International Journal of Obstetric Anesthesia (2006) 15, S1-S43
doi:10.1016/j.ijoa.2006.03.003

Abstracts of free papers presented at the annual meeting of the Obstetric Anaesthetists' Association, Glasgow 11-12 May, 2006

ORAL PRESENTATIONS

(The presenter is underlined)

POSTER PRESENTATIONS

O01 Thrombocytopenia and gender, pregnancy and preeclampsia: a comparison of platelet function

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Introduction: Platelet count thresholds for regional blockade vary from 50 to 100×10^9/L.[1] This is not based on outcome data. Thresholds do not take gender differences in coagulation into account. This in vitro observational study examines the effects of laboratory generated thrombocytopenia analysed at a platelet count of 50×10^9/L on Thromboelastography (TEG®) maximum amplitude, a test of platelet function, in four groups of volunteers.

Methods: Healthy male (n=20) and female (n=20) volunteers and pregnant (n=20) and preeclamptic (n=12) women at term were recruited. From each, 35 mL of venous blood were aspirated into a citrated tube and manipulated in the laboratory in accordance with established protocols,[2] to generate individual blood samples with low platelet counts. A full blood count and coagulation profile were performed on all samples to ensure identicality in all respects except for platelet counts. TEG® was performed on all laboratory samples in accordance with the Hemoscope manual. The Tukey-Kramer multiple-comparison test was used to identify statistical significance defined as $P<0.05$.

Results: Differences in height, weight and coagulation profile varied with gender and pregnancy as expected. Age ranges were similar. 140 data points were obtained for men, 146 for women, 139 for pregnant women and 71 for preeclamptic women. There was a spectrum of coagulation through preeclamptics then pregnant women to non-pregnant women, and finally men who demonstrated the poorest coagulation. Differences between the groups at a platelet count of 50×10^9/L were highly significant.

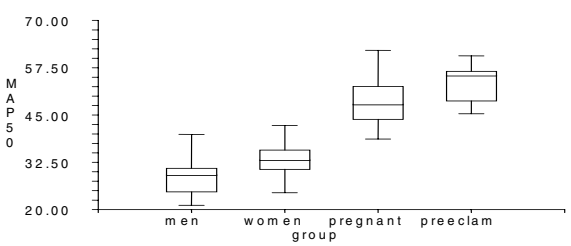

Fig: Box plot for all four groups against maximum amplitude (MA) at a platelet count of 50×10^9/L (P50)

Conclusion: At a platelet count of 50×10^9/L, preeclamptic and pregnant women maintain platelet function within normal range whereas men and non-pregnant women demonstrate poor function.

References

1. Douglas MJ. Coagulation abnormalities and obstetric anaesthesia. Canad J Anaesth 1991; 38: R17-R21.
2. White M: Platelet protocols. San Diego: Academic Press, 1999; 39-42.

O02 Effects of crystalloid and colloid preloads on coagulation assessed by thromboelastography in parturients prior to elective cesarean section

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Introduction: Fluid preloading with colloids reduces hypotension more effectively than crystalloids before spinal anesthesia for cesarean delivery.[1] However, colloidal solutions, e.g. hydroxyethyl starches, can adversely affect coagulation (decreasing factor VIII and vWF, and impairing platelet function).[2] We investigated the coagulation effects of fluid preloading with 6% Hetastarch (HES) vs. lactated Ringer's solution (LR) using thromboelastography (TEG) before cesarean section.

Methods: Following IRB approval, 30 healthy patients were randomized to receive either 1500 mL LR or 500 mL HES (670/0.75) over 30 min before spinal anesthesia for elective cesarean section. TEG was performed before fluid preloading with blood drawn from an 18-g i.v. cannula. A second sample was obtained for TEG analysis from the contralateral arm after preloading. One mL of whole blood was placed in a vial containing kaolin and, after mixing, 360 µL kaolin-activated whole blood was analysed in a prewarmed TEG. Data were analysed using parametric and non-parametric tests as appropriate ($P<0.05$).

Results: Baseline TEG values were similar between study groups. We observed no statistically significant changes in TEG parameters after preloading in group LR (table). However, in group HES, there were statistically significant increases in r and k times after preloading compared to baseline values ($P=$ 0.01 and 0.004 respectively).

TEG parameters	LR baseline	LR post-preload	HES baseline	HES post-preload
r (min)	3.7 [1.2]	5 [2.6]	3.8 [1.6]	5.5 [2.7] *
k (min)	1.2 [0.5]	1.2 [0.3]	1.3 [0.4]	1.7 [0.5] *
α angle (º)	70.1 [7.3]	71.7 [11.3]	67.5 [9.7]	61.7 [12.2]
MA (min)	79.7 [6.5]	80.2 [7.8]	75.9 [9.4]	74.0 [11.4]

Values are median [interquartile range]. * $P<0.02$ HES post-preload compared to HES baseline values

Conclusion: Preloading with 500 mL of 6% HES produces modest haemostatic effects as measured with TEG. However, we speculate that the trend towards hypocoagulability observed in our study is unlikely to affect peri-operative blood loss during cesarean section. Further investigations are needed to determine whether these haemostatic changes are altered by different volumes and preparations of hydroxyethyl starches.

References

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2. Kozek-Langenecker SA. Effects of hydroxyethyl starch solutions on hemostasis. Anesthesiology. 2005;103:654-60.

O03 Safe regional anaesthesia in idiopathic thrombocytopenic purpura in pregnancy: a retrospective study

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Introduction: Idiopathic thrombocytopenic purpura (ITP) causes thrombocytopenia in 37.5% of parturients with a platelet count of 70×10^9/L or less at term.[1] We reviewed the medical charts of parturients with ITP with the aim of adding to the available evidence regarding safety of regional anaesthesia in ITP.

Methods: After ethics approval, 486 charts of parturients coded as thrombocytopenia from the last ten years were reviewed. Parturients were classified as ITP if the diagnosis was made by a haematologist or if the severity and onset of thrombocytopenia in relation to pregnancy were consistent with ITP. Thrombocytopenia was classified as 'indeterminate' if no clear cause was detected and the lowest recorded platelet count at any time was $<100\times10^9$/L. All other parturients and those with a lowest recorded platelet of 100×10^9/L or more were excluded. Data about anaesthetic and obstetric management, treatment of ITP and complications of regional anaesthesia were collected.

Results: 228 parturients had a diagnosis of ITP and their lowest recorded platelet count ranged from 30-390×10^9/L. A total of 178 parturients, including 117 with confirmed ITP, received regional anaesthesia.

Table1. Platelet count ranges at the time of regional insertion

	Total number of regionals		
Platelet count range ($\times10^9$/L)	ITP	'Indeterminate'	Totals
>100	58	18	76
80 -100	35	28	63
50 - 79	22	12	34
<50	1	1	2
No counts available	1	2	3
Totals	117	61	178

Of these, 34 (22 with ITP) had a platelet count of $<80\times10^9$/L and two (1 ITP) had platelet counts $<50\times10^9$/L at the time of regional anaesthesia (Table1). No haemorrhagic or neurological complications from regional anaesthesia were recorded.

Conclusions: In this study we have recorded safe regional anaesthesia in parturients with platelet counts below 80×10^9/L, some as low as 41×10^9/L. The results of this study should add to the available evidence regarding the safety of regional anaesthesia in thrombocytopenia, in particular in ITP.

Reference

1. Saino S, Kekomaki R, Riikonen S, Teramo K. Maternal thrombocytopenia at term: a population based study. Acta Obstet Gynecol Scand 2000; 79: 744-749.

O04 Use of recombinent factor VIIa, (rFVIIa) in the management of post-partum haemorrhage

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Introduction: Massive obstetric haemorrhage remains a leading cause of maternal mortality. We report our experience of using rFVIIa in the treatment of major post-partum haemorrhage (PPH) necessitating hysterectomy in three previously healthy parturients.

Case 1: A 29-year-old nullip diagnosed with major posterior placenta praevia and fibroids underwent category III caesarean section at 34 weeks. Torrential PPH required hysterectomy. Clinical improvement occurred 15 min after a single 70-μg/kg bolus of rFVIIa.

Case 2: A 27-year-old multip (one previous caesarean section) had vaginal delivery followed by PPH, internal iliac artery ligation and hysterectomy. Clinical improvement occurred 10 min after a single 75-μg/kg bolus of rFVIIa.

Case 3: A 36-year-old multip. (one previous caesarean section) had precipitate labour followed by PPH requiring hysterectomy. A single 75-μg/kg bolus of rFVIIa led to clinical improvement such that transfer for embolisation was possible.

No thrombotic complications occurred.

	Case 1	Case 2	Case 3
Initial therapy			
Packed red cells (units)	35	35	42
Fresh frozen plasma (units)	12	14	16
Cryoprecipitate (units)	10	10	30
Platelets (pools)	5	1	3
Lowest Hb g/dL	4	7.2	6.4
Coagulation before rFVIIa			
PT (9.6 - 11.6 s)	21.3	16.2	30.5
APTT (24 – 32 s)	62	72	>360
TT (10 – 15 s)	13	13	17
Fibrinogen (2.2 - 4.3 g/dL)	0.61	1.11	0.38
Coagulation after rFVIIa (1 –2.5 hours later)			
PT (9.6 - 11.6 s)	8.8	11.2	9.2
APTT (24 – 32 s)	30	62	33
TT (10 – 15 s)	12	13	15
Fibrinogen (2.2 - 4.3 g/dL)	1.66	1.08	1.96

Discussion: Although not licensed, there are numerous reports of rFVIIa use in obstetrics.[1] None report thrombotic complications. The regimes and doses used vary widely. Based on this considerable body of data, it may now be time to reach a consensus on use in the management of obstetric haemorrhage.

Reference

1. Laffan M, O Connell NM Perry DJ et al. Analysis and results of the recombinent VIIa extended-use registry. Blood Coag Fibrinolysis 2003; 14 (S1): S35-S38.

O05 Fetal pH after phenylephrine or ephedrine infusion titrated to maintain systolic blood pressure at caesarean section under spinal anaesthesia

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Introduction: Fetal acidosis may follow reduced placental intervillous blood flow due to reduced systolic blood pressure (SBP) or placental vasoconstriction. Additionally it can follow fetal metabolic rate increases[1] with increased carbon dioxide production and umbilical cord arteriovenous differences ($UAVPCO_2D$). Our primary aim was to evaluate cardiac output (CO) changes following phenylephrine or ephedrine infusions titrated to maintain baseline SBP (bSBP). We now present our fetal secondary outcome data.

Methods: In this randomised double-blind study, women (n=40) scheduled for caesarean section received either phenylephrine 100 µg/min (P) or ephedrine 5 mg/min (E) infusions, titrated to maintain bSBP. Baseline haemodynamics (CO, HR, bSBP) were recorded in the left lateral tilt position before fluid preload and every minute after a standard spinal anaesthetic until delivery. Umbilical cord blood gases were analysed within 5 min of delivery. Statistical analysis included Mann-Whitney *U* tests ($P<0.05$).

Results: Maternal characteristics were similar. Good SBP control was attained in both groups with minimal periods of hypotension (SBP<80%) or hypertension (SBP>120%) (Table). CO and heart rate increased over time with E but decreased with P. E was associated with significantly more fetal acidosis (two-fold increase in $UAVPCO_2D$) with a mixed metabolic and respiratory pattern.

N=20 per group	Phenylephrine	Ephedrine
Hypotensive (min)	1 (0, 3)	0 (0, 1)
Hypertensive (min)	1 (0, 3)	2 (1, 3)
Spinal-delivery (min)	39 (37, 42)	41 (37, 45)
Infusion on (min)	21 (19, 25)	12*(9, 14)
Vasopressor (mg)	2.15 (1.9, 2.5)	60*(45, 70)
UApH	7.33 (7.31, 7.34)	7.22*(7.16, 7.27)
UABE (mmol / L)	-0.6 (-2, -0.1)	-4.65*(-6.1, -2.7)
$UAPCO_2$ (kPa)	6.36 (6.16, 6.77)	7.93*(6.82, 8.93)
$UAVPCO_2D$ (kPa)	1.04(0.83, 1.13)	2.07*(1.68, 2.13)

Data are medians (interquartiles),*$P<0.05$

Conclusion: Despite good bSBP control, and increased CO with E, potentially maintaining intervillous flow, E resulted in lower UApH. Our data suggest that increased fetal metabolism contributes to this acidosis.

Reference

1. Cooper D, Carpenter M, Mowbray P, et al. Fetal and maternal effects of phenylephrine and ephedrine during spinal anesthesia for cesarean delivery. Anesthesiology 2002; 97: 1582-1590.

O06 The effect of adding fentanyl to epidural levobupivacaine for emergency caesarean section

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Introduction: If women receiving low-dose epidural analgesia require caesarean section in our unit, levobupivacaine 0.5% is used since lidocaine or ropivacaine have no clear benefits.[1,2] Fentanyl is often added, but this is not universal. We evaluated the addition of fentanyl in a double-blind, randomised controlled trial.

Methods: After LREC approval, informed consent was obtained from women receiving epidural analgesia with 0.1% bupivacaine 15 mL+fentanyl 2 µg/mL followed by 10-15 mL *prn*. If caesarean section was required, 0.5% levobupivacaine 20 mL+fentanyl 75 µg or saline 1.5 mL was given over 3 min. Further levobupivacaine (≤ 15 mL), i.v. opioids, inhaled N_2O or general anaesthesia was given for breakthrough pain. At end of surgery rectal diclofenac 100 mg+epidural diamorphine 2.5 mg were given. Comparisons were with Mann-Whitney or χ^2 tests, $P<0.05$ denoting significance. Power analysis for sample size (100 per group) was based on previous studies.

Results: The study was stopped after 112 patients due to a protocol change to PCEA instead of midwife top-ups. Data from three patients were lost or incomplete. Patients' details and epidural analgesia data were similar. There was no significant difference in onset times or supplementation between the groups, but more intra-operative nausea/vomiting with fentanyl (Table). Postoperative data were similar for the two groups.

	Fentanyl (n = 43)	Saline (n = 66)
Cold to T4 (min)	10 (5-15 [0-29])	11 (7-15 [0-48])
Touch to T5 (min)	10 (6-18 [0-29])	12 (9-17 [3-85])
Ready for surg (min)	12 (9-17 [1-39])	12 (8-17 [3-63])
Supplementation	7 (16%)	12 (18%)
Intra-operative nausea/vomiting*	23 (53%)*	16 (24%)*

Median (IQR [range]) or number (%); *$P = 0.004$

Conclusion: Although epidural fentanyl may improve the quality of block for *elective* caesarean section with bupivacaine[3] we found no such advantage in emergency cases, with no reduction in onset times and an increased incidence of intra-operative nausea and vomiting.

References

1. Lucas DN, Ciccone GK, Yentis SM. Extending low-dose epidural analgesia for emergency Caesarean section. A comparison of three solutions. Anaesthesia 1999; 54: 1173-1177.
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O07 Extension of epidural blockade for emergency caesarean section: a survey of UK practice

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Introduction: It is routine practice for a working epidural, which has been sited for the provision of analgesia in labour, to be used to provide surgical anaesthesia for emergency caesarean section. Little has been published about the practicalities of how this is achieved in the emergency setting.

Methods: We conducted a postal survey of UK lead obstetric anaesthetists. We sought to discover where the top-up is given, which drugs are used and whether a test dose is given. We asked if monitoring is used for transfer to theatre, whether local guidelines have been established, and if any adverse incidents have occurred.

Results: The response rate was 82%. We found that:

- 80.5% of consultants initiate the top-up in the delivery room
  - 68% give the full top-up in the delivery room
  - 25% used monitoring during transfer
  - 12.5% transfer the patient to theatre before giving the rest of the dose
- 12.5% give no drug until the patient is in theatre.
- 61.5% do not give a test dose.

Thirteen combinations of local anaesthetics and adjuncts were used:

	% of respondents
0.5% bupivacaine alone	41.5%
in combination	18%
2% lidocaine alone	5.5%
in combination	34.5%
0.5% levobupivacaine	12.5%
Epinephrine added	23.5%
Bicarbonate added	12%
Guidelines established	64% of units

45 adverse incidents associated with the extension of epidural blockade were reported by 15.5% of respondents. These included 12 cases of high block requiring intubation, and six cases of possible inadvertent intravascular epidural catheter, which lead to seizures in two cases and a cardiac arrest in one.

