks provide equivalent analgesia and opioid sparing effects to HD blocks for CD. Findings suggest that lower doses (<50mg bupivacaine equivalents per side) can be used to help reduce LA toxicity risk without compromising analgesic efficacy.

P78 Maternal mobility and epidural analgesia satisfaction with programme intermittent bolus

SD Balakrishnan, A Philips
Department of Anaesthesia, Nottingham City Hospital, Nottingham University Hospitals NHS Trust, Nottingham, UK

Introduction: Recent development of pumps providing intermittent epidural boluses has been associated with greater maternal satisfaction and improved maternal mobility. The programme intermittent bolus (PIB) epidural protocol was introduced in our maternity unit in mid-2014. We evaluated the effect of this protocol on maternal satisfaction for analgesia and mobility.

Methods: A prospective evaluation of 64 women was carried out over five months, from March to July 2015. All women received 0.1% levobupivacaine + fentanyl 2µg/mL PIB epidural infusions with patient-controlled epidural analgesia (PCEA). The regimen consists of 7 mL PIB with 1-h bolus interval and 6 mL PCEA for breakthrough pain, with a 20-min lockout period. Midwives completed questionnaires on maternal satisfaction with analgesia and mobility 2 h following epidural placement and 1 h after delivery. The midwives also carried out mobility assessments at these two points.

Results: Out of the 64 women who answered the questionnaire, 28 (44%) had a spontaneous vaginal delivery, 24 (38%) had an instrumental delivery and 12 (19%) underwent caesarean section. The overall satisfaction on analgesia and mobility was excellent (Table). Two hours following epidural insertion, none of the 55 women assessed demonstrated dense motor block (unable to bend knees) and six of 53 parturients demonstrated dense motor block an hour after birth.

Table: Maternal satisfaction with analgesia and mobility

<table>
<thead>
<tr>
<th></th>
<th>Very satisfied</th>
<th>Satisfied</th>
<th>Dissatisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analgesia with epidural</td>
<td>37/55 (67.3%)</td>
<td>15/55 (27.3%)</td>
<td>3/55 (5.5%)</td>
</tr>
<tr>
<td>Analgesia after birth</td>
<td>39/54 (72.2%)</td>
<td>14/54 (25.9%)</td>
<td>1/54 (1.9%)</td>
</tr>
<tr>
<td>Mobility with epidural</td>
<td>30/54 (56.6%)</td>
<td>23/54 (42.6%)</td>
<td>1/54 (1.9%)</td>
</tr>
<tr>
<td>Mobility after birth</td>
<td>30/53 (56.6%)</td>
<td>22/53 (41.5%)</td>
<td>1/53 (1.9%)</td>
</tr>
</tbody>
</table>

* 2 h after epidural placement. **1 h after birth

Discussion: Our results show high satisfaction levels in analgesia and mobility during labour and after birth among women consistent with previous studies on PIB. A high proportion of women did not attempt to stand or walk. Reasons documented for this include being asleep, fetal concerns post-procedure and patient refusal. Our findings highlighted the need to encourage mobility in women with epidural analgesia during labour. We are currently educating our midwives to use our Trust obstetric mobility assessment tool during epidural analgesia and information is now provided to women at antenatal classes to encourage mobility during labour. We aim to re-evaluate following these two interventions.

References
P79 Postoperative analgesia for elective caesarean section with oral diclofenac or ibuprofen: steps to improve analgesia as part of an enhanced recovery package
N Ungureanu, A Azhar, K Cullis
Selwyn Crawford Department of Anaesthesia, Birmingham Women's Hospital, Birmingham, UK

Introduction: Following concerns regarding diclofenac's possible cardiovascular effects and that it became unavailable due to a manufacturing and supply issue, a decision was made in our hospital to prescribe 8-hourly ibuprofen 800 mg as the NSAID of choice for regular analgesia and discharge medication following elective caesarean section. We took the opportunity to evaluate our analgesia regimen for elective caesarean section by comparing rescue analgesia requirements for two groups of patients before and after oral diclofenac became unavailable before commencing enhanced recovery.

Methods: We included 100 ASA 1/2 patients with singleton pregnancies who underwent elective caesarean section under spinal anaesthesia with 0.5% bupivacaine plus diamorphine 300 µg over a 6-month period. Five patients in each group were excluded from analysis as they could not be prescribed NSAIDs. We looked retrospectively at 45 patients for whom 8-hourly oral diclofenac 50 mg was used following caesarean section and prospectively at 45 patients who received 8-hourly ibuprofen 800 mg. All patients received rectal diclofenac 100 mg at the end of surgery, regular 6-hourly paracetamol and as required Oramorph 10-20 mg.