Conclusions: This is the first survey into the practice of the extension of epidural blockade for emergency caesarean section. While we hope the information will be used to aid the development of local guidelines, we would argue that given the reported complications associated with this technique, the top-up should be conducted in theatre with full monitoring, for all cases, except possibly a category I caesarean section.

O08 Audit of uterine exteriorisation at caesarean section

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Introduction: NICE guidelines recommend that the uterus is not routinely exteriorised at caesarean section as it is associated with pain and does not improve operative outcome.[1] We audited the incidence of uterine exteriorisation in our unit.

Method: We conducted a prospective audit of all women undergoing caesarean section under regional anaesthesia over a four-week period. Data were collected on the incidence of exteriorisation and its effect on intra-operative pain, nausea, vomiting and need for anaesthetic intervention. The grade of caesarean section[2] and the seniority of anaesthetist and surgeon were also noted.

Results: 98 caesarean sections were performed during the audit period. In 26 the uterus was exteriorised. Pain was reported in eight caesarean sections. The incidence of pain was higher in the uterine exteriorisation group (27% vs. 1%). In the uterine exteriorisation group (n=26) pain was reported in 31% (n=4) of patients with de novo combined spinal epidural and 25% (n=3) patients with epidural top-ups. Analgesic interventions ranged from systemic opioids (19%), epidural local anaesthetic (7%), both (4%) and conversion to general anaesthesia (4%). Nausea and vomiting were more common when the uterus was exteriorised (35% vs. 7%). The uterus was exteriorised in all grades of caesarean section, but most frequently in grade II (31%) and III (32%). Exteriorisation was most frequently performed by non-consultant obstetricians.

Conclusion: Uterine exteriorisation was performed in 26% of caesarean sections during our audit period, which was higher than we had anticipated. It was associated with pain, nausea and vomiting and subsequent need for anaesthetic intervention. This highlights the need for the anaesthetist to be vigilant when uterine exteriorisation is necessary.

References

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2. Lucas DN, Yentis S, Kinsella SM et al. Urgency of caesarean section: a new classification. J Roy Soc Med 2000; 93: 346-350.
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O09 A predictive model for caesarean delivery

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Introduction: Obesity was cited in the CEMACH: *Why Mothers Die* Report 2000-2[1] as a major contributor to maternal death. We analysed the effect of obesity, age and parity on obstetric outcome.

Methods: All deliveries in our city teaching hospital in 2004 were analysed using multinomial logistic regression to assess the effect of body mass index (BMI), age and parity on the mode of delivery.

Results: Complete data from 4085 mothers (1814 primiparous and 2271 multiparous) were analysed. 19.4% had a booking BMI >30 kg/m^2 and 45.9% were >30 years old. The table shows the effect of each variable on the individual type of delivery compared with spontaneous delivery.

		Odds ratio	P value
Assisted delivery	Age	1.069	<0.001
	BMI	0.986	0.21
	Parity	0.134	<0.001
Elective caesarean section	Age	1.067	<0.001
	BMI	1.062	<0.001
	Parity	1.352	0.028
Emergency caesarean section	Age	1.078	<0.001
	BMI	1.049	<0.001
	Parity	0.222	<0.001

Both increasing BMI and age significantly [P<0.001] increase the risk of caesarean section. An increase in BMI from 30 to 40 increases the risk of emergency caesarean section by 1.049^{10} = 1.61 or 61%, and an increase in age from 30 to 40 years doubles the risk of emergency caesarean section. From further logistic regression analysis, the probability, P, that a patient, with a known age, BMI and parity, will have an emergency or elective caesarean section rather than a vaginal delivery is given by $P = (1+e^{-z})^{-1}$, where z = -4.083 + (0.06×age) + (0.055×BMI) + (-0.582×0 or 1, depending on parity). For example, the probability of a 30 year old primiparous mother with a BMI of 25, having a caesarean section is 30%, and the risk of caesarean section in a 35 year old primiparous mother with BMI of 45 is 64%. Similar equations have been derived to calculate the chance of emergency caesarean section and vaginal delivery.

Conclusion: Based on the data available from our unit in 2004, we can assess the chance of caesarean section based on a mother's age, BMI and parity. This provides essential information to mothers, obstetricians and anaesthetists during antenatal planning for delivery to anticipate and avoid the risk of serious adverse events.

Reference

1. Lewis G. Key Findings. In: *Why Mothers Die* 2000-2002. Sixth Report CEMACH. London: RCOG, 2004: 50.

O10 Peripartum hysterectomy in the UK: outcomes and management of associated haemorrhage

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Introduction: Peripartum hysterectomy is one of the most serious complications of modern obstetrics and is usually undertaken to control severe postpartum haemorrhage. Recent CEMACH reports have recommended that peripartum hysterectomy be considered sooner rather than later in cases of life-threatening haemorrhage.[1] However, the most recent triennial report has suggested an increase in deaths from haemorrhage despite this advice.[2] There have been no national population-based studies to determine the incidence of peripartum hysterectomy, its risk factors, associated management or outcomes. This national study was therefore undertaken to provide baseline incidence data and to describe the outcomes and associated management.

Method: A national surveillance and case-control study using the new UK Obstetric Surveillance System (UKOSS).

Results: 100% of UK consultant-led obstetric units contributed to UKOSS. 144 peripartum hysterectomies were reported over the first six months, representing an estimated incidence of 4.0 per 10,000 births (95%CI 3.3-4.7 per 10,000 births). The associated maternal mortality was 1% (0-3%) and perinatal mortality 2% (0-6%); 19% of women had an associated major morbidity (11-27%); 10% of women had no documented treatment for haemorrhage other than hysterectomy. Other treatments used were: Syntocinon infusion (76%), prostaglandin F2α (53%), ergometrine (43%), intrauterine balloons (24%), B-Lynch suture (11%), intra-abdominal packing (9%), factor VII (6%) and uterine artery ligation (5%). Women undergoing hysterectomy received a median of 12 units of blood (range 0-80), 4 units of FFP (0-21), 0 units of platelets (0-6) and 0 units of cryoprecipitate (0-27); 88% of women were admitted to ITU with a median stay of 2 days (range 1-25).

Conclusion: The national incidence of peripartum hysterectomy has been established. The condition has considerable associated mortality and morbidity. Both the severity of associated haemorrhage and its management appear very heterogeneous suggesting there is a place for national evidence-based guidelines on this topic.

References

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O11 Assessing light touch: a new level of confusion!

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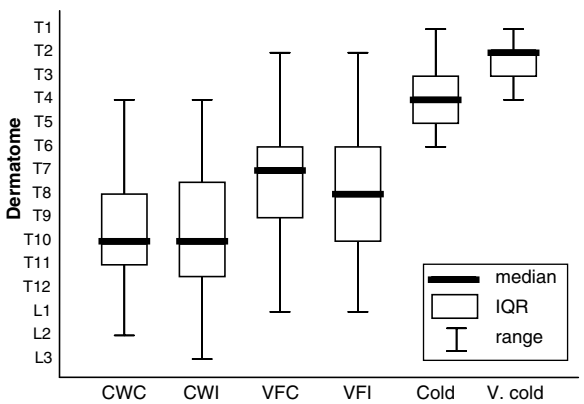
Introduction: Loss of sensation to light touch up to and including T5 is accepted as being required for a painless caesarean section.[1] However, the assessment of light touch remains undefined. We aimed to show if a difference existed in block height measurement between the various methods of temperature and light touch assessment favoured by most obstetric anaesthetists in the UK.

Methods: Verbal consent was obtained from 40 mothers to assess block height, using four methods of touch and two methods of temperature assessment. Block height was tested 10 min after receiving a 2.5-mL intrathecal injection of 0.5% heavy bupivacaine, fentanyl 20 μg and morphine 100 μg. The methods were assessed in random order. Touch was assessed using cotton wool (CW) and a von Frey hair (VF) size 12, both applied continuously (C) and intermittently (I). Block height was defined as the uppermost dermatome in which no sensation was felt. Temperature was assessed using ice and recorded at the level of 'cold' and 'very cold'.

Results:



All blocks were considered satisfactory for caesarean section to proceed. Significant differences were found in block heights between all pairs of the different methods of assessment (CW, VF and temperature: Wilcoxon signed ranked test $P<0.001$ for all), although intermittent or continuous application made no significant difference. There was a much greater range of dermatome spread for touch than temperature. Only nine mothers had a light touch block up to T5 before the start of surgery.

Conclusions: The results illustrate that light touch is difficult to standardise and temperature assessment is more reliable. Painless caesarean section can be anticipated with a light touch block lower than T5.

Reference

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O12 Sensory testing for spinal anaesthesia for caesarean section: variability and dermatomal separation

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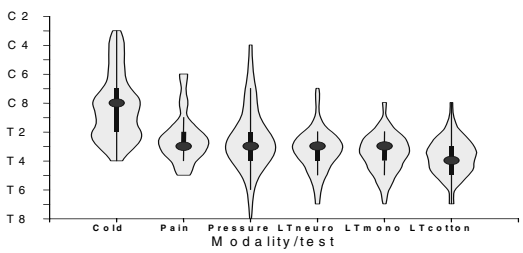
Introduction: Block to light touch at the 5th thoracic segment predicts adequate intra-operative comfort for patients undergoing caesarean section under spinal anaesthesia.[1] There is no consensus as to the best method for block assessment. This study aimed to compare the variability and dermatomal separation of six different tests.

Method: Women with a singleton pregnancy, beyond 36 weeks gestation, undergoing elective caesarean section under combined spinal-epidural anaesthesia were recruited for this observational study. An identical spinal anaesthetic was given to all. A single researcher with no clinical role assessed the block height at 20 min from the time the local anaesthetic was injected. Six tests were used in random order: ethyl chloride (cold), standardised Neuropen 40 g (pain), standardised monofilament 10 g (pressure), Neurotip stroking (light touch), monofilament stroking (light touch), cotton wool (light touch). The data were analysed using the (non-parametric) Friedman test and Dunn's multiple comparison post test.

Results: Median dermatomal level, interquartile range and frequency distribution for each test are shown in the violin plot.



The dermatomal difference between the four modalities was significant ($P<0.0001$), but paired tests failed to find significant difference between Neuropen and monofilament, monofilament and Neurotip and between the tests for light touch. The coefficient of variation was highest with ethyl chloride (24.1%) and lowest with cotton wool (10.4%).

Conclusion: Some of our sensory tests had a distinct distribution that was statistically different from others. Cold (ethyl chloride) was distinguishable from two tests of light touch (monofilament and cotton wool). It was impossible to distinguish between tests for pain (Neuropen), pressure (monofilament) and light touch (Neurotip). Ethyl chloride had the greatest variability and cotton wool the least.

Reference

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O13 Spinal and combined spinal epidural techniques are best performed at L3/4 not L4/5

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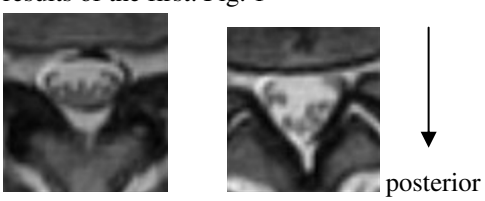
Introduction: After a number of case reports of conus damage and an editorial,[1] it was recommended that the lowest possible intervertebral space that is palpable should be used for spinal or combined spinal epidural techniques. On personal observation it was noted that failure to obtain CSF at a probable L4/5 space was common, whilst CSF was easily obtained in the space above. We conducted a retrospective review of normal lumbar MRI scans to determine if there was an anatomical reason for this observation.

Methods: After approval from the Trust's audit department, 60 lumbar MRI scans that had been requested for back pain and had been reported as normal were retrospectively reviewed. The scans were from 34 females and 26 males between the ages of 18 and 56 years. The shape of the intrathecal sac was viewed at the midpoint of the L3/4 and L4/5 space in each patient. The shape was reviewed, once by an anaesthetist who visually reported the shape as oval or triangular (with the apex of the triangle presenting to the posterior epidural space) and secondly by a radiologist, who made accurate measurements and was blinded to the results of the first. Fig. 1



Round sac at L3/4 Triangular sac at L4/5

Results: Visual inspection and measurement were equally effective at determining the changes in thecal sac shape. In four scans the results were equivocal, 10 where the thecal scan was oval at both levels but smaller at L4/5, 20 where there was no change at the two levels and 26 scans where the thecal sac changed from oval at L3/4 to triangular at L4/5. Using the test of inference from proportions in a population the change of thecal sac shape from oval to triangular in the population is 42% (95% CI 31-55%).

Discussion: This observational study provides an anatomical explanation for our observed difficulty, where it may be difficult to enter the thecal sac at L4/5 when the presenting part to the epidural space is the apex of a triangle, but easy in the space above.

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O14 Increasing depth to the epidural space: is the standard Tuohy needle long enough?

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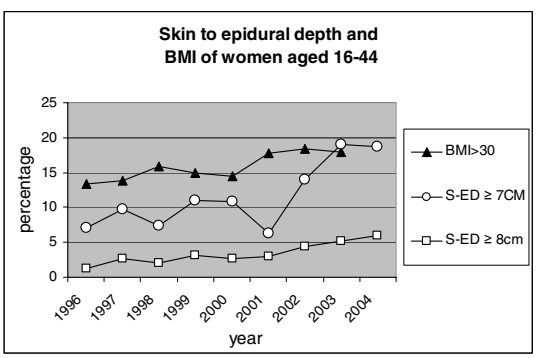
Introduction: This study investigated the skin to epidural depth (S-ED) of obstetric epidurals over the last nine years. No previous publications have reported trends of S-ED over time. The latest CEMACH report highlighted the increasing risk of complication from obesity in obstetrics.[1] Obesity can also lead to difficulties in performing regional anaesthesia.

Method: Data were extracted from the Derriford Hospital obstetric anaesthetic database, covering 1996 to 2004. The S-ED, estimated by the graduated Tuohy needle, is routinely recorded at the time of insertion. We present Department of Health national data on body mass index (BMI) for comparison.[2]

Results: 16,080 epidurals were performed over 9 years and S-ED was recorded in >95%. From 1996 to 2004 the mean S-ED increased from 5.04 to 5.66 cm. Regression analysis produced a statistically significant linear equation showing a 0.08-cm increase in S-ED per year (P<0.001). The percentage of epidurals with S-ED ≥7 cm and ≥ 8cm has increased from 7.10% to 18.71% and 1.19% to 5.91% respectively. Regression analysis showed a statistically significant linear increase in these percentages of 1.38% per year for S-ED ≥7 cm (P=0.01) and 0.52% for S-ED ≥8 cm (P<0.001).



Conclusion: Although these data show a small population increase of S-ED in obstetric epidurals, the key finding of clinical importance is the increase in percentage of epidurals sited with a S-ED ≥8 cm. It is now at 5.91% and set to be >10% by 2014. As most standard epidural Tuohy needles are 8 cm in length, perhaps it is time to start questioning if our current "standard" Tuohy needle is going to be adequate for obstetric epidurals in the coming years.

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O15 "Early-warning scoring" in obstetrics

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Introduction: The last CEMACH report[1] highlighted failure to recognise and act on common signs of critical illness in maternity patients. We undertook a prospective audit of documentation of postnatal observations to identify what parameters were recorded regularly, and the implications for workload of an "early warning scoring system" for parturients.

Method: The observation charts for patients in the post-natal ward were reviewed daily for one month. For each patient we collected data on demographics, mode of delivery, anaesthetic technique and the extent and frequency of observations until discharge. We defined abnormal (a "trigger") using accepted criteria.[2]

Results: In total 103 patients were reviewed. This represented a total of 271 "patient days." Spontaneous vaginal delivery (SVD) without anaesthetic (40.1%), emergency (14.6%) and elective (12.6%) caesarean section using spinal anaesthesia with intrathecal opioid, accounted for the majority of modes of delivery. Following a SVD, temperature, heart rate and blood pressure were checked in 93.6% of patients on day 1. This decreased, to 71.4% by day 4. All other patient groups had these parameters checked daily until discharge (100%). According to local policy, caesarean section patients also should have had respiratory rate, oxygen saturations, neurological status, pain score, nausea score and proteinuria checked. The results of the first 48 h are given below:

Obs	R.R.	Sats	Neuro	Pain	Nausea	Protein
Day 1	87.2%	33%	87.2%	87.2%	84.6%	7.7%
Day 2	62.9%	0	25.7%	51.4%	48.6%	2.9%

The largest group with abnormal physiology were patients who had undergone emergency caesarean section. The majority of their triggers occurred within the first 48 h (67.7%) with a peak incidence within 24 h (45%). The most common types were hypothermia (48%), tachycardia (19%) and systolic hypotension (14%).[2] Oxygen saturations were poorly documented.