Results: Six patients in the diclofenac group and seven in the ibuprofen group did not require postoperative rescue morphine.

Table: Morphine consumption in the two groups

<table>
<thead>
<tr>
<th></th>
<th>Diclofenac Group (n=45)</th>
<th>Ibuprofen Group (n=45)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphine used in the 1st 12h postop if next NSAID within 18h (mg)</td>
<td>15(13[0-40])</td>
<td>23(19[0-60])</td>
</tr>
<tr>
<td>Morphine used in the 2nd 12h postop period if next NSAID within 18h (mg)</td>
<td>16(18[0-60])</td>
<td>20(17[0-60])</td>
</tr>
<tr>
<td>Morphine used in the 1st 12h postop if next NSAID after 18h (mg)</td>
<td>23(21[0-70])</td>
<td>24(24[0-70])</td>
</tr>
<tr>
<td>Morphine use in the 2nd 12h postop period if next NSAID after 18h (mg)</td>
<td>16(19[0-60])</td>
<td>22(23[0-80])</td>
</tr>
<tr>
<td>Total morphine use in hospital (mg)</td>
<td>50(43[0-160])</td>
<td>67(51[0-170])</td>
</tr>
<tr>
<td>Timing of last morphine dose (h post-op)</td>
<td>28.5[17-36]</td>
<td>31.5[25-37]</td>
</tr>
</tbody>
</table>

Data are mean(SD)[range] and median [interquartile range]

Discussion: Our results suggest that apart from a slight increase in the total amount of morphine used, the two regimens provide similar analgesic outcomes in this setting. Previous studies have demonstrated the analgesic equivalence between diclofenac 50 mg and ibuprofen 600 mg for mild to moderate pain.1 We are planning to introduce 6-hourly ibuprofen 600 mg as part of regular analgesia for caesarean section to match paracetamol administration times and make it more intuitive to use for patients. This change is likely to contribute to earlier discharge as part of the enhanced recovery protocol.

Reference

P80 A case of perimortem caesarean section with survival following out of hospital cardiac arrest
J Murley, P Mallet, B Anigbogu*, R Smith‡, J Nortje, M Morosan
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Introduction: We present the case of a 31-year-old patient who survived a perimortem caesarean section (CS). Return of spontaneous circulation (ROSC) occurred after 32 min of cardiopulmonary resuscitation (CPR).

Case report: The patient was deemed suitable for a vaginal birth following a previous CS in a different regional hospital. In this pregnancy, she went into labour at 39+5 weeks. The patient suffered a cardiac arrest on the way to the hospital. CPR was in progress upon arrival, as she was in pulseless electrical activity (PEA). A perimortem CS was carried out immediately (12 min after loss of cardiac output) revealing the fetus present in the peritoneal cavity with uterine rupture. ROSC occurred after eight cycles of CPR, with adrenaline administered via intraosseous (IO) needle. Initial blood measurements taken during CPR were an unrecordable pH with a serum lactate of 30 mmol/L. Forty minutes after ROSC, the first recorded arterial pH was 6.3 and bicarbonate was 1.3 mmol/L. Following delivery of a stillborn baby, the ruptured uterus was sutured, and the patient was transferred to the intensive care unit (ICU) for multiorgan support. She underwent an urgent hysterectomy 12 h later and also required two further laparotomies. The patient was weaned off respiratory support and her trachea was extubated on day 7. The patient made good progress and was discharged home on day 35.

Discussion: Cardiac arrest in the pregnant population is a rare occurrence with an estimated incidence of 1:12 000.1 In our case, several factors contributed to a successful outcome: immediate initiation of cardiac compressions by paramedics, immediate perimortem CS upon emergency department (ED) arrival, internal pulse assessment (direct palpation of aorta until ROSC), good team work with timely interventions where required (ICU support, timing of hysterectomy, management of coagulopathy). Maternal survival rate from perimortem CS is 54.3%, including in-hospital events.2 A cohort matched retrospective study of women undergoing CPR in emergency departments in Canada found a lower overall survival rate (36.9%), however only 1 out of 22 patients survived a perimortem CS in ED (no data was given on gestational age or aetiology).3 Our case report emphasizes that, despite severe initial metabolic derangement which might be considered unsurvivable, outcome might still be favourable with prolonged CPR and subsequent intensive management warranted.

References
P81 Acute aortic syndrome in pregnancy: endovascular management
CV Collinson, A Milne, G Morrison, C Love*, N Palamiapan*
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Introduction: Acute aortic syndrome complicating pregnancy is uncommon but potentially fatal for both mother and fetus. We present such a case, highlighting the progressive nature of this condition from intramural haematoma to dissection.

Case report: A 35-year-old woman (para 1) of 28 weeks of gestation presented to obstetric triage with a short history of severe upper back pain requiring morphine analgesia. Pregnancy and medical history were unremarkable. Cardiorespiratory examination was normal, with palpable radial pulses bilaterally and no features to suggest Marfan syndrome. Chest x-ray, ECG and fetal heart rate were normal. In view of the severity of symptoms, a CT chest was performed that showed intramural haematoma in the descending thoracic aorta from the left subclavian artery origin to the coeliac axis, with no evidence of dissection. Initially the case was managed medically with elective caesarean section planned for 30-32 weeks of gestation. However, repeat MR angiography 5 days after presentation showed progression to aortic dissection with the entry tear 8.5 mm distal to the left subclavian (Stanford Type B). In view of its progressive nature despite best medical management, Thoracic Endovascular Aortic Repair (TEVAR) without delivery of the fetus was planned. Invasive monitoring was established and anaesthesia induced with propofol and remifentanil target-controlled infusions. The iliac vessels were found to be too small to facilitate TEVAR, so delivery of a healthy baby by caesarean section was performed to facilitate insertion of a right iliac conduit graft. Blood loss was 800 mL. A dissection stent graft was then placed in the aortic arch distal to left subclavian artery via the conduit graft. Following extubation, PCA morphine and ketamine analgesia were established and an ACE inhibitor and statin commenced. The postoperative course was monitored with serial CT scans. On day 3 post-op, a new aortic dissection flap at the level of T12 required a further stent between the mid descending thoracic aorta and the coeliac origin. On day 16 post-op, a new penetrating mid thoracic aortic ulcer with worsening intramural haematoma and progressive dilatation required a stent to be interposed between the existing proximal and distal stents. The patient was discharged from hospital on day 29 post-op. Six months later, a successful open repair was performed. Pathology of the aortic tissue could not confirm or exclude underlying connective tissue disorder. Mother and baby are both currently well.

Discussion: There should be a high index of suspicion for serious pathology in pregnant women with new-onset pain requiring opioid analgesia. Multidisciplinary cooperation is essential to determine the optimal timing of TEVAR and delivery of the fetus in the context of an evolving clinical scenario. Maintenance of haemodynamic stability, to ensure placental perfusion yet avoid increases in shear stress during laryngoscopy and autotransfusion post-delivery, requires careful titration of anaesthetic agents and vasopressors.

Reference

P82 Dural puncture: a pain in the neck with cervical radiculopathy but no headache
GV Crossingham
Anaesthetics, Derriford Hospital, Plymouth, UK

Introduction: A typical presentations of dural puncture are rare. We describe severe neck pain and cervical radiculopathy with minimal headache as a complication of dural puncture that has not been reported elsewhere in the literature.

Case report: A 60 kg, 36-year-old with a twin pregnancy requested an epidural for labour analgesia. She was fit and well. Initial attempts to site an epidural failed. A second anaesthetist achieved loss of resistance with no evidence of a dural puncture by the Tuohy needle. The epidural catheter was passed, meniscal drop observed and test dose administered, revealing that the catheter was in fact, intrathecal. Excellent intrapartum analgesia was achieved with the spinal catheter with no cardiovascular compromise. The second stage lasted 2 h and both babies were delivered vaginally in lithotomy. One placenta was unfortunately retained. The spinal catheter remained in situ, so the intention was to provide regional anaesthesia via a top-up in theatre. On transferring the patient to theatre, she reported sudden onset of very severe shoulder pain. No cause was immediately identifiable. General anaesthesia was provided for manual removal of placenta and the spinal catheter was removed. On waking, the shoulder pain had subsided. On day 1, the patient developed severe neck and left shoulder pain. The decubitus position provided partial relief only. Headache was absent. Physical examination was normal. On day 3, she reported intermittent tingling and numbness in the left C5-7 dermatomes with persistent neck pain. The symptoms were unchanged by lying down or neck movement. Neurological exam revealed sensory loss in the C5-7 dermatomes with global hyperreflexia. Examination was otherwise unremarkable and she was able to mobilise with opioid analgesia. An MRI excluded demyelination/disc prolapse/tumour and vertebral abnormalities but supported the diagnosis of severe intracranial hypotension. She subsequently had a 20 mL blood patch. Symptoms did not improve immediately, but within 24 h her neck pain and sensory disturbance had resolved. She underwent a further emergent MRI for persistent sciatica and lumbar back pain post blood patch, which indicated that the low pressure features had improved. No pathology was identified to explain the lumbar pain and sciatica. She was discharged with amitriptyline. Follow-up revealed no recurrence of the neck pain or arm symptoms, but the sciatica and back pain persists at six weeks.