Conclusions: The introduction of an early warning scoring system in maternity for the first 48 h only post partum would formalise current practice with little increase in workload but would miss almost one third of events. The audit identified faulty thermometers, giving an erroneously high hypothermia rate and lack of adequate pulse oximetry measurement and equipment.

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O16 Contamination of ampoules used for intrathecal injections of fentanyl and diamorphine

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Introduction: Central infection is a rare but serious complication of regional anaesthesia. The external surfaces of fentanyl and diamorphine ampoules used for neuraxial blocks are not sterile, with the potential for glass particles to contaminate their contents upon opening.[1-3] We investigated whether wiping the neck of the ampoules with alcohol before opening affected bacterial contamination of their contents.

Methods: 95 fentanyl and diamorphine ampoules used for spinal anaesthesia over three months were opened in a standard way by one of two ODPs. In half they wiped the ampoule's neck with isopropyl alcohol first, and let it air-dry. The diamorphine was dissolved within the ampoule in sterile saline drawn up by the anaesthetist from a double-wrapped sterile bag. After aspiration of drug by the anaesthetist *via* a 5-µm sterile straw, the ampoule's inside was swabbed, avoiding touching the neck. Swabs were incubated on blood agar for four days at 37°C in air, and growth was scored 0 (none), 1 (scanty) or 2 (moderate). Data were analysed with the Mann-Whitney rank-sum or Fisher's exact tests, $P < 0.05$ denoting statistical significance.

Results: 6 fentanyl and 89 diamorphine ampoules were swabbed in total. In the alcohol group no swabs grew organisms compared with 9 (18%) in the non-alcohol group ($P = 0.004$). Median (IQR [range]) score in the non-alcohol group was 1 (1-1 [0-2]; $P = 0.002$ compared with the alcohol group).

Conclusions: Bacterial contamination of fentanyl and diamorphine ampoules' contents, presumably by glass particles during opening, is common and can be reduced by wiping the ampoule's neck with alcohol. We did not investigate the efficacy of the filter straw to filter bacteria, but it has been shown that filters can reduce contamination of injectate with glass particles[1-3] and our findings provide further argument for their routine use before spinal anaesthesia.

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O17 Ten-year retrospective audit of intrathecal and epidural opioid use at Poole Maternity Unit

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Introduction: The level of monitoring required for obstetric patients after spinal opioid administration remains controversial.[1] Current national guidelines suggest hourly monitoring of respiratory rate, pain and sedation scores for 12 and 24 h in women receiving intrathecal diamorphine and morphine respectively.[2] We carried out a retrospective audit of intrathecal and epidural opioid usage and postoperative monitoring of complications in women undergoing caesarean section over a 10-year period in our maternity unit.

Method: The following data were collected from postoperative observation charts for patients receiving epidural or intrathecal opioids for caesarean section between 1995 and 2005:

- Type, dose and route of opioid administration;
- Total number of hours patient monitored after caesarean section;
- Respiratory rate, sedation and pain scores;
- Treatment of pain, nausea and pruritus.

Results: 5711 case records were examined. Women received fentanyl 0.0125–0.1 mg or diamorphine 0.15–5 mg via the intrathecal or epidural route. 89% of patients were monitored for a minimum of 4 h and 69% monitored for 8 to 12 h. There were no cases of respiratory depression. 91.5% of patients had pain scores of 0 or 1 (no or mild pain on movement) and this was achieved with 28% requiring additional analgesia in the form of paracetamol, NSAIDs or oramorph. Although 98.6% were alert or mildly sedated, 78 patients (1.4%) were moderately or severely sedated. 7.68% required anti-emetic treatment and 10.2% had pruritus, of which 3.3% required treatment.

Conclusion: Over two-thirds of our patients were monitored for 8 to 12 h. With close monitoring, 91.5% of women had good pain relief with the help of additional analgesia. There were no cases of respiratory depression but 1.4% of patients were moderately or severely sedated. This study has shown the value of close monitoring, which allows optimisation of analgesia and early treatment of side effects.

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O18 Are women with obstetric cholestasis different?

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Introduction: Obstetric cholestasis, (OC) affects 0.7% of pregnancies in the UK. It is characterised by raised fetal and maternal serum bile acids and is associated with increased fetal loss. Delivery at 37 weeks is standard management.[1] Early induction and decreased vitamin K absorption increase the risk of postpartum haemorrhage. Anaesthetic issues include increased risk of surgical delivery due to intrapartum fetal distress, failed preterm induction of labour and the possibility of coagulation abnormalities.

Method: All OC cases between 1996-2003 in our unit were scrutinised. Cases were identified by the presence of raised bile acids (>14 μmol/L) or clinical manifestations of OC. Records were searched for coagulation abnormalities, anaesthetic interventions and complications and outcome of labour. Those with multiple pregnancy or pregnancy-related diseases were excluded. Unaffected controls for the labouring women were the next woman who delivered, matched for parity and onset of labour. Women with significant pathology were excluded from the control group.

Results: 65 cases were identified; 11 had pre-labour caesarean section; 8 went into labour spontaneously and 46 were induced, the majority at 37 weeks. The incidence of operative and instrumental delivery was no greater than for matched controls. One patient had abnormal coagulation antenatally that corrected after vitamin K; all patients had normal coagulation profiles by the time of delivery. Five OC cases had post-partum haemorrhage: three following vaginal delivery; versus six in the control group. 71% of labouring women overall had regional analgesia. Again the two groups did not differ in this respect. One patient in each group had general anaesthesia for urgent section; all the others had regional anaesthesia. There were no recorded major anaesthetic complications associated with bleeding. One woman in the control group required caesarean hysterectomy and went to ITU post-partum.

Discussion: Neither the condition itself nor the obstetric management increased anaesthetic workload. Unlike previous series, the incidence of PPH was not increased.[2] With normal coagulation profile, there is no apparent contraindication to regional analgesia.

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P01 Haemodynamic effects of intravenous bolus or infusion of oxytocin in women undergoing caesarean section

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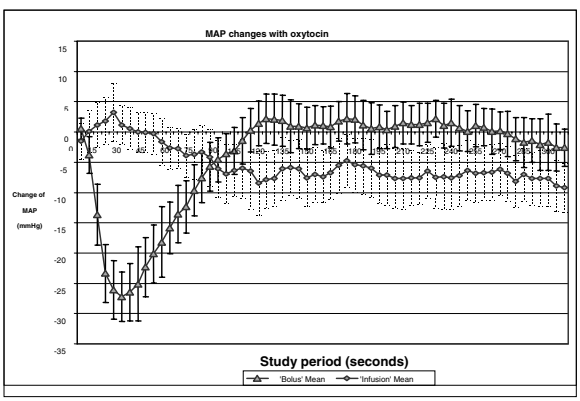
Introduction: The haemodynamic effects of intravenous oxytocin have been documented, but not widely appreciated. This was highlighted in the Confidential Enquiry into Maternal Deaths. This study was designed to determine the cardiovascular effects of an intravenous bolus versus infusion.

Method: After local ethics committee approval was obtained, 30 women having elective caesarean section were recruited. They were randomly allocated to receive a 5-units i.v. bolus of oxytocin (bolus group) or an i.v. infusion of the same dose over 5 min (infusion group) at delivery of the baby. Routine monitoring, intravenous access and intra-arterial pressure monitoring were established before standardised subarachnoid anaesthesia. Haemodynamic variables were downloaded from the anaesthetic monitor to a laptop computer every 5 s.

Results: Women in the bolus group had a maximum change in mean arterial pressure of -27 ± 7.6 mmHg and maximum change in pulse rate of +17 ± 10.7 beats/min compared with -8 ± 8.7 mmHg and +10 ± 9.7 beats/min in the infusion group (P <0.01). Estimated blood loss was similar in the two groups.



Conclusion: Intravenous bolus of oxytocin causes significant decreases in mean arterial pressure even in healthy women. Administering it as an infusion over 5 min provides greater haemodynamic stability with no apparent increase in estimated blood loss.

P02 A comparison of the effects of CSE and spinal on maternal and fetal haemodynamics during caesarean section

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Introduction: The safety of spinal over epidural anaesthesia during caesarean section, in terms of fetal well-being, has recently been questioned,[1] although many also question the reliability of incremental epidural anaesthesia. A combined spinal epidural (CSE) technique using low doses of local anaesthetic and opioid provides the reliability of intrathecal blockade with the cardiovascular stability of an epidural catheter. Accordingly we conducted a double blind randomised controlled trial postulating that for caesarean section CSE would result in a higher fetal umbilical artery pH (UApH) when compared with spinal anaesthesia.

Method: 60 healthy parturients with normal singleton pregnancy undergoing elective caesarean section were randomised to receive either a single-shot spinal of hyperbaric bupivacaine 12.5 mg or a CSE consisting of hyperbaric bupivacaine 6 mg intrathecally, with additional doses of local anaesthetic given epidurally as required to achieve surgical anaesthesia. Both groups received diamorphine 300 μg intrathecally and an i.v. phenylephrine infusion, adjusted to maintain blood pressure at pre-anaesthetic levels. In addition to non-invasive blood pressure (NIBP), maternal cardiac output (CO) and umbilical pulsatility index (UAPI) were measured using Doppler ultrasound prior to and 5, 10 and 15 min following the institution of anaesthesia. Fetal UApH was measured soon after delivery. The time taken to start surgery, the need for supplemental analgesia during surgery and the pain scores during surgery were recorded in both groups.

Results: Patient demographics were similar in the two groups. There was a reduction in UAPI in the spinal group at 5 min. There were no other differences in maternal NIBP, maternal CO, UAPI or the need for supplemental intra-operative analgesia between the two groups. The UApH was similar in the two groups (7.37 vs. 7.36). The interval until the start of surgery was longer in the CSE group (18.7 vs. 27.5 min (P<0.05)) and the pain score during surgery was higher in the CSE group (VAS score 5 mm vs. 14 mm (P<0.05)).

Discussion: When the healthy mother, carrying an uncompromised fetus, undergoes regional anaesthesia using phenylephrine to control changes in BP, there is no maternal haemodynamic or fetal pH reason to choose CSE over single shot spinal. In these circumstances choice of a CSE technique may lead to a longer anaesthetic time and poorer pain scores.

Reference

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P03 Cerebral haemodynamics in pregnancy and severe preeclampsia: transcranial method of research

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Introduction: Analysis of cerebral haemodynamics in pregnant patients with preeclampsia represents an area of special interest. A new method of transcranial colour scan allowed us to improve and simplify cerebral blood flow investigations. The goal of the present study was to estimate and compare values of cerebral haemodynamics in pregnancy, complicated by preeclampsia and in uncomplicated pregnancy.

Methods: We designed and performed a prospective study, which included 45 patients, age 17-38 years (27.5 ±5.3 years) with a verified diagnosis of severe preeclampsia and 72 patients with normal pregnancy, 3rd trimester, without significant co-morbid states, age 19-34 years (24.5± 4.3 years); this was a control group. In the preeclampsia group cerebral blood flow and cerebrovascular reactivity were studied after initiation of treatment. All patients underwent a duplex scan of extracranial portions of brachiocephalic arteries with a linear probe, frequency 5 MHz and transcranial duplex scan (TCDS) in the area of the middle cerebral artery (MCA) (segment M1) with sector probe, frequency 2.5 MHz. By transtemporal approach in MCA M1 segment we determined peak systolic flow velocity (Vps), maximal end-diastolic velocity (Ved), time-adjusted maximal velocity (TAMX), resistance index (RI), pulsative index (PI) and systolic/diastolic ratio (S/D). Significance of mean values differences was calculated using Student's t-test with normal spread in group, and confirmed by Colmogorov-Smirnov and Lillieforts tests.

Results: From the analysis of our data we found the following: all haemodynamic values in M1 segment of MCA in preeclamptic patients were decreased in comparison with the same values in healthy pregnant women: PI (mean 0,77 vs. 0,84, $P<0,01$); RI (mean 0,52 vs. 0,54, $P<0,05$); Vps (mean 90,22 vs. 104,74 cm/s, $P<0,001$); Ved (mean 43,25 vs. 48,53 cm/s, $P<0,001$); TAMX (mean 61,48 vs. 67,30 cm/s, $P<0,01$); S/D (mean 2,02 vs. 2,06, $P<0,05$). These pathophysiological changes of cerebral haemodynamics were consistent with the dopplerographic pattern of diminished perfusion and are typical for vascular segments, which are located proximally to the zone of abnormally high haemodynamic resistance: pre-stenotic arterial segments, episodes of arterial hypertension and distal vasoconstriction. These results showed that patients with severe preeclampsia had decreased cerebral perfusion.

P04 Randomised controlled trial of combined spinal epidural vs. spinal anaesthesia for elective caesarean section: effects on cardiodynamic parameters

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Introduction: Spinal anaesthesia (SA) and combined spinal epidural anaesthesia (CSEA) are recognised as the safest forms of anaesthesia for elective caesarean section, though hypotension can be a problem. Modern bioimpedance monitors allow reproducible and accurate non-invasive measurement of cardiodynamic parameters.[1] Our aim was to find out whether one of two standard anaesthetic techniques had a smaller influence on cardiodynamic parameters of pregnant women during elective caesarean section.

Method: After ethics approval, 70 women were randomised into two groups to receive either SA or CSEA. Both groups received hyperbaric bupivacaine 12.5 mg and diamorphine 0.3 mg intrathecally, as is the current practice in the Princess Royal Maternity Hospital. All injections were made in the sitting position. After the SA or CSEA was sited at L3/4, mothers were placed supine with a 15° left lateral tilt. Ephedrine was administered whenever systolic arterial pressure fell below 20% of baseline measurement. Cardiac index (CI) and systemic vascular resistance index (SVRI) were measured every 2 min using a BioZ© impedance cardiography monitor. We also noted the total ephedrine dose during the anaesthetic and Apgar scores of the delivered neonate at 1 and 5 min. Statistical analysis was by two-sample t-test or the Mann-Whitney test.

Results: There were no significant differences in the baseline variables between the two groups.

	SA	CSEA	*P*-value
Minimum intra-op. CI	2.8 (0.7)	3.0 (0.7)	0.2588
Minimum intra-op. SVRI	1219 (277)	1157 (302)	0.3701
Total ephedrine dose*	12 (6,18)	6 (0,18)	0.3834
Time between start of preparation and readiness for surgery	10.6 (3.0)	13.3 (3.8)	0.0027
Apgar 1 min*	9 (9, 9)	9 (9, 9)	0.4453
Apgar 5 min*	10 (10, 10)	10 (9, 10)	0.7404

Data are mean (SD) and analysed by t-test, or *median (inter-quartile range) and analysed by Mann-Whitney test

Conclusion: Though there is a trend towards mothers in the SA group having a lower CI and higher ephedrine requirements this was not significant. CSEA placement required significantly more time.

Reference

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P05 Survey of vasopressor use during caesarean section under spinal anaesthesia

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Introduction: Ephedrine has traditionally been recognised as the vasopressor of choice for hypotension during CS.[1] 'When to treat and with what' has recently been reviewed, which may have resulted in a change of practice.[2] In addition, α-agonists have been advocated as an alternative to ephedrine to treat spinal-induced hypotension. In the light of this, we conducted a survey of vasopressor use during caesarean section under spinal anaesthesia in the South West (SW) region.

Methods: A survey questionnaire was sent to all anaesthetists involved in regular obstetric anaesthetic practice in the SW region (n=103). Three hypotensive scenarios were given in the survey questionnaire; each with differing heart rates.

Results: The response rate was 62%. Of the 66 respondents, 24 were consultants, 33 trainees and 9 non-consultant career grades (NCCG); 37 respondents acted on a percentage change of blood pressure, whereas 19 acted on an actual drop in blood pressure below a specific level. Nine respondents used other criteria such as nausea as a treatment threshold.

Vasopressor choice changed depending on heart rate. Ephedrine was given in 89% of cases if the heart rate was below 60 beats/min, in 54% if the heart rate was between 60-120 beats/min, and in 20% if the heart rate was greater than 120 beats/min. Phenylephrine was the second vasopressor of choice, increasing in use as the heart rate increased: 8% of cases if the heart rate was <60 beats/min, 38% if the heart rate was 60-120 beats/min, and 54% if the heart rate was >120 beats/min; 24% of respondents used metaraminol if the heart rate was >120 beats/min.

Discussion: This survey suggests a change in practice from previous surveys, with an increase in α-agonist use. It was disappointing to see that less than 10% of respondents strive to maintain normal baseline levels as has been suggested in recent editorials.[3]

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P06 Influence of uterine exteriorization versus *in situ* repair on post-cesarean maternal pain

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Introduction: This study was conducted in order to compare post-cesarean pain associated with the practice of routine exteriorization of the uterus versus *in situ* uterine repair in immediate puerperium.

Methods: This prospective study included 206 women who underwent cesarean delivery and who were randomly assigned to two groups based on the site of uterine repair; group 1: exteriorized uterine repair (n=102); group 2: in situ uterine repair (n=104). Exclusion criteria were neuraxial block and patient refusal to participate.

Results: There was no significant difference among the groups in maternal age, weight, gestational age, race, preoperative hemoglobin or gravidity. All subjects underwent general anesthesia and the uterus was opened by a low transverse incision. Exteriorization of uterus had a statistically significant association with the higher postoperative pain scores (first night: 66.66 *vs.* 43.46 $P<0.001$, second night 44.64 *vs.* 23.87 $P< 0.001$). The incidence of post-cesarean fever, wound infection, duration of hospital stay, and postoperative hemoglobin drop were similar between groups.

Conclusion: Exteriorization of the uterus for repair of the surgical incision increases first- and second-day postoperative pain significantly in women undergoing cesarean section.

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P07 Post caesarean section observations: an audit and comparison of practice between a district and a teaching hospital

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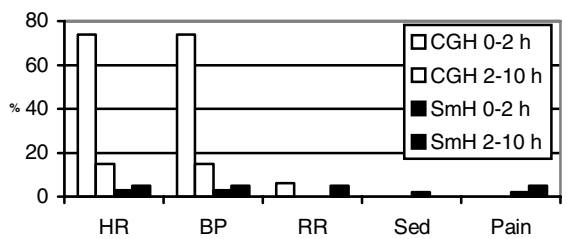
Introduction: In 2004 NICE published guidance which stated that after caesarean section blood pressure (BP), heart (HR) and respiratory rate (RR) and pulse oximetry should be recorded every 5 min for the first 30 min in recovery, then continued half hourly for 2 h, then hourly. Women who have had neuraxial opioids should have a minimum of hourly observations for at least 12 h, which should also include pain and sedation (SED) scores. We present an audit of post-caesarean section observations at Cheltenham District General Hospital (CGH: ~3000 deliveries a year) and compare the results with those of a regional maternity unit (Southmead: SmH, ~5500 deliveries a year) to see if a difference in practice exists between the units.

Method: Data from all caesarean section were collected at CGH until 50 patients were included. These included date, time, urgency, type of anaesthetic, opioid dose and route of administration and the number of observations recorded in the first 2 h, then the next 10 h. These data were audited against standards derived from NICE, which were that nine sets of observations should be taken in the first 2 h then 10 sets in the next 10 h, a set being HR, BP, RR, SED and pain scores. This was then repeated at Southmead.

Results: The bar chart demonstrates the percentage of patients meeting the standards in both hospitals.



Discussion: The results show that at CGH none of the standards were achieved although the results compare favourably with practice at SmH. The question that remains is should practice at CGH change or can the NICE guidelines be dismissed as unrealistic. The frequency and duration of observations suggested is a safeguard against the risk of delayed respiratory depression with neuraxial opioids, although we know of no reported instance amongst postnatal patients. To conclude, a local protocol should be constructed for post-caesarean section observations at CGH but it is probably unnecessary for it to adhere to the guidelines suggested by NICE.

Reference

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P08 Observational audit of intrathecal opioid-induced pruritus during caesarean section

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Introduction: Intrathecal opioids are commonly used as adjuvants during regional anaesthesia for caesarean section. Pruritus is a common complaint by patients. We wished to establish what proportion of patients actually complained of pruritus and if there was a difference in the incidence of pruritus between intrathecal fentanyl and diamorphine.

Method: We conducted an observational audit of 40 patients presenting for elective caesarean section under spinal anaesthesia, which was administered according to departmental protocols with 0.5% bupivacaine 12.5 mg and either fentanyl 25 μg or diamorphine 0.3 mg based on the duty anaesthetist's preference. We subsequently completed a questionnaire assessing pruritus using the verbal analogue score (VAS=1-10) 20 min after spinal placement, in recovery and on the ward next morning.

Results: There was a 35% incidence of pruritus in the patients who received diamorphine compared to 30% in those who received fentanyl. As expected, all those who received fentanyl complained of pruritus intra-operatively and immediately postoperatively, whereas most of those who received diamorphine developed late onset pruritus. The severity of diamorphine-induced pruritus was greatest the next day (Table).

	Fentanyl		Diamorphine	
	%	VAS	%	VAS
20 min post spinal	30%	6 (5-7)	15%	2 (1-4)
In recovery	20%	1 (1)	35%	3 (1-6)
Next morning	0%		10%	6 (5-10)

Conclusion: Although only a small number of patients were observed, our audit suggests that intrathecal opioid-induced pruritus is a significant problem. As pruritus due to diamorphine is not seen immediately, some patients may indeed be suffering silently. In accordance with published data, should these patients be given prophylactic ondansetron? Further work may be required.

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P09 Twenty-four years' experience of epidural pethidine for post-caesarean section pain relief: an alternative to neuraxial diamorphine?

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Introduction: Epidural pethidine provides effective analgesia with fewer side effects than subarachnoid morphine for post-caesarean section pain relief.[1] It has been used widely around the world, though experience is limited in the UK, partly due to the availability of diamorphine, which is commonly used intrathecally or epidurally. Since the end of 2004, problems with the manufacture of diamorphine have resulted in limited supply of this drug to many hospitals throughout the UK. Epidural pethidine has been used at the Royal Devon and Exeter Hospital for post-caesarean section pain relief since 1979, where it has been shown to provide superior analgesia compared with intramuscular pethidine,[2] and it remains today our routine method of pain relief following this procedure. We conducted a retrospective review of our experience with this technique over the years 1982 to 2005.

Method: Obstetric anaesthetic records dating from 1982 to 2005 were searched to identify cases where epidural pethidine had been administered after caesarean section, the dose given and major complications reported.

Results: We identified 5859 women who have received epidural pethidine since 1982, with no recorded major complications. The dose administered has remained unchanged since its first use in our institution. A solution made up by pharmacy of preservative-free pethidine 50 mg in 10 mL normal saline is midwife-administered as required (maximum 2-hourly) following caesarean section. The epidural catheter is removed 24 to 48 h after delivery. Comprehensive information on pain scores, frequency of dosing and frequency of complications including itch, nausea and drowsiness were not available. A recent departmental audit however found 95% of women satisfied with their pain relief and median (interquartile range [range]) number of doses of 5 (3-7 [0-11]).

Conclusion: Our extensive experience with epidural pethidine suggests it is safe and effective for post-caesarean section pain relief and an alternative to neuraxial diamorphine. We plan to conduct a prospective audit to study in more detail the influence of epidural pethidine on pain scores, frequency of dosing, side effects and maternal satisfaction.

References

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P10 Using audit to monitor and improve the quality of post-caesarean section analgesia

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Introduction: With increasing caesarean section rates the provision of adequate postoperative analgesia is a vital aspect of obstetric anaesthesia care. This allows early mobilisation and decreases the risk of thrombo-embolic disease. Quality analgesia improves the ability of mothers to cater for their infants and improves patient satisfaction.

Method: The effectiveness of our post-caesarean section pain relief protocol was audited in November 2003 and in June 2005. Fifty patients were followed up in each audit. Data obtained included medication prescribed and administered postoperatively and pain scores using the visual analogue scale on leaving recovery (0 h), at 6 h, 24 h and on mobilizing. After analysing results from the first audit the following changes were instituted: education of midwives and patients regarding the pain relief protocol and the employment of a surgical nurse to monitor patients and provide analgesia in the first 24 h after surgery.

Results: All women were prescribed medication according to protocol.

	1st Audit	2nd Audit
Not given prescribed medication	38%	14%
Pain score at 0 h		
0	100%	100%
Pain score at 6 h		
1 – 3	14% (7)	90% (45)
4 – 6	86% (43)	10% (5)
7 – 10	0%	0%
Pain score at 24 h		
1 – 3	12% (6)	90% (45)
4 – 6	54% (27)	10% (5)
7 – 10	34% (17)	0%
Pain score mobilising		
1 – 3	0%	80% (40)
4 – 6	76% (38)	20% (10)
7 – 10	24% (12)	0%

Conclusion: The audit shows the importance of education and regular administration of analgesia. In the light of the present shortage of midwives, patient care may be improved by continuing education and employing surgical nurses for the postoperative surgical needs of the patient thus freeing midwives to perform their specialised tasks.

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P11 Conversion of regional to general anaesthesia for caesarean section: an audit of practice

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Objective: Review of anaesthetic techniques for caesarean section and identification of causes for conversion from regional (RA) to general anaesthesia (GA) in a district general hospital setting.

Method: We reviewed our obstetric database for the year 2004 and analysed 1309 cases that had anaesthetic intervention during child birth. The data were further reviewed for parturients who had regional techniques but required conversion to GA.

Results: The unit caesarean section rate was 20.1%, 34% of these were elective and 66% emergency; 97% of elective and 79% of emergency caesarean sections were managed under RA (proposed standard is >95% of elective and >85% of emergency caesarean section to be managed under regional technique[1]). Eight of 606 spinals (1.3%) required conversion to GA, four during elective (1.2%) and four during emergency caesarean section (8.4%). Of 604 labour epidurals, 7.5% failed, 45/166 (27%) requiring caesarean section failed (27 for emergency caesarean section). The proposed standard for conversion from RA to GA is <1% for elective and <3% for emergency caesarean section.[1]

Reasons for epidural conversion		GA	Spinal
category I & 2 caesarean section		15	0
Inadequate pain relief	labour	6	10
	caesarean section	5	0
Maternal request		3	0
Post caesarean section conversion		1	2
No record		0	1
Accidental removal		0	1
Reasons for spinal conversion			
Inability to perform		2	
Inadequate block		3	
Post caesarean section conversion		2	
High block following repeated spinal		1	

Conclusion: The conversion rate to GA in our practice was higher than the proposed standards. The higher conversion rate was identified as being due to inadequate pain relief (21), maternal and fetal causes (15, i.e. category I and 2 caesarean section) and maternal requests (3). Monitoring of epidural analgesia in labour may be more difficult in our unit as it is based on three floors of a tower block and may be one of the reasons for high epidural conversion rate. These issues are currently being addressed and we intend to re-audit the figures for 2005.

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P12 Audit of epidural top-ups for emergency caesarean section and trial of forceps

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Introduction: The decision-to-delivery interval, and consequently the anaesthetic response time, are under increasing scrutiny. Traditionally in elective caesarean section, 2% lidocaine with adrenaline 1:200,000 is used to provide a quicker onset block than 0.5% bupivacaine with less breakthrough pain. However, a recent study in emergency cases with established labour analgesia showed no difference between the agents.[1] There is also potential for drug errors in the preparation of the lidocaine and adrenaline mixture.

Aims: To audit choice of agent, time to establish blocks and the quality of block provided in routine practice.

Method: Data were collected prospectively by the anaesthetist at the time of top-up. Completed data sheets were analysed for agent used, method of top-up (bolus over 5 min/incremental), ready for surgery time, and need for supplemental analgesia.

Results: Patients received either lidocaine/adrenaline or levobupivacaine. Overall 62% of blocks were ready for surgery in 20 min increasing to 76% if the top-up was given as a bolus.

	Lidocaine/adrenaline		Levobupivacaine	
	Total n=22	as bolus n=12	Total n=25	as bolus n=17
Ready in 15 min	7 (32%)	5	5 (20%)	4
Ready in 20 min	17 (77%)	11	12 (48%)	11
Ready in >30 min	1 (4.5%)	0	3 (12%)	0

Block quality was similar between levobupivacaine and lidocaine/adrenaline. However when epidural fentanyl was added, 3/22 cases required supplemental analgesia compared to 8/25 without epidural fentanyl.

Conclusions: Although the block quality using 2% lidocaine/adrenaline 1:200,000 was similar to 0.5% levobupivacaine, lidocaine/adrenaline still appeared to be quicker in our practice. Using a bolus technique improves speed of onset, especially with levo-bupivacaine. We recommend that all top-ups should have additional epidural fentanyl and be given as a bolus over 5 min. If a similar ready for surgery time for levobupivacaine can be achieved as previously shown[1] we would suggest in our unit that lidocaine/adrenaline should not be used routinely for emergency caesarean section, but reserved for identified cases only, such as difficult maternal airway and fetal distress.

Reference

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P13 Anaesthesia for category I caesarean section: what are we doing and who is doing it?

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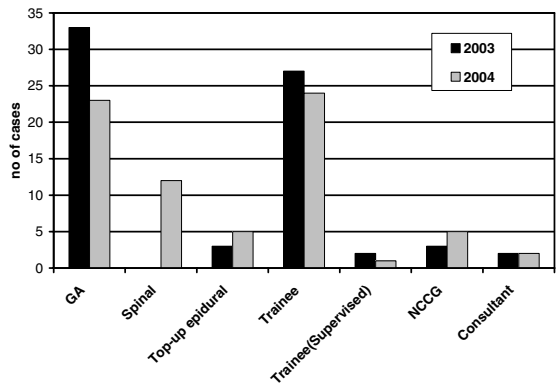
Introduction: General anaesthesia (GA) for category I caesarean section is associated with morbidity and mortality including the risk of failed intubation and aspiration. Recent literature has supported the use of the "rapid sequence spinal" as an alternative.[1]

Method: We conducted an audit of anaesthetic technique and grade of anaesthetist of all category I caesarean sections performed in 2003 and 2004.

Results: The numbers of category I caesarean sections carried out in 2003 and 2004 were 36 and 40 respectively. Annual confinement rates for 2003 and 2004 were 2928 and 2998. In 2003, 91% of these caesarean sections were performed under a GA compared with only 57% in 2004, when more regional techniques were used.



Trainees performed the majority of category I caesarean sections and were usually unsupervised (see graph) although almost half the operations were performed between the hours of 0800 to 1800. More category I caesarean sections were performed by senior trained staff (NCCG and consultant) in 2004.

Discussion: This audit suggests a trend towards the use of regional techniques for category I caesarean section in our unit, maybe following recent reports of the 'rapid sequence spinal' as an alternative to GA. Unsupervised trainees are still involved in the majority of category I caesarean sections. Recent guidelines from the AAGBI and OAA suggest a minimum of 10 consultant anaesthetist sessions per week.[2] With the introduction of this change we would expect the number of unsupervised trainee sections to decrease in future.

References

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P14 So how many sections can you do in one day?

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Introduction: We are very aware of the increasing caesarean section rate in our unit; our routine audit has revealed it to be over 30% in some months in 2005. This has big implications for anaesthetic workload in a busy obstetric unit. Our colleagues, the obstetricians, seem to have a very different view about how many sections it is possible to do in one day.

Methods: We decided, therefore, to audit our elective sections over a two-week period. We took precise timings of all aspects of a patient coming to theatre for elective caesarean section and then leaving for the recovery room. This included the time taken to site the i.v., to site the spinal or CSE, for the anaesthetic to be fully effective, the surgeons to scrub, and at the end of the procedure to have the patient moved to her bed.

Results: We performed 30 elective sections over two weeks. The total theatre time for each section was 81 min (SD±15.9) and surgical time was 33.8 min (±10.2). The difference between anaesthetic time and surgical time was 47.1 min (±12.3). If four elective sections were done in one day the anaesthetic time would be 5.4 h but the surgical perspective of the same experience would be 2.2 h. This means that the actual anaesthetic time is more than double the surgical time

Conclusions: Traditionally the obstetrician is called when the patient is ready for surgery and also leaves theatre to write up the notes at the end of the operation. This gives the operator a very different view of the time taken for a caesarean section and may lead to too many elective sections being scheduled for one day.