Discussion: A possible explanation for this unusual presentation is that intracranial hypotension caused central downward traction and tension on the C5-7 nerve roots via descent of the brain. Indeed, anatomical studies indicate that the C5 and C6 roots are more strongly anchored to their vertebral foramina than more distal roots. Perhaps these symptoms were exacerbated by the high CSF loss that can occur when a catheter shears the dura. The development of persistent low back pain and sciatica after a 20 mL blood patch is similarly atypical. In light of the normal radiological studies, this may be due to a localised inflammatory response.

References
**P83 Seizures in the paralysed parturient: eclampsia or autonomic dysreflexia?**

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Critical Care Services, New Cross Hospital, Royal Wolverhampton NHS Trust, Wolverhampton, UK

**Introduction:** Pregnancy in a patient with a history of spinal cord injury (SCI) is rare with many challenges. Among these is autonomic dysreflexia (ADR), occurring in approximately 85% of SCI above T6. This can be exacerbated by any number of causes such as urinary retention and pain. Patients are also at risk of any complication of pregnancy e.g. preeclampsia, leading to difficulty in diagnosis in the acute setting.

**Table:** Signs and Symptoms of ADR¹

<table>
<thead>
<tr>
<th>Signs</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>hypertension, hyperthermia, spasticity,</td>
<td>Minor</td>
</tr>
<tr>
<td>pupillary dilation, loss of consciousness,</td>
<td>headache, visual disturbance,</td>
</tr>
<tr>
<td>convolution</td>
<td>myoclonus, paeraesthesia</td>
</tr>
</tbody>
</table>

**Case report:** A quadriplegic 35-year-old primigravida had a history of SCI at C6–7 nine years previously. Following extensive antenatal work up by the obstetric team she was booked for caesarean section (CS) at 37 weeks of gestation under combined spinal-epidural anaesthesia. She attended the maternity unit at 36 weeks feeling unwell. On arrival her blood pressure (BP) was 160/95 mmHg and she was diaphoretic. Intravenous access proved difficult, therefore her BP was treated with oral nifedipine. Following administration, an attempted vaginal examination led to a brief loss of consciousness and uncontrolled muscle jerks of all four limbs. She was transferred to the maternity HDU for further management, continuing to have myoclonic jerks. On commencing invasive monitoring, her BP had risen to 190/110 mmHg. Given her presentation with elevated BP and proteinuria, eclampsia could not be excluded. Treatment with intravenous magnesium and labetalol was initiated. Her long-term suprapubic catheter was noted to be debris laden. She stated it had not drained well overnight; it was known to have bacterial colonization. Unsuccessful bladder lavage was attempted, to remove a cause of ADR. Operative delivery and catheter change was felt to be the most appropriate course of action, due to her ongoing raised BP. A lumbar epidural and central venous line were sited in theatre. Her suprapubic catheter was changed, yielding a reasonable diuresis. A healthy baby girl was delivered by emergency CS. Once stabilised she was transferred to critical care for monitoring, with treatment for hypertension, possible eclampsia and antibiotics for a suspected urinary tract infection (UTI).

**Discussion:** With extensive antenatal planning, this case highlights the need for contingency and emergency planning. Awareness of this high-risk patient by the obstetric and anaesthetic teams allowed rapid assessment and decision making. Initial presentation was consistent with both eclampsia and ADR, confounded by a blocked catheter and UTI. Following the insertion of the epidural, BP stabilised, normalising after the delivery. Epidural anaesthesia has repeatedly been used in the treatment and prevention of ADR in labour and delivery, reducing stimuli in the perinatal period.