P15 Survey of regional anaesthetic and difficult airway equipment in Croatian obstetric units

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Introduction: Nine Croatian obstetric units were visited by an international team, to promote regional anaesthesia for labour and delivery. The availability of regional anaesthetic and airway equipment in each unit was audited to assess each unit's ability to provide a regional anaesthesia service and to assess ability to deal with difficult or failed intubation.

Method: Each member of the team was issued with an inventory of regional and airway equipment to complete on location.

Results: *Regional equipment:* Pre-prepared epidural kits were widely available. Filter needles for drawing up drugs were unavailable. Epidural infusion pumps were available in six units, only two units had a PCEA pump. Pencil point spinal needles were available in only five units; the remaining four units had Quincke needles only. CSE kits were available in only four units. Lidocaine 1% or 2%, bupivacaine 0.5% and levobupivacaine 0.5% were widely available. Heavy bupivacaine 0.5% was unavailable. Fentanyl was available in all units and was the most common adjunct. Ephedrine was widely available in all nine units; none of the units had α agonists. Aseptic technique was generally good and ice or crude touch were used to assess regional block.

Airway equipment: In four units, Macintosh blades were the only type available. Simple masks, oropharyngeal airways, endotracheal tubes, introducers, LMAs, suction equipment, Magill's forceps, simple cricothyrioidotomy and tracheostomy equipment were widely available but nasopharyngeal airways, bougies, LMA-ProSeal, intubating LMAs, Combitubes, intubating bronchoscopes, jet ventilation or quicktrach systems were not. Seven units had no difficult/failed intubation protocols.

Discussion: Although Croatian obstetric units had a limited range of regional anaesthetic equipment, most team members felt that increasing this alone without improving the infrastructure of the service, with guidelines and structured training, would not improve the obstetric regional anaesthesia service. The equipment available for dealing with difficult or failed intubation was limited and insufficient to meet the UK Difficult Airway Society Guidelines.

Reference

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P16 Audit on maintenance of anaesthetic record in caesarean section

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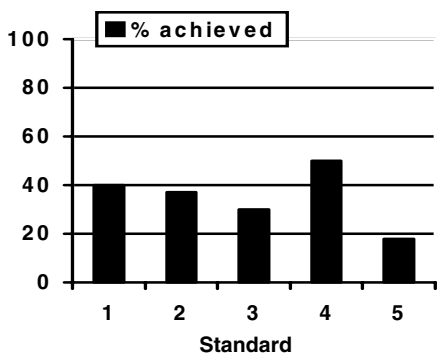
Introduction: Caesarean section is the most common operation performed in this hospital. Documentation of events is vital for medico-legal purposes and is crucial in improving the quality of anaesthetic services for the parturient. The present audit was designed to analyse our anaesthetic records against the set standards drawn up by the Royal Colleges of Anaesthetists[1] and AAGBI.[2]

Method: The project is a retrospective study involving 100 caesarean sections performed at Hull during the months of January to April 2005.The data were analysed against the target criteria using a proforma that was designed from the guidelines of the RCOA[1]and AAGBI.[2] The standards for the audit are:

1. 100% of anaesthetic records should include RCOA minimum data for the anaesthetic record.
2. The outcome, timing and level of regional block before surgery in all cases.
3. End-tidal concentration of volatile agent in all general anaesthetics.
4. 100% record of timing of decision-delivery interval, start of anaesthesia, skin incision, uterine incision and delivery of the baby
5. Comment about pain during surgery and treatment offered with full details in all cases.

Results:



Conclusion: The audit showed lack of proper documentation in decision-delivery time, risk explanation, testing the block, timing of events and pain during surgery. The deficiency is significantly higher in emergencies. Hence our recommendation is to aim for a complete and clear record in all cases.

References

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P17 Anaesthetic documentation at caesarean section: a retrospective audit

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Introduction: Problems during regional anaesthesia (RA) for caesarean section can often be a cause for litigation. A clear and complete anaesthetic record is vital as the exact timing of events may be critical. The Royal College of Anaesthetists (RCA) have proposed standards for best practice.[1] 100% of anaesthetic record should have the following information: (1) outcome and time of regional block testing before surgery; (2) strict recording of the time of skin (KTS) and uterine incision (KTU) and delivery (DT); (3) pain during RA and treatment offered; (4) fetal heart rate (FHR) monitoring in theatre during preparation. We aimed to audit the anaesthetic record of caesarean sections under RA and compare them to the RCA standards.

Methods:76 anaesthetic records were audited. Data were collected about urgency of caesarean section, grade of anaesthetist, RA technique, induction time (spinal/epidural top-up), time and modality of testing RA (cold, touch or pinprick), outcome of block, KTS, KTU and DT, pain during caesarean section, treatment offered and FHR monitor in theatre.

Results:

- 100%of cases had RA technique and induction time recorded.
- Only 14.5% (11/76) had time of RA testing before surgery noted.
- Although 86.8% (66/76) recorded block height, only 53.9% (41/76) noted the modality of testing.
- 36.8% (28/76) recorded KTS, 15.8% (12/76) noted KTU and 52.6% (40/76) noted DT.
- 32.9% (25/76) noted the presence/absence of pain during caesarean section and 14.5% (11/76) noted treatment offered and its effectiveness.
- Although the FHR is routinely monitored in our theatres, it was not documented in any anaesthetic record.

Conclusion: The audit showed that record keeping in our unit falls short of the RCA standards. 100% had KTS, KTU and DT recorded in theatre but it was documented in only some of the records. Since the audit we have printed the above recommended standards of monitoring in the form of peel off stickers that have to be completed and stuck on the anaesthetic record of every caesarean section and we aim to re-audit in three months time.

Reference

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P18 A retrospective audit of caesarean sections performed under general anaesthesia

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Introduction: The 2004 Confidential Enquiry into Maternal and Child Health report has once again highlighted the increased risk of death associated with general anaesthesia for caesarean deliveries.[1] All caesarean sections in this unit were audited to determine the prevalence and circumstances of general anaesthesia over a one-year period.

Methods: The medical records of all general anaesthesia caesarean section cases for 2004 were retrospectively examined.

Results: There was 1755 caesarean sections (22.3% of all deliveries) of which 132 (7.5%) were performed under general anaesthesia; 13 records were excluded due to lack of data. The elective general anaesthesia rate was 2.2%. The emergency general anaesthesia rate was 9.6%. This table summarises the reasons for using general anaesthesia.

	Elective	Emergency	Total (%)
Severe maternal/fetal compromise	N/A	64	64 (53.8)
Maternal request	3	1	4 (3.4)
Regional block contraindicated	5	8	13 (10.9)
Bleeding	4	5	9 (7.6)
Regional block failure	3	15	18 (15.1)
Others		3	3 (2.5)
No recorded reason		8	8 (6.7)
Total	15	104	119

There were 15 cases of regional anaesthesia failure in the emergency group, six spinals and nine epidurals. Eight of the epidural cases (functioning for labour) were category II and III caesarean sections converted intra-operatively.

Conclusions: General anaesthesia and conversion rates from regional anaesthesia for caesarean sections compared favourably with the RCA targets.[2] 86.5% of general anaesthetics were performed for reasons within international guidelines. However, 6.7% of general anaesthesia caesarean sections were performed in women with functioning epidurals. These were category II and III caesarean sections, representing cases where general anaesthesia could possibly have been avoided. There was no reason for conversion given in 6.7% of cases. These findings will require current practices to be modified. We anticipate closing the audit loop by repeating this audit prospectively once these issues have been addressed.

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P19 A telephone survey of high dependency units and recovery facilities within maternity units

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Introduction: A study of 14 intensive care units (ICU) in southern England showed that 1.84% of all ICU admissions were obstetric.[1] The OAA/AAGBI revised guidelines (2005)[2] set standards for recovery and high dependency facilities within maternity units. They recommend that every maternity unit that undertakes caesarean section should have a designated, staffed and equipped recovery area with specifically trained personnel. They also state that high dependency care should be near and available to the delivery suite. We have therefore conducted a pilot study to determine the facilities for recovery and high dependency care within maternity units in our region.

Methods: We conducted a telephone survey of hospitals within London and Essex regions. We contacted the on-call obstetric registrars at each centre and collated and analysed the data.

Results: We surveyed 14 hospitals. These included teaching and district general hospitals. The delivery rates of these hospitals were between 2600 and 4600 per annum.

- Eight units (57%) had HDU facilities within their delivery suite. The number of beds varied from 1-6.
- Two maternity units did not have access to an ICU on site. Four units (29%) required transfer via ambulance to the general ICU. Distances between the maternity unit and ICU varied from 200 metres to 10 kilometres.
- Seven of the HDUs were able to offer invasive monitoring.
- Eleven hospitals (79%) had a designated recovery area within the delivery suite.
- The majority of recovery care was undertaken by midwives. However, in 29% of units recovery staff were available within working hours.
- There was uncertainty in the level of recovery and HDU training the midwives had received.

Conclusions: Our survey revealed that there is a wide variation in the recovery and HDU services between maternity units within the region surveyed. Although we aim to attain the standards set, there appear to be deficiencies.

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P20 Postoperative neonatal oxygen saturation after caesarean section: comparative study using sevoflurane and isoflurane with 50% nitrous oxide in oxygen for general anaesthesia

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Background and goal of study: The study was designed to evaluate difference of oxygen status and other blood gas analyses of neonate after extraction, and 5 min later using sevoflurane and isoflurane combined with mixture of 50% nitrous oxigen and oxygen during caesarean section.[1,2]

Materials and Methods: The randomized study included 22 mothers, ASA I-II at the term undergoing caesarian section. General anaesthesia was induced in both groups with propofol 2 mg/kg, and succinylcholine 1.5 mg/kg to facilitate tracheal intubation. Spqr Parturients received in first group sevoflurane used in 0.5-1% progressive incremental dosing up, and second group received isoflurane in dose 0.5-0.75%, using in both groups mixture of 50% nitrous oxide and oxygen. After extraction of neonate we evaluated PaO_2 and SaO_2 and other gas analyses in umbilical artery and vein, and after 5 minutes we analysed capillary blood samples, and scoring of global respiratory function of neonate.

Results:

Table 1. Mean umbilical vein (UV) and artery (UA), maternal artery (MA) PaO_2 and SaO_2 at delivery (kPa) and capillary (Cap) PaO_2 and SaO_2 5 min after delivery.

	PaO_2				SaO_2			
	MA	UV	UA	Cap	MA	UV	UA	Cap
Sevofl	23.2	5.2	2.6	7.8	99.6	72.9	27.8	89.2
Isofl.	19.0	4.9	2.4	4.9	99.3	70.5	22.5	65.8

There were no significant differences in Apgar score or respiratory function between neonates in the two groups.

Conclusion: This study demonstrated that maternal administration of sevoflurane and mixture of 50% nitrous oxide and oxygen during the induction to delivery interval significantly increased the umbilical vein and artery PaO_2 and SaO_2 at birth than combination of isoflurane and mixture of 50% nitrous oxide and oxygen.

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P21 Neurological complications post-partum: a survey of knowledge in the Southampton area

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Introduction: Neurological complications after delivery may be transient or permanent, trivial or devastating.[1] It is important that healthcare professionals, in both the hospital and community setting, who come into contact with these complications have a working knowledge of the causes and presentations. The few, very serious complications must be recognised by all and be referred appropriately. We assessed the understanding of some complications across different specialty groups.

Method: A questionnaire was distributed to 10 randomly selected people in each of the following local specialty groups: obstetricians (obs), anaesthetists (anaes), midwives (MWs) and general practitioners (GPs). Five scenarios were described and the respondents asked to suggest a diagnosis, say to whom they would refer the patient, and the urgency of the referral.

Results:

Question number		Obs	Anaes	MWs	GPs
1. Peroneal	correct diagnosis?	80%	90%	70%	60%
nerve lesion	appropriate referral?	80%	90%	70%	60%
	recognition of urgency?	50%	90%	60%	60%
2. Epidural	correct diagnosis?	80%	100%	10%	80%
abscess	appropriate referral?	80%	100%	40%	90%
	recognition of urgency?	60%	100%	50%	90%
3. Femoral	correct diagnosis?	50%	40%	30%	80%
nerve lesion	appropriate referral?	50%	90%	80%	60%
	recognition of urgency?	60%	100%	50%	100%
4. Local	correct diagnosis?	80%	70%	60%	80%
trauma	appropriate referral?	60%	40%	70%	80%
	recognition of urgency?	80%	40%	50%	60%
5. Epidural	correct diagnosis?	50%	90%	30%	60%
haematoma	appropriate referral?	60%	100%	60%	100%
	recognition of urgency?	60%	100%	50%	100%

Conclusions: Knowledge was good regarding common complications relating to individual specialist groups. A broad knowledge, however, was lacking. The overall recognition of potential devastating neurological sequelae after regional analgesia was poor. We feel that further education is vital for all who have contact with new mothers. This will prevent serious neurological diagnoses being missed and ensure optimum care for all women. We plan to organise teaching and a written information booklet for relevant groups within our hospital to address this locally.

Reference

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P22 Searching Google about epidural related paralysis

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Introduction: Women considering labour epidural analgesia may fear its very rare complication of permanent paralysis.[1] When preparing for labour, women might consult the internet to see how commonly this occurs. However, information on the internet is not professionally regulated and may be misleading. The purpose of this study was to see if information on the internet regarding the likelihood of suffering epidural-related paralysis was similar to that generally accepted by medical literature.

Method: The search terms "epidural" and "epidural paralysis" were considered most likely to be used by concerned women and were submitted to the popular search engine Google.co.uk in two separate searches (December 2005). The first thirty websites from each were analysed. Websites that were clearly not related to regional anaesthesia/analgesia and duplicated websites were eliminated. Websites that mentioned paralysis as a complication were selected and analysed to see what mention was made regarding the likelihood of epidural related paralysis happening.

Results: After elimination, there were 18 websites mentioning epidural related paralysis. In these, four didn't mention likelihood and one said that epidurals weren't associated with paralysis. The remaining mentioned paralysis as: extremely uncommon/rare (4); very rare (2); rare (2); very low incidence (1); risk of severe neurological complications 1:11,000 (1: if this included paralysis wasn't stated); about epidural abscess and paralysis, mentioned that abscesses occurred rarely (1); described paralysis in the historical Woolley and Roe case and mentioned studies with large series of patients with no permanent neurological sequelae (1). In one website a woman described herself becoming permanently paralysed following a labour epidural where the Anesthesiologist had mentioned "That never happens (paralysis), that's just an old wives tale."

Conclusion: Four websites didn't mention the likelihood of paralysis and thus left its estimation to the women's imagination. The website with the unfortunate patient experience may have made some women distrust professional information. One website was falsely reassuring by not associating epidurals with paralysis. However, the majority of websites that mentioned paralysis indicated that it is an unlikely event, and thus agreed with current medical literature.[1]

Reference

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P23 Audit of epidural venous puncture during epidural and CSE insertion. in the obstetric population

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Introduction: It was observed that epidural venous puncture was more common with combined spinal epidurals (CSE) than with epidurals in pregnant women. It was postulated that epidural veins are displaced by saline injection during the loss-of-resistance technique with epidurals performed alone, but during CSE there is a time delay between saline injection and placement of the catheter, which may increase the chance of epidural venous puncture.

Methods: 38 women received CSE and 38 epidural for analgesia in labour or for caesarean section. Each woman's booking BMI was recorded. A 16-gauge epidural needle/26-gauge pencil-point spinal needle CSE kits and 18-gauge epidural kits were used. If and when blood was encountered during the procedure was recorded. For the CSE technique it was stipulated that saline should not be injected via the Tuohy needle between the spinal dose being injected and the catheter being inserted.

Results: There was a statistically greater incidence of frank blood encountered via the epidural catheter with CSE than with epidurals.

	CSE n=38	Epidural n=38	*P* value
Total venous puncture	26.3%	18.4%	0.409
Frank blood in catheter	13.2%	0%	0.021
Staining of catheter with blood	5.2%	7.9%	0.644

There was correlation between a BMI >30 kg/m^2 and the incidence of epidural venous puncture in the epidural but not the CSE group.

Conclusion: Epidural venous puncture is more common during CSE than epidural insertion in pregnant women. Injecting a further volume of saline via the Tuohy needle immediately before epidural catheter insertion during CSE procedures may avoid this.

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P24 Subcategory analysis of accidental dural puncture following epidural insertion

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Introduction: Accidental dural puncture (ADP) is a recognised complication of epidural insertion. This can be manifest in three ways: (1) identifying CSF in the epidural needle, (2) recognising an intrathecally sited epidural catheter by either seeing CSF in the catheter or obtaining a block consistent with spinally placed local anaesthetic and (3) the patient experiencing post dural puncture headache (PDPH) without obvious complications during insertion. In our unit, not based on local data, we quote a national standard 1% PDPH rate and a success rate for epidural blood patching (EBP) of around 75%. Our aim in this study was to see if these figures were valid for our staff and patient population, by analysing the different subcategories of ADP.

Methods: The study design was a retrospective analysis of data from 23 months, starting January 2004, in a teaching hospital maternity unit. Baseline patient information was obtained from the hospital computerised record system. The department log provided details of epidural complications (including late referrals from the community) allowing patients to be allocated to one of the three groups listed above.

Results: There were 10 324 deliveries; 3211 labour epidurals (31.1%) were performed. ADP incidence was 1.9% (60 patients): 28 recognised ADP, 12 spinal catheters, and 20 headaches without obvious insertion complication. Actual PDPH incidence was 1.2% (40 patients), the breakdown of which is as tabulated.

	PDPH rate	Blood patch rate	Repeat patch rate
Recognised ADP (n=28)	14 (50.0%)	11/14 (78.6%)	4/11 (36.7%)
Spinal catheter (n=12)	6 (50.0%)	5/6 (83.3%)	1/5 (20%)
Unrecognised, but PDPH (n=20)	20	8/20 (40%)	1/8 (12.5%)

Conclusion: Although slightly above 1%, our overall PDPH rate was consistent with quoted figures,[1] as was the rate of PDPH following recognised ADP.[2] Analysing the subcategories, however, suggests that the need for, and success of, blood patching may vary depending on how the ADP presents. Therefore quoting a standard 75% success rate for EBP may not be valid. Using these data we are now able to give our patients more detailed risk and benefit information.

References

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P25 Does audit feedback reduce accidental dural puncture rate?

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Introduction: Accidental dural puncture (ADP) leading to post dural puncture headache (PDPH) is a recognised complication of epidural insertion, which can have serious adverse consequences. It has been proposed that departmental ADP rates should be audited.[1] We postulated that by producing a monthly audit report of ADP rate we would encourage best practice and perhaps reduce this rate. Therefore, we audited the effect of introducing a system of monthly feedback of accidental dural puncture rate (ADP) on the future ADP rate.

Methods: The design was a two-stage prospective audit covering 22 months and 9879 deliveries, from January 2004 in a teaching hospital maternity unit. The ADP rate was collected monthly, derived from the unit reporting system. ADP was defined as a recognised tap at insertion, a block pattern that suggested an intrathecally placed catheter, or subsequent signs and symptoms typical of PDPH (including re-referrals after discharge). The first 11 months' data were not publicised. A monthly report detailing the ADP rate was produced for all anaesthetists in the unit during the second 11-month phase. The overall rate for the first time period was included in these reports to act as a baseline reference or target figure to improve upon. The overall ADP rates in the two time periods were analysed by Mann Whitney U-test.

Results: A total of 3085 epidurals (31.2% of deliveries) were recorded. Results of the two groups are as tabulated:

	1st 11 months	2nd 11 months
ADP rate mean % (±SEM)	1.23±0.27	2.36±0.39

Difference significant at P=0.04

Conclusion: Unexpectedly the introduction of an audit feedback system was associated with an increase in the ADP rate. It is not clear if this was a causal association, or what the mechanism for this might be. Whilst our ADP rates remain within previously described levels of between 0 and 2.6%[2] the increase does need addressed. This audit however suggests that a system of audit feedback alone does not reduce a unit's accidental dural puncture rate.

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P26 Retrospective audit of accidental dural puncture management in labour epidural analgesia

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Introduction: Accidental dural puncture is a definite source of morbidity and mortality to obstetric populations. Large numbers of labour epidurals are performed by anaesthetic departments with the majority of the workload in the UK falling on trainees. The incidence of accidental dural puncture (ADP) during the technique of epidural catheter placement in the obstetric population has been quoted as between 0.19-3.6% in UK obstetric anaesthetic departments.[1] ADP is usually managed by either subarachnoid catheter or epidural re-site. Departmental management of ADP was audited over five years.

Methods: The following data were extracted from case records and a computerised audit system: recognition of ADP, method of analgesia provided after ADP, time from ADP to epidural blood patche (EBP), grade of operator, efficacy and number of EBPs, consultant input and overall departmental rate of ADP.

Results: A total of 52 cases were identified. All patients were reviewed by a consultant and all epidural blood patching was undertaken by a consultant or supervised directly by a consultant. The departmental rate of ADP over a five-year period was approximately 0.7%. Eighty two percent of women with PDPH required at least one EBP. One third experienced a recurrence of symptoms: 20% required a 2nd patch providing 100% sustained relief of symptoms. Use of subarachnoid catheters was limited and provided satisfactory analgesia in 55% of cases. ADP was initially unrecognised in 30% of PDPH cases.

Conclusion: Our department favours epidural re-site as opposed to a subarachnoid catheter for the immediate management of ADP. This seems to be in common with UK as opposed to North American practice. Our success with subarachnoid catheters however is poor by comparison with published literature.[2] Unrecognised dural breach remains a concern with approximately 30% of ADPs going unrecognised by the operator. A high index of suspicion for ADP must be maintained with difficult insertion, as catheter misplacement is potentially disastrous. Sub-arachnoid catheters are inherently safer as appropriate doses of drugs are used when compared to an epidural re-site and appear to reduce the risk of PDPH.[2]

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P27 Incidence of readmission for post dural puncture headache at North Staffordshire Royal Infirmary

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Introduction: The ineffectiveness[1] of various management strategies for PDPH, and the latent period of onset of PDPH are well recognised, leading to readmissions and patient distress. We wished to exanine our incidence and reasons for readmissions for PDPH, to plan for future management.

Method: We carried out a retrospective study from April 2000 to March 2005. Patients were identified from our data records on PDPH. Information was sought from patient notes on patient characteristics, technique of regional analgesia, severity of PDPH and its treatment and effectiveness, advice given on discharge and subsequent management on readmission.

Results: A total number of 84 patients were identified with an incidence of PDPH 0.29% after a spinal and 80% after an accidental dural tap. Management strategies varied with the severity of the PDPH and the wishes of the patients. All patients discharged (with or without PDPH), were warned about the recurrence of the headache and the need to contact us.

Table 1: Method of management for dural tap and PDPH and their effectiveness

	n	Average hospital stay	Discharged with PDPH n	Readmitted n (%)
Intrathecal catheter	4	1.4 days	0	0
Saline infusion	4	4.5 days	0	3 (75%)
Expectant	61	3.75 days	26	6 (9.8%)
Blood patch	14	3.89 days	1	2 (14.3%)
Caffeine	1	5.0 days	0	0

Conclusions: Firstly**,** we identified a need to reinforce the required information through patient information sheets for PDPH. Secondly, we decided to focus more on prophylactic measures including leaving the epidural catheter intrathecally following an accidental dural puncture.

Reference

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P28 Complications of combined spinal epidural: an audit of our experience

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Introduction: There has been considerable interest in the incidence of complications following combined spinal epidural (CSE) insertion.[1] In our obstetric unit CSE insertion has been a popular mode of anaesthesia and analgesia for a number of years. We felt in a good position to examine our obstetric database and comment on our experiences.

Method: Ethical approval was deemed unnecessary for this project. Our database was searched from 2003-2005 inclusive. Information regarding indication for insertion, insertion difficulties and post-procedure follow-up was retrieved. Data were split into those women actively labouring and those not. Data were analysed using SPSS v12.0.

Results: We retrieved data for 2688 women. The table displays incidences of complications.

Complication	N	%
Dural tap needle	24	0.9
Dural tap catheter	8	0.3
High block	10	0.4
Failed spinal	131	4.9
Failed epidural	103	3.8
Blood in catheter	250	9.3
PDPH	31	1.2
Neurological symptom	16	0.6

There was no difference in incidence of complications in labouring and non-labouring women for any complication, with the exception of an increased frequency of failure to thread the epidural catheter in labouring women, 49/852 vs non-labouring 41/1302 P=0.006 (Fisher's Exact Test).

Conclusion: In line with other authors we have found that failure of the epidural or spinal component is relatively common. Blood in the epidural catheter is also a frequent event. Our overall dural puncture headache rate is in line with figures commonly quoted for women undergoing regional anaesthesia/analgesia.[2] We feel CSE is an appropriate choice of technique in both labouring and non-labouring women. It would be interesting to compare these figures with those derived for single anaesthetic techniques.

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P29 The UK Obstetric Surveillance System (UKOSS): an effective way to study rare disorders of pregnancy with anaesthetic, obstetric and midwifery input

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Introduction: Rare disorders are difficult to study, therefore knowledge is poor and management rarely evidence-based. The British Paediatric Surveillance Unit has developed a successful system to survey rare disorders in children.[1] This system was developed and modified to allow study of rare disorders of pregnancy through the UK Obstetric Surveillance System (UKOSS).[2] The system was launched in February 2005.

Method: Cases are collected through a monthly card mailing to nominated obstetric anaesthetists, obstetricians, midwives and risk managers in each UK hospital with a consultant-led maternity unit. Data collection forms for each condition are subsequently sent to each clinician reporting a case.

Results: 100% of UK consultant-led obstetric units are participating in monthly case reporting (n=230). The average response rate to the monthly mailing over the first six months was 89%. The regular UKOSS reporters in each hospital consisted of obstetric anaesthetists (24%), obstetricians (37.5%), midwives (20.6%) and risk managers (17.9%); 435 cases of the different conditions were reported over this time (table), with complete data collection for 89% (16.8% reported by obstetric anaesthetists, 30.8% by obstetricians, 26.4% by midwives and 26% by risk managers).

Condition	Number of cases reported	Expected number of cases
Acute fatty liver	30	48
Amniotic fluid embolism	5	6
Antenatal pulmonary embolism	60	30
Eclampsia	141	150
Peripartum hysterectomy	157	150
Tuberculosis	42	102

Conclusion: UKOSS is an effective system to collect information about a range of rare disorders of pregnancy from a range of clinicians including anaesthetists, and could be used in the future to study rare anaesthetic complications in pregnancy on a national basis. This information can be used to help prevention and treatment of these uncommon problems.

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P30 Buprenorphine (Subutex) as a methadone substitute: implications for the obstetric anaesthetist

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Introduction: The use of buprenorphine as a methadone substitute in the treatment of heroin addiction is gaining popularity in the UK. Its complex pharmacology, difficulties in supervised administration and limited evidence of advantage over methadone make its use contraversial.[1] In a city setting, one third of mothers presenting in pregnancy over the last two years with drug dependency problems were taking buprenorphine. Because of this drug's complex interaction with pure μ opioid agonists, a protocol based on our best current knowledge has been developed with an on-going audit of analgesia/anaesthesia for delivery.

Methods: A protocol for the administration of pure μ opioid agonists (pethidine, fentanyl and morphine) for labour analgesia/anaesthesia has been developed. The administration of a pure μ agonist to a patient on buprenorphine, which is a partial agonist/antagonist is not usually problematic, although efficacy may be limited. However, the administration of buprenorphine in high doses to a patient who has recently had a pure μ-agonist should be avoided, as an acute withdrawal state can be precipitated. Our protocol divides buprenorphine users into three groups: <4 mg daily, 4-16 mg daily and >16 mg daily, which places the mothers into relative risk groups for precipitating acute withdrawal when re-instituting buprenorphine. In our protocol, the usual doses of i.m. pethidine and epidural fentanyl are allowed and fentanyl can be given as part of a balanced technique for caesarean sections under spinal, epidural or general anaesthesia. Morphine as a long-acting μ agonist is avoided because of the potential problems re-introducing buprenorphine post partum. The mother's usual dose of buprenorphine is recommenced early in the post partum period and can be supplemented with additional 2-mg tablets prn. Tramadol is avoided.

Results: 19 women on buprenorphine have delivered. One mother on >16 mg of buprenorphine used Entonox only. Mothers had no analgesia (1), Entonox (8), pethidine (2), Entonox and epidural (2), Entonox pethidine and epidural (1), elective CS under spinal (2), unknown (3). The use of local anaesthetic only epidurals for post caesarean section pain relief has been unpopular because of motor blockade. Buprenorphine is re-instituted early for analgesia after caesarean section.

Conclusion: We have successfully introduced this controversial drug into our labour analgesia guidelines. Audit by our substance misuse midwife and close liaison with the obstetric anaesthetists continue.

Reference

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P31 Diabetes in pregnancy: an audit of anaesthetic practice

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Introduction: Diabetes is a multisystem disease associated with a high caesarean section rate for delivery.[1] Regional anaesthesia is the gold standard in obstetric anaesthetic practice for delivery by caesarean section. However, because of emergency obstetric intervention and associated obesity, this group of patients can be particularly challenging to the obstetric anaesthetist.

Method: The University Hospital of Wales is a tertiary level maternity centre with 5500 deliveries per year. Data were obtained from our IT database (PROTOS®) for a period between 2000 and 2005

Results: Information was retrieved on 281 women. One hundred and sixty five women (58.7%) had gestational diabetes, 93 (33%) had pre-existing insulin-dependent diabetes mellitus and 19 (6.7%) pre-existing non insulin-dependent diabetes mellitus. The overall caesarean section rate for women with diabetes was 63% (overall average in unit is 24%). Around half of these caesarean sections were emergencies. The instrumental delivery rate was 6.2%. The epidural rate for labour was 27.2%, comparable with the overall average in the unit. Anaesthetists were directly involved in the care of 207 patients (73.6%).

Anaesthesia for caesarean section	Number (%)
Spinal	124 (72.9)
Epidural top-up	23 (13.5)
Combined spinal-epidural	14 (8.2)
General anaesthesia	11 (6.4)

Discussion: Diabetes is associated with maternal multisystem disease, metabolic and electrolyte imbalance and obesity. The recent CEMACH report stresses the various implications of diabetes in pregnancy.[2] Diabetes is a significant risk factor and 73% of mothers needed direct anaesthetic involvement. Almost half these anaesthetics were given in an emergency setting and regional techniques were used in 94% of caesarean sections. The duty anaesthetist is informed when *all* diabetic mothers are admitted to the delivery suite and early involvement at this stage allows a high rate of regional anaesthesia to be used, with appropriate senior involvement if required.

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P32 Placenta praevia, Syntocinon dose and the 2001 Confidential Enquiry into Maternal Deaths

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Introduction: The Confidential Enquiry into Maternal Deaths 1997-1999 (CEMD) recommended a 5-unit dose of Syntocinon at caesarean section.[1] We performed a retrospective audit of the impact of this advice on initial bolus Syntocinon dose and further management during caesarean section for placenta praevia.

Method: Women who had caesarean section for placenta praevia between April 1999 and May 2004 were included. The case notes were examined for details of peripartum management. Fall in haemoglobin was corrected for blood transfusion by subtracting 1 g/dL for each unit transfused. Analysis was by χ^2-squared and unpaired t test.

Results: Complete data were available for 105 women, 50 pre-CEMD and 55 post-CEMD. The initial dose of Syntocinon was 10 units in 45 cases and 5 units in 5 cases pre-CEMD, whereas post- EMD it was 10 units in 27 and 5 units in 28 (P<0.0001). Further management was analysed according to the initial dose of Syntocinon (Table).

	Initial dose	
	5 units	10 units
Further doses of Syntocinon required *	19/33	5/72
Total bolus dose [units; mean (SD)] **	8.5 (3.8)	10.7 (2.6)
n receiving Syntocinon infusion	31/33	64/72
n receiving other uterotonics	3/33	15/72
Estimated blood loss [mL; mean (SD)]	1165 (1494)	946 (582)
Fall in Hb >2 g/dL (preop to lowest postop)	10/33	24/72
Fall in Hb >2 g/dL (corrected)	11/33	30/72
Blood transfusion given	3/33	15/72

* P < 0.0001; ** P < 0.0004; all other comparisons not significant

Discussion: 87% of lead obstetric anaesthetists used 10 units of Syntocinon at routine caesarean section pre-CEMD but 83% used 5 units post- CEMD.[2] A smaller change has occurred in our hospital in cases of placenta praevia. In this audit, more cases needed a further bolus dose of Syntocinon after 5 than 10 units but despite this the average total bolus dose was lower. Syntocinon 5 units has smaller cardiovascular effects than 10 units.[3] This audit has not shown any adverse consequences of a 5-unit bolus with regular use of Syntocinon infusion.