**Reference**


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**P84 Severe headache after neuraxial analgesia**

CH Malcolm, M Ochoa-Ferraro, J Corfe

Anaesthetics, Norfolk and Norwich University Hospital, Norwich, UK

**Introduction:** In the 2014 MBRACE-UK report, two maternal deaths were directly attributed to neuraxial anaesthesia.¹ We present the case of a young woman who was diagnosed with a severe post-dural puncture headache (PDPH), who subsequently developed pneumocephalus and bilateral subdural haematomas (SDH).

**Case report:** A 23-year-old primigravida was admitted for induction of labour and on maternal request, an epidural was sited uneventfully and provided effective analgesia. Sudden onset of severe headache occurred immediately post delivery. A diagnosis of PDPH was made. Two epidural blood patches (EBP) were performed at 28 and 47 h post symptom onset. Both failed to provide symptomatic relief. Subsequently a change in headache character was noted and a CT scan was performed which revealed pneumocephalus. Despite regular analgesia the headache worsened. Magnetic Resonance Imaging (MRI) of the brain and spine demonstrated bilateral SDH. No surgical intervention was deemed necessary by our regional neurosurgical centre but they advised a third EBP. This was performed under fluoroscopic guidance. Our patient experienced brief symptomatic relief, but upon mobilisation the headache recurred. Further multidisciplinary care planning did not recommend a fourth EBP. In the following days there was slow improvement. Repeat MRI 12 days later reported resolving SDH. Our patient was discharged after 20 days and was debriefed in the anaesthetic outpatient clinic.

**Discussion:** Our case illustrates the complexities of a unique complication of neuraxial analgesia. There were many learning points and although success rates of EBP increase when repeated,² it can be ineffective altogether and a plan of further management should be made. Atypical features of a postpartum headache should prompt further investigations.³ We should maintain a high index of suspicion for other causes of headache, such as SDH. Although preceded by typical PDPH symptoms, a change in character to a constant headache with or without focal deficits is characteristic. EBP has emerged as the gold standard treatment for a PDPH and it may prevent the development of SDH.⁴ In our case, timely, albeit unsuccessful EBP did not halt progression to SDH. Pneumocephalus has been described after loss of resistance to air techniques,⁴ loss of resistance to saline was used when performing both EBP in our patient, however, on one occasion a small volume of air was used to confirm the epidural space. Our patient’s symptoms eventually resolved and she had no lasting neurological sequelae.

**References**


P85 Thrombotic thrombocytopenic purpura in pregnancy: a diagnostic emergency
C Bryant, M Drake, C McIntock*, L Hughes*
Women’s Health Anaesthesia, National Women’s Hospital, Auckland, New Zealand, *Obstetric Medicine, National Women’s Hospital, Auckland, New Zealand

Introduction: Thrombotic thrombocytopenic purpura (TTP) is a rare but important cause of thrombocytopenia and haemolytic anaemia in pregnancy. We describe a case of acute onset congenital TTP in pregnancy, successfully treated with plasma exchange (PEX) and delivered uneventfully by caesarean section under spinal anaesthesia.

Case report: A 40-year-old primigravida presented at 36 weeks of gestation with severe thrombocytopenia and haemolysis. She was asymptomatic other than some minor gum bleeding and intermittent epistaxis, and had no previous medical history. Initial full blood count revealed a platelet count of 12 x10^9/L with a haemoglobin of 112g/L, low haptoglobins and elevated lactate dehydrogenase. An initial diagnosis of TTP was made on the basis of these laboratory parameters and the clinical history, with alternative diagnoses of HELLP, preeclampsia and acute fatty liver of pregnancy considered unlikely. Two units of fresh frozen plasma (FFP) and methylprednisolone were administered immediately, and PEX commenced within 8 h. This continued for 3 days and resulted in a steady rise in her platelet count to 163 x10^9/L. Induction of labour was attempted on day 4; however, this was unsuccessful. She proceeded to deliver a healthy female by uncomplicated category 3 caesarean section at 36+5 weeks of gestation, performed under spinal anaesthesia with no adverse sequelae. Her platelet count remained stable postoperatively, and she was discharged home on day 4 postpartum. A diagnosis of congenital TTP was confirmed several weeks later with a low ADAMTS-13 enzyme level (<1%) on admission blood testing and no detectable autoantibody.