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P33 Risk factors for blood transfusion in women with placenta praevia requiring caesarean section

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Introduction: Recently, NICE recommended intra-operative cell salvage in obstetrics. Women with placenta praevia are at high risk from morbidity and mortality from major haemorrhage. We wished to identify risk factors for major blood loss in this group where setting up a cell saver in anticipation would be cost-effective.

Method: We conducted a retrospective study from September 2002 to August 2005, including only those patients with placenta praevia who required caesarean delivery. Patients were identified from the theatre record books. Details collected were: patient characteristics, urgency of caesarean section, type of anaesthetic, grade of anaesthetist, grade of placenta praevia, previous caesarean delivery, estimated blood loss, blood transfusion in the intraoperative and immediate postoperative period, pre- and postoperative haemoglobin.

Results: Of the 15 033 deliveries there were 76 patients with placenta praevia, including one case of placenta accreta, with a transfusion incidence of 13%. 26/76 patients had had previous caesarean section. Patients who were given general anaesthesia (GA) had a mean blood loss of 1147 mL in comparison to those given a regional anaesthesia (RA): 773 mL.

Table 1. Incidence of transfusion in patients with placenta praevia

		Transfusion rate	
Grade of praevia	n	RA n (%)	GA n (%)
Low lying	32	2/23 (8.69%)	2/9 (22.2%)
Low lying with scar	9	1/7 (14.2%)	1/2 (50%)
Partial	5	2/4 (50%)	0/1 (0%)
Partial with scar	4	0/3 (0%)	0/1 (0%)
Complete	13	0/1 (0%)	0/2 (0%)
Complete with scar	13	0/3 (0%)	1/10 (10%)

Conclusion: Our study adds to the existing evidence that patients with placenta praevia given GA bled more and had a higher transfusion incidence[1] (twice in our study) than those given RA. But we failed to identify the presence of a previous scar as a risk factor. However, it is the women with repeated caesarean sections and placenta praevia whom we will consider in future for the use of the cell saver.

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P34 Massive obstetric haemorrhage: an audit at a tertiary referral centre

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Introduction: Massive obstetric haemorrhage (MOH) remains a major cause of maternal mortality. Successful management requires a multidisciplinary approach. Every obstetric unit should have a protocol for MOH and 'fire drills' should be undertaken regularly.

Method: This audit was conducted over a 10-month period (March-Dec 2005). All haemorrhages >2000 mL were included in the audit. The parameters recorded were: time of surgery, presence of predisposing factors, involvement of anaesthetic and obstetric consultants, use of invasive monitoring, pharmacological and other measures used to control the haemorrhage and ITU admission.

Results: There were 25 cases of MOH during the audit period and all were post-partum haemorrhages. Sixteen cases occurred between 0800-1700. More than half the cases had predisposing factors. Anaesthetic consultants were informed in 19 cases, and were present during 17 cases. Obstetric consultants were informed in 22 cases and were present during 21 cases. Invasive monitoring was used in 12 women.

Pharmacological measures	Number of cases (%)
Oxytocin	25 (100)
Ergometrine	20 (80)
Carboprost	12 (48)
Misoprostol	9 (36)

Eighteen women received blood transfusion, 16 received fresh frozen plasma, 10 received platelets and seven received cryoprecipitate. Four women had a B Lynch suture, five had a hysterectomy and three had uterine artery embolisation. Seven women were admitted to ITU for ventilation. No deaths occurred during the audit.

Conclusion: The maternal morbidity due to MOH remains high. Causes can include lack of familiarity with guidelines, delay in involving more senior staff and failure to adequately assess the blood loss;[1] 20% of the mothers in this audit required hysterectomy. This procedure has a huge impact for women of child-bearing age. Whilst the procedure is often life saving, should we be trying harder to avoid it? Perhaps a more focused use of blood and blood products would help, or should uterine artery embolisation, maybe performed as the primary procedure, be considered while the patient is still haemodyanamically stable?

Reference

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P35 Analysis of severe obstetric morbidity in an inner-city teaching hospital

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Introduction: As maternal mortality has become rare in developed countries, severe maternal morbidity has been suggested as an alternative to measure success and safety of obstetric interventions.[1] As part of an on-going larger study we also aimed to determine and explore the causes of severe obstetric morbidity in our unit.

Method: We conducted a descriptive retrospective review of all obstetric admissions to our intensive care unit (ICU) between January 2002 and December 2004. The labour ward and ICU databases and individual case notes were reviewed.

Results: The total deliveries during this period were 11 296. There were 22 obstetric admissions to the ICU. Two of these were direct transfers to the ICU from other local hospitals and were not included in the analysis. Of the balance 20 admissions giving an incidence of 1.78/1000 deliveries, one was a planned admission in a woman with cardiac valvular disease following an elective caesarean section. There was one maternal death due to severe HELLP.

Reason	n=20	Incidence/1000
Severe haemorrhage	6	0.53
HELLP	4	0.35
Severe PIH	3	0.27
Neurological	2	0.18
Sepsis	1	0.09
Anaphylaxis	1	0.09
Renal failure	1	0.09
Status epilepticus	1	0.09
Cardiac disease	1	0.09

Discussion: Although the reasons for admission in our analysis were similar to other studies,[2] our incidence/1000 deliveries were much less. We believe that this maybe due to the establishment of an obstetric HDU just before the period of analysis and the organisation of regular "fire-drills" in various obstetric emergencies.

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P36 Antenatal anaesthetic assessment clinic 1999-2005: review of transplant patients

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Introduction: This institution is a teaching hospital with 5000 deliveries per annum. An antenatal anaesthetic assessment clinic was established in 1999. Guidelines for referral were widely circulated and referrals are in excess of 100 per annum. Our hospital is also a centre for kidney, kidney-pancreas and liver transplantation and the regional cardiothoracic centre is recognised for heart, heart-lung and lung transplantation. We wished to ascertain the number of transplant recipients referred to our antenatal assessment clinic since inception and to review their outcome.

Method: All transplant recipients referred to the antenatal anaesthetic clinic between April 1999 and December 2005 were identified, and their case notes retrospectively reviewed for maternal, fetal and graft outcome. We also searched for any transplant recipients who had delivered at our hospital during the same time period but had not been referred to the antenatal anaesthetic clinic.

Results: Six transplant recipients were identified of whom one was not referred to the clinic. Four of these women had liver transplants, one had a heart transplant and one had a kidney transplant. There were a total of 10 pregnancies. One woman had an in-utero transfer of care due to change in residence. All seven successful deliveries were by caesarean section of which two were emergencies. There were two preterm deliveries at 34 weeks and 33 weeks and a fetal death at 36 weeks. There was a spontaneous miscarriage at 12 weeks. One baby was born with pelvo-uretro junction obstruction. One baby had a low birth weight requiring neonatal intensive care. No neonatal infections were noted. Maternal outcomes were as follows: two2 cases of preeclampsia, one urinary tract infection, one jaundice and one post partum haemorrhage. One woman required ICU admission for pulmonary oedema. There were no cases of renal failure or anaemia. None of the women had altered graft function during their pregnancies.

Conclusion: Adverse maternal, fetal and graft outcome have been reported in previous literature.[1] We found certain known complications and an increased rate of operative delivery in our sample. In agreement with previous published data, we found that successful outcome can be achieved in pregnancy in transplant recipients,with a multidisciplinary approach to their care.

Reference

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P37 Thromboembolism risk assessment: guidelines alone will not change practice!

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Introduction: Thromboembolism remains the leading direct cause of maternal death in the UK.[1] The most recent CEMACH report found that following the introduction of the Royal College of Obstetricians and Gynaecologists' (RCOG) guidelines on thrombo-prophylaxis,[2,3] although deaths after caesarean section have fallen dramatically, deaths after vaginal deliveries have unfortunately not improved.[1]

Methods: Over a six-week period, we prospectively audited the presence or absence of risk factors and the use of thromboprophylaxis in all women admitted to our unit. The mothers were classified as low/medium risks for labour and moderate/high risk for caesarean section according to RCOG risk assessment profiles.[2,3] Staff caring for the mothers was not aware of the audit. We compared the results with our previous audits in 1999[4] and 2003,[5] after which local guidelines were developed.

Results: A total of 310 women were reviewed during this period. The numbers given thromboprophylaxis:

Labour	2003	2005
Low risk	0/58 (0%)	2/17 (12%)
Medium risk	8/21 (38%)	3/3 (100%)
Caesarean section	1999	2005
Moderate risk	12/65 (18%)	21/21 (100%)
High risk	3/21 (14%)	7/7 (100%)

None of the women in the audit developed deep vein thrombosis or pulmonary embolus.

Discussion and conclusion: Our audits confirm the findings of the last CEMACH report. The last three reports recommended that all women with risk factors should be carefully screened and consideration should be given to a wider use of thromboprophylaxis. Despite the establishment of guidelines in our unit, improvement in practice was seen only in one group of women. Developing guidelines alone will not improve practice. Re-audits, education, changes in attitudes and practice by members of staff are needed if outcomes are to be improved.

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P38 Does booking body mass index of a pregnant patient affect the degree of left lateral tilt at elective caesarean section?

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Introduction: 15° of left lateral tilt at caesarean section is used to prevent aortocaval compression and supine hypotensive syndrome.[1] Patients feel insecure and unstable, however, with a tilt of 15°. The CEMACH report describes a 16% increase in obesity.[2] As a result of increasing body mass index (BMI) we hypothesize that more patients will feel unstable with a 15° tilt.

Aim: To investigate the effect of BMI on tolerance of left lateral tilt of the operating table at elective caesarean section.

Method: Advice from a local hospital ethics committee representative was obtained. Ethics committee approval was not required as this was an examination of routine anaesthetic practice. Thirty-three women were recruited at term undergoing elective caesarean delivery. Routine practice for spinal anaesthesia was undertaken. A protractor and plumb line were attached to the table, which was tilted to 15° or to when the patient felt unstable or uncomfortable. The measured angle of tilt was noted along with the booking weight and height to calculate BMI. The results were analysed using Microsoft Excel regression analysis.

Results: 33 women were recruited. The mean booking BMI was 27 kg/m^2 (range 21-37). The mean tolerated lateral tilt was 13.3° (5°-15°). There was no statistically significant correlation between booking BMI and tolerated tilt at elective caesarean section (R=0.22).

Conclusion: BMI at booking bears little relationship to BMI on the day of delivery due to the physiological process of weight gain during pregnancy. Therefore we propose to investigate the BMI and tolerated table tilt on the day of delivery. The anatomy of distribution of adipose tissue may also influence the degree of instability. Those patients who have mainly gained weight in a centripetal distribution, will have higher centres of gravity and therefore may feel more unstable. We also propose to investigate abdominal girth.

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P39 Weight gain and body mass index in pregnancy

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Introduction: The Confidential Enquiry into Maternal Deaths 2000-02 again draws attention to the fact that obese pregnant women are at greater risk from anaesthesia and should be referred to the anaesthetist early.[1] In our unit we review women with body mass index (BMI) greater than 40 kg/m^2 at booking, although it has been suggested that greater than 35 is optimal. We were concerned that a number of women were not being reviewed because their weight was normal at booking, but by the end of their pregnancy they were in the high-risk group.

Method: Over an eight-week period, we audited the booking weight and BMI of consecutive patients for elective caesarean section and weighed them as they came to theatre.

Results: The results for 88 patients are given in the table. We had hoped to present results for 100 patients but 12 forms were incomplete because the patients had not been weighed at the antenatal clinic.

	Booking	Term
Weight (kg)	73.3 (17.6)	83.9 (16.9)
BMI (kg/m^2)	27.7 (7.6)	32.2 (6.1)

Data are mean (SD)

The mean weight gain was 10.8±5.3 kg. There were four women who had not been reviewed, whose BMI at term was greater than 40 kg/m^2 (4.5%). If we reviewed patients with booking BMI greater than 35, six women would have missed review (6.8%).

Conclusion: We are missing some high-risk women and some women are not being weighed at all. We plan to re-emphasise the need to weigh all women at booking and at 36 weeks and refer women to the anaesthetist if they come into the high-risk group at either time.

Reference

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P40 Does the presence of a midline gutter make regional techniques easier in mothers with body mass indices >40 kg/m^2?

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Introduction: The incidence of obesity is increasing in young women. Body mass index (BMI) >35 kg/m^2 has been listed as an independent risk factor for maternal death.[1] Previously we have reported increased difficulty siting regional blocks in mothers with BMIs >35 kg/m^2 compared to mothers with BMI <35 kg/m^2.[2]

Aim: To identify anatomical features that predict difficulties siting regional blocks in mothers with BMI values >40 kg/m^2.

Methods: Scottish Morbidity Returns (SMR2) data were analysed for BMI >40 and case-note reviewed. Data collected included analgesia, time to site regional block, mode of delivery, presence of palpable spinous processes and/or midline gutter.

Results: 47 of 3754 were identified with a BMI >40 kg/m^2. Case-notes were available for 40 mothers; 29 weeks received a regional technique.

Table 1. Time for siting regional block and presence or absence of palpable lumbar spines and midline gutter.

Time	Lumbar spines palpable			Midline gutter		
(min)	Yes	No	No data	Present	Absent	No data
0-10	4/14	9/14	1/14	8/14	2/14	4/14
11-20	0/7	2/7	5/7	0/7	2/7	5/7
21-55	1/8	6/8	1/8	2/8	4/8	2/8

Where data were available, blocks were sited within 10 min in 8/10 mothers (80%) with a midline gutter compared to 2/8 (25%) without a midline gutter (6/8 i.e. 75% requiring 11-55 min); 5/29 (17.2%) had spontaneous vaginal deliveries, 4/29 (13.8%) had instrumental deliveries, 8/29 (27.6%) had elective and 12/29 (41.4%) had emergency caesarean sections. The overall caesarean section rate in our unit is 30%.

Conclusion: In the absence of palpable spinous processes, a palpable midline gutter appears to be a reassuring clinical feature predicting relative ease siting blocks in this study. Equally the absence of a midline gutter identifies mothers in whom siting blocks is likely to be very difficult and time-consuming. The increased need for emergency caesarean section in these high-risk mothers and their increased risk at general anaesthesia, support our recommendation for early epidural analgesia in labour.

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P41 The design of a novel ultrasound probe to guide the insertion of central neuraxial anaesthesia in obese parturients

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Background and purpose: We describe the design of a novel ultrasound transducer to guide the insertion of lumbar epidural and combined spinal epidural anaesthesia and analgesia in obese parturients. The prevalence of obesity in parturients is likely to increase in the future as prevalence of children defined as obese has increased to approximately 7% of girls between the ages of 2 and 19 years old.[1]

Method: The introduction of the needle from the side of the traditional ultrasound probe is suboptimal as the angle of needle approach has to be adjusted for different depths of the target and the needle approaches the interspinous space at an angle to the sagittal plane. The use of a novel ultrasound probe in which the needle may be advanced parallel to the plane of the ultrasound wave front will allow the gap in the image to be used as an aiming device. The gap in the ultrasound image correlates with the physical gap in the probe. The tip and shaft of the needle can be visualised throughout the advancement of the needle. The spinous processes may only be imaged if the wave front is directly above the spinous processes. Therefore correct advancement is dependant on the concurrently imaging of the spinous processes and the needle.

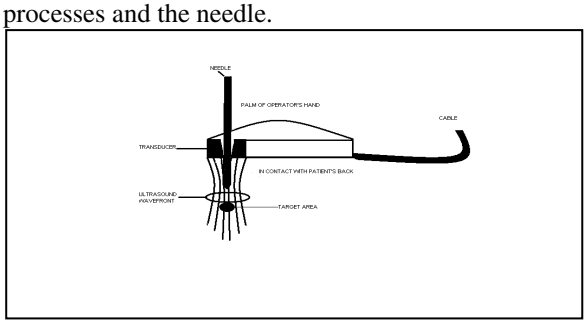

Fig 1. Cross section of novel ultrasound probe

Conclusions: To evaluate the clinical efficacy of the split-array ultrasound probe, a randomised trial is currently recruiting obese parturients scheduled for elective caesarean section, to compare the traditional clinical methods of palpation and ultrasound-guided insertion of needles for combined spinal/epidural anaesthesia.