Discussion: Thrombotic thrombocytopenic purpura is a rare, acute and potentially life-threatening disorder that typically affects women and can be precipitated by pregnancy, with an incidence of 1 in 200,000 maternities.1 It comprises thrombocytopenia, haemolytic anaemia and microvascular thrombosis, and has an untreated mortality of 90%. Women presenting with a new diagnosis of TTP in pregnancy typically do so in the third trimester or postpartum period, and are more likely to have a congenital rather than acquired aetiology.2 TTP should be suspected in a case of severe thrombocytopenia in pregnancy and the specialist advice of a haematologist sought as prompt treatment with plasma exchange is potentially life-saving. PEX comprises apheresis and replacement with donor FFP that is repeated daily and has reduced the mortality of TTP to 20%.3 Importantly, platelet transfusion is contraindicated in TTP as it fuels the coagulopathy. With successful treatment and subsequent improvement in the platelet count, delivery by caesarean section can be safely performed under spinal anaesthesia.

References

P86 Undiagnosed idiopathic syringomyelia and failed spinal and epidural: causation or coincidence?
J Lewis, I Saule
Anaesthesia, Queens Medical Centre, Nottingham, UK

Introduction: Syringomyelia is a rare condition characterised by a syrinx, or fluid filled sac, within the central canal of the spinal cord. It has a prevalence of about 8.4 per 100,000.1 Undiagnosed asymptomatic syringomyelia, however, may be more common.2 We present a case of failed spinal and epidural anaesthesia with neurological symptoms that may relate to a previously undiagnosed cervicothoracic spinal syrinx.

Case report: A 31-year-old multiparous woman in her third pregnancy was admitted at 36 weeks for monitoring due to grade 4 placenta praevia. She was scheduled for an elective caesarean section at 37+2 weeks for which a spinal anaesthesia was planned. Hyperbaric bupivacaine 2.6 mL and diamorphine 300 μg (total volume 2.9 mL) was injected via a 90 mm 25-gauge Whitacre spinal needle with the patient in the sitting position. The patient was immediately placed supine on the operating table with left lateral tilt. She received phenylephrine via infusion and boluses to maintain a systolic blood pressure >100 mmHg and a heart rate <100 beats/min. Her spinal block had a fast onset but only attained a maximum height of T7-8 to cold and T9-10 to light touch. She maintained good quadriceps motor power and was able to lift her legs. At 20 min the patient commented that her hands “felt funny” with reduced sensation. No other evidence of high block was found. As the block was inadequate for surgery a decision to insert an epidural was made. After an uneventful insertion of the epidural catheter in the left lateral position 2% lidocaine 2.5 mL, 0.5% levobupivacaine 2.5 mL and fentanyl 100 μg were injected. The lower limb motor function and sensory block on the torso did not change, but, over 10 min the patient reported that her hands became weak with worsening numbness. Her anaesthesia was converted to an uneventful general anaesthetic. Upon emergence from anaesthesia, initially the patient had good power in all limbs but soon after was found to be weak in all muscle groups in both upper limbs. Over the next 12 hours her neurological signs fluctuated with complete resolution of her upper limb weakness and then development of bilateral lower limb weakness and left arm weakness. A CT brain was preformed which was normal followed by an MRI of brain and spine which showed a spinal cord syrinx localised at C6-7 and extending from T5-6 to T8. No other abnormalities were found. Initially she was unsteady on her feet and found mobilising difficult. Her symptoms improved over the next two days and she was discharged on day three post caesarean section with normal power and sensation throughout.

Discussion: There are few reports of cases of syringomyelia in pregnancy and subsequent delivery. These are all in patients with symptomatic disease. In contrast there are many cases of failed spinal anaesthetic, often with clear explanation. This does, however, leave a small number of failed or inadequate spinal anaesthetics with no clear cause. It is very difficult in this particular case to know if the transient neurological symptoms and signs were related to the cervicothoracic syrinx.

References
P87 Massive thrombus and cardiac arrest during elective caesarean section

KA Holdom, E Hartsilver
Anaesthetics, Royal Devon & Exeter Hospital, Exeter, UK

Introduction: Perimortem caesarean section is an extremely uncommon event.1 We present a case of collapse and cardiac arrest in an elective patient for caesarean section (CS), an evolving disseminated intravascular coagulation (DIC) and use of ultrasound assisted catheter directed thrombolysis to treat a massive saddle pulmonary embolism.

Case report: A 33-year-old G2P1 woman presented for elective CS. She had undergone a previous category 2 CS for macrosomia after failure to progress in labour. Her current pregnancy was uncomplicated. She had an uncomplicated spinal anaesthetic with a bilateral block to T3 tested with ice and light touch. She suddenly appeared distressed, rapidly lost consciousness and became bradycardic (heart rate 30 beats/min). Anaesthesia was induced and a tracheal tube placed. Pulses were absent and cardiopulmonary resuscitation (CPR) started for a PEA arrest. Perimortem caesarean section was undertaken. Two cycles of CPR lead to return of spontaneous circulation after 7 min. The ECG showed ST elevation. Echocardiography showed a mass in the right atrium. There was brisk vaginal bleeding with ROMET confirming DIC. Blood was given and the massive transfusion protocol activated. A decision was made to place a B Lynch suture. Resuscitation continued with blood products. At the end of surgery bleeding had slowed significantly. On arrival to ICU her haemoglobin was 5 g/dL and further brisk bleeding briskly required transfered to theatre where an uncomplicated hysterectomy was performed. On return to ICU she was stable. Next morning a CT pulmonary angiogram (CTPA) showed a massive saddle embolism. Echocardiography showed high right-sided ventricular pressure. A decision was made to use ultrasound-guided catheter directed thrombolysis. She was transferred to cardiology and a catheter placed next to the embolism. Alteplase was run over a 24-h period, intravenous unfractionated heparin was run aiming for APTT of 1.5. Repeat echocardiography showed normal right-sided pressures and CTPA showed reduction in clot burden. Low-molecular weight heparin was converted to warfarin. She was extubated and discharged 11 days later neurologically intact with a healthy baby girl.

Discussion: MBRRACE-UK has shown that thrombosis is the leading cause of direct maternal death (33%).1 The sudden collapse meant the initial diagnosis was problematic with multiple differentials. Rapid access to on-table echocardiography was invaluable. DIC evolved rapidly and has been demonstrated in previous perimortem caesarean sections. The SEATTLE II study showed that placing a catheter next to a thrombus in massive and sub-massive pulmonary embolism, allowed small doses of a thrombolytic agent to be targeted directly at the clot reducing the risk of an intracranial bleed.2

References
1. MBRRACE-UK: Saving Lives, Improving Mothers’ Care Lessons learned to inform future maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2009-2012: December 2014

P88 Use of ultrasound guidance for epidural blood patch following unintentional dural puncture

Z Hajat, VJ Wilson, F Roberts
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Introduction: Epidural blood patch is a widely recognised treatment for post-dural puncture headache (PDPH),1 a rare but serious complication of labour epidural analgesia. We present a case where the use of lumbar ultrasound altered our management of this intervention.

Case report: A 32-year-old G2P1 parturient requested epidural analgesia during labour. An epidural catheter was sited using a BBraun Surety® l6-gauge Tuohy kit. Insertion was documented as uneventful and effective peripartum analgesia was obtained. Forty-eight hours after delivery she presented with a classic postural headache, photophobia, tinnitus, and fatigue. PDPH was diagnosed and consent for epidural blood patch obtained. Immediately before the blood patch a lumbar spine ultrasound using a Sonosite M-Turbo® curvilinear probe (2-5 MHz), revealed a midline defect in the ligamentum flavum at the level of the epidural site (Fig.) and a narrowed space below. Anticipating a repeat dural puncture due to abnormal anatomy, the blood patch was performed one space above the initial puncture site. Autologous blood (22 mL) was injected into the epidural space at L2-3 until she experienced pain in her leg and immediate resolution of her symptoms.

Figure: Lumbar ultrasound showing midline defect

Discussion: Ultrasound is a non-invasive investigation which may be used to identify lumbar spine anatomical defects; its use to assess the anatomy and depth of the epidural space is receiving growing interest. A ligamentum flavum defect may adversely affect a loss of resistance technique and may predispose to dural puncture.2 In this case it is unclear whether the defect observed was congenital or caused by the initial epidural attempt. Conventional teaching recommends placement of epidural blood patch either at the same level or one below the initial puncture site as autologous blood injected during epidural blood patch has been shown to preferentially spread cephalad.3 In the light of our observations using ultrasound and perceived difficulties in insertion we opted to use the space above the initial site.

References