Reference

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P42 A postal survey of lead clinicians regarding fasting guidelines and premedication for elective caesarean section in the UK

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Introduction: The last survey of acid aspiration prophylaxis was in 1994.[1] Recent evidence suggests that gastric emptying is not delayed in non-labouring women in the third trimester.[2] In the light of these findings, we surveyed 230 obstetric units to determine the current practice for fasting and premedication before elective caesarean section.

Method: A postal questionnaire (approved by the OAA) was sent out in October 2005 to the lead clinician for obstetric anaesthesia in each unit where caesarean sections are performed. A second questionnaire was sent to non-responders. Enquiry was made with regard to premedication for both general and regional anaesthesia.

Type of anaesthesia	General	Regional
Ranitidine	97%	95%
Metoclopramide	42%	38%
Sodium citrate	77%	46%
Proton pump inhibitors	2%	1.5%
Other	1.5%	3%

Results: Replies were received from 199 of 230 obstetric units, an 87% response rate; 83% of responders agreed that 6 h was the minimum fasting time for food before elective caesarean section (10% starved for more than and 7% for less than 6 h). However, 59% allowed clear fluids up to 2 h pre-operatively, 2.5% allowed fluids less than 2 h and 3.5% allowed sips until theatre. The commonest agents used for premedication were ranitidine, metoclopramide and sodium citrate (see table). Proton pump inhibitors (PPI) were sparsely used. The majority of units now admit patients on the day of surgery for elective caesarean section (93%). Arrangements are made to see high risk patients (65%) and all patients (26%) pre-operatively.

Conclusion: Ranitidine was the commonest prophylaxis used for elective caesarean section; 95% before regional and 97% before general anaesthesia, which is slightly higher than in 1994 (93%). Sodium citrate use has declined**,** especially for regional anaesthesia (46%) compared to 90% in 1994. Many units are now allowing clear oral fluids before caesarean section up to 2 h pre-operatively and admitting on the day of surgery.

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P43 Closing the loop: a survey to demonstrate the impact of guidelines on oral intake following caesarean section

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Introduction: Early feeding after caesarean section leads to reduced postoperative opioid requirements[1] without increasing gastrointestinal morbidity.[2] A survey performed in our unit in 2003 showed that patients were fasted for prolonged periods after caesarean section. Subsequently we introduced guidelines (1 h after caesarean section for fluids and 6 h for food), which we have audited.

Method: 80 patients were reviewed 24 h after caesarean section. Data collected included elective (EL) or emergency (EM) caesarean section, type of anaesthesia, opioid requirement, time to first food and drink and patient satisfaction levels.

Results: The table below compares our audit results for patients having both EL and EM regional anaesthesia (RA) and general anaesthesia (GA) from 2003 and 2005.

	Hours to first drink -mean (range)	Hours to first food - mean (range)
EL RA 2003 (n=50)	11.7	19.0
EL RA 2005 (n=31)	2.0 (0-7)	7.1 (2-18)
EM RA 2003 (n=50)	11.6	18.1
EM RA 2005 (n=35)	2.0 (0-8)	8.0 (1-16)
EM GA 2003 (n=9)	12.9	23.5
EM GA 2005 (n=14)	5.5 (2-14)	10.8 (5-17)

Dissatisfaction rates regarding time to food intake were as follows: 24% of EL patients (42% in 2003), 25% of EM GA patients (0% in 2003), and 14% of EM RA patients (25% in 2003).

Conclusion: The guidelines have dramatically reduced the period of postoperative fasting and led to improved patient satisfaction. These guidelines could be further modified as many patients actually had fluids/food before the guideline suggestion, without adverse effects.

References

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P44 Administration of antacid prophylaxis to high-risk women in labour: completing the audit loop

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Introduction: Over the last two years we have performed two audits to determine whether high- risk women in labour were receiving antacid prophylaxis according to our delivery suite guidelines. The initial audit in 2003 demonstrated that only 30% of high-risk women received ranitidine and most did not receive it for several hours after becoming high-risk. Discussion of these initial audit results highlighted that one of the main difficulties was defining which women were classed as high-risk. It was agreed that we needed to change the definition from the original long list of medical and obstetric inclusions. We thus simplified it to one where women were considered high-risk if they were either on continuous CTG monitoring or had a BMI >40 kg/m^2. The audit was then repeated at the end of 2004.

Method: In each audit we collected data from 27 high-risk women in active labour. We recorded the reason and time they had become high-risk, the proportion requiring surgical intervention, whether they had received ranitidine and the timing of its administration.

Results: 27 high-risk labouring women were audited on both occasions, a high proportion of which did require surgical intervention. Of those, one woman in 2003 and 10 women in 2004 were in labour long enough to require a second dose of ranitidine.

	2003	2004
Received ranitidine	8 (30%)	22 (81%)
Ranitidine <120 min after declared high risk	2 (5%)	14 (52%)
Received second dose of ranitidine	1 (100%)	6 (60%)
Required surgical intervention	18 (67%)	18 (67%)

A year later the re-audit showed a 51% increase in high-risk women being given their first dose of ranitidine. Ranitidine was also shown to have been given much more promptly once a high-risk woman was found to be in labour. We have now placed stickers on the CTG machines reminding midwives to give ranitidine every 6–8 h to high-risk women. In the repeat audit the delay in giving ranitidine was often cited to have been due to the midwife having to leave the room to obtain the drug from a locked cupboard. We have not been successful in our attempt to have ranitidine more freely available in the delivery rooms.

Conclusion: By simplifying the definition of a high-risk labour, coupled with further education to those on the delivery unit, we have been able to institute a substantial increase in ranitidine prescribing.

P45 Fasting and antacid prophylaxis in labour: an audit

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Introduction: In recent years, practice regarding fasting and antacid prophylaxis for women in labour has changed.[1] Our labour suite protocols reflect these changes, allowing clear fluids during active labour but fasting for solids, as well as an antacid prophylaxis protocol for low to high risk labouring women. These protocols have never been subject to audit and there were concerns whether they were being adhered to.[2]

Method: A literature search confirmed that little evidence exists regarding both these issues. We proceeded with a pilot followed by the definitive audit collecting the following data on all emergency theatre cases: time of procedure, type of anaesthetic, whether the patient was fasted and if so for how long, whether the patient was high risk, and type and time of antacid given in relation to coming to theatre. The forms were in theatre and completed by the anaesthetist.

Results:

Duration of fasting: A total of 85 emergency cases were collected over a 2-month period, of which 10 had no record of the duration of fasting. In the remaining 75 the mean fasting time for solids was 11 h (SD=6.2).

Antacid administration: In 13 women the decision to proceed to caesarean section was made soon after admission to labour ward. They obviously did not receive antacids during labour and received ranitidine (either i.v. or orally) when the decision to proceed was made. Only one received oral sodium citrate in theatre whereas protocol suggests *all* cases should.

There were 44 high risk cases (52%) of which 35 delivered by caesarean section; 1/35 received no prophylaxis, 31/35 received oral antacids (ranitidine 150 mg) and the remaining three received i.v. ranitidine in theatre; 6/35 required a second dose 6 h later, but only two received it. General anaesthesia was used twice, and one of these patients received oral sodium citrate.

Conclusion: Though the protocol is adhered to as far as the first dose of ranitidine administration, there is room for improvement in current practice. This includes follow-up doses as only a third of patients received them on time. Administration of oral sodium citrate seems often to be forgotten, as 92% of patients did not receive any.

References

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P46 Survey of attitudes of labour ward staff concerning oral intake in labouring women

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Introduction: As the incidence of gastric aspiration and resulting maternal death are extremely rare,[1] the appropriateness of a 'nil by mouth' policy during labour has been questioned. Evidence suggests that extended periods of fasting during labour might be detrimental and it may be safe to give certain drinks or foodstuffs during labour.[2,3] We were interested in ascertaining the labour ward staffs' attitude to oral intake during labour.

Methods: We undertook a paper survey of all labour ward staff (obstetricians, anaesthetists, midwives and anaesthetic assistants) over a one-month period. The questions were in a yes/no format. Data were stored and analysed using Microsoft® Excel.

Results: The overall response rate was 59% (63/106).

Table 1. Responses to survey questions.

	Yes	No
Do you think women would like to eat and drink during labour?	62 (97)	2 (3)
Should all women be offered food during labour?	11 (17)	53 (83)
Should all women be offered free fluids during labour?	41 (65)	22 (35)
Should there be a different feeding protocol for low and high risk patients?	54 (87)	8 (13)
Should women who have received i.m. opioids be offered free fluids during labour?	49 (79)	13 (21)
Should women who have an epidural (LA & opioids) be offered free fluids during labour?	48 (76)	15 (24)

i.m.=intramuscular; LA= local anaesthetic; Data are n (%).

When asked about the safety of various foods and fluids, unlimited diet (99%), unlimited fluids such as tea, fizzy drinks (85%) and isotonic drinks (59%) were not considered safe. Limited light snacks (75%), unlimited clear fluids (71%), and limited amounts (500 mL/4h) of other fluids (58%) were considered safe in labour.

Conclusion: From this survey it appears that labour ward staff feel comfortable allowing labouring women to receive free clear fluids and limited amounts of other fluids and foodstuffs, even if they have received opioids. We plan to ascertain women's views as to whether there is any drive to relax the current policy.

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P47 Decision pathway for epidural analgesia in labour

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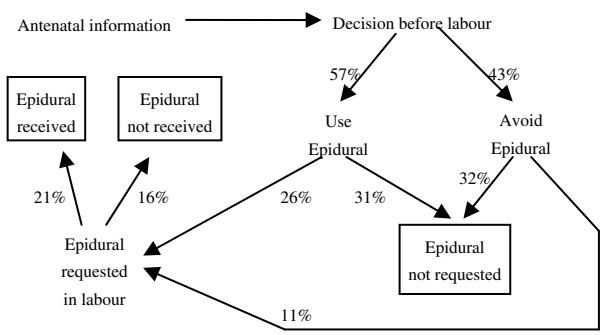
Introduction: Epidural rates in labour nationally show a wide variation.[1] This has many causes including anaesthetic cover, midwifery staffing levels and obstetric case mix. Our unit has a low epidural rate and we have received a number of complaints from those who have not received epidurals. Although maternal request is the commonest indication for epidural analgesia, there is little information in the literature quantifying maternal preferences for choice of analgesia. We sought to evaluate maternal attitudes towards epidural analgesia in the ante, intra and post partum period by using a numerical decision pathway.

Method: After local ethics approval, all mothers who delivered in one week were interviewed within 12 h of delivery using a structured questionnaire. Women who had undergone elective caesarean section were excluded. They were asked how they had obtained information about epidural analgesia antenatally and whether they wanted to use or avoid epidural analgesia. The mothers were then asked whether they requested an epidural and if so, whether they received one. Mothers were asked about their preferences for future labours.

Results: 115 mothers took part. The figure summarises their decision pathway for epidural analgesia.



46% of mothers who considered an epidural before labour went on to ask for one, while 26% of those who did not want an epidural before labour, asked for one. The overall epidural rate was 21%. However, 42% of the patients requested but did not receive epidurals; 83% were told that it was too late in labour, and 22% that there was no anaesthetist available; 96% of those who asked for and received epidural analgesia would probably have one again.

Conclusion: Almost 1 in 6 of the women interviewed asked for but did not receive epidurals, with the main excuses being either too late in labour or no anaesthetist available. The audit identified limitations in our epidural service provision, but also provided information about changes in maternal attitudes towards epidural analgesia, before and after labour.

Reference

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P48 Introduction of a guideline for epidural test dosing in Aberdeen Maternity Hospital

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Introduction: The incidence of misplaced epidural catheters in obstetric practice is low but the complications are potentially devastating. The purpose of the epidural test dose is to identify a subarachnoid or intravenous catheter without causing real or potential harm to the patient.[1,2] Limited clinical evidence exists to guide practice because of the low complication rates involved. Guidelines for epidural test dosing must therefore be based on accepted good clinical practice and the known effects of local anaesthetic solutions.

Objectives: (1) Quantify current test-dosing practice in Aberdeen Maternity Hospital (AMH). (2) Design a guideline for best practice in epidural test dosing based on accepted good clinical practice and the known effects of local anaesthetics. (3) Introduce this guideline in AMH and re-audit test-dosing practice thereafter.

Methods: Epidural test doses given from 1st November 2004 to 30th April 2005 were collated retrospectively from AMH epidural records. A guideline was developed and agreed with all consultant obstetric anaesthetists. It was distributed to all anaesthetists; all new AMH trainees received it in the introductory package; a copy was attached to the epidural trolley on the labour ward. Following introduction of the guideline, the test doses given from 1st August to 22nd December 2005 were noted and compared with the initial data.

Results: 425 epidurals were sited in the first 6-month period; 33 doses given (7.8%) were potentially unsafe, risking very high block or toxicity; 14 (3.3%) might not have identified a subarachnoid catheter. Following the introduction of the guideline, 329 epidurals were sited. 174 of test doses (52.9%) were given in adherence with the guideline. Of those given out-with the guideline, none were potentially unsafe but 24 (15.5%) might not have identified a subarachnoid catheter.

Conclusion: Since the introduction of an epidural test dose guideline at AMH the safety of practice has improved. However, there was poor compliance (52.9%) with the guideline and the number of uninformative test doses remains high. These results are disappointing. In order to address these problems we intend to reintroduce the guideline with the results of this audit.

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P49 An audit on consent for regional anaesthesia: how much do women remember while still in labour?

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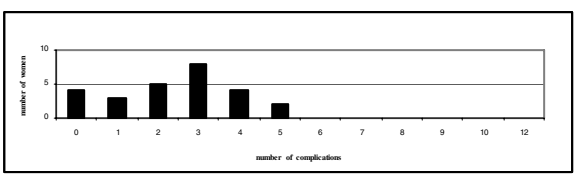
Introduction: Much has been written on consent for regional anaesthesia (RA) in labour but it is generally accepted that women remain legally competent. Of concern is that recall of information is usually poor. However, previous studies have measured recall post partum. In this audit, women were questioned within hours of a combined spinal epidural (CSE), once comfortable but still in labour.

Method: Women requesting CSE for labour gave consent in the standard manner. Twelve potential complications were mentioned (infection, hypotension, shivering, itching, retention, headache, failure, backache, nerve injury, haematoma, leg weakness and augmentation/assisted delivery) and additional factors noted (age, dilatation, contraction frequency, current analgesia, previous labours or RA, whether previous information had been given and/or read and whether English was their first language). On a subsequent visit, verbal consent was taken and, if given, the woman was asked to name any of the 12 complications mentioned at the time of consent. Results were further broken down using Kendall's tau-b correlation and the Mann Whitney tests, looking for relationship between the additional factors noted and number of complications recalled.

Results: Data were obtained for 26 women. No woman remembered more than five complications. The median was three with an inter-quartile range of 1-3.25.



Those most commonly remembered were headache, backache, haematoma and nerve injury. Correlation was found between dilatation and number of complications recalled (2-tailed sig. 0.015, R sq linear 0.277) and inversely between contraction frequency and complications recalled (2-tailed sig. 0.026 but R sq linear 0.167). The difference in recall between those who had received previous verbal information and those who had not was significant (2-tailed sig. 0.027). No other factors had significant effect on recall.

Conclusion: The rates of recall were similar to those of previous studies. However, the relationship between memory and comprehension is complex and lack of recall does not mean lack of understanding.[1] Consent should be taken from women in labour before RA.

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P50 What women want to know: antenatal delivery of information about analgesia for labour

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Introduction: A sound knowledge of analgesic options available for labour is vital to enable pregnant women to make informed decisions during labour. The main aims of this study were to establish current sources of information for pregnant women, and to identify what, when and how pregnant women want analgesic information delivered.

Method: Local research and ethics approval was obtained. Women were recruited at the end of hospital antenatal classes. A structured questionnaire was completed about sources of information for labour analgesia and preferred methods of information delivery. The risks of epidural analgesia that women wanted to be informed of were investigated using a modified Community Risk Scale tailored to the local population.[1,2]

Results: 44 nulliparous women completed a questionnaire regarding information delivery; 43/44 completed a questionnaire regarding epidural risk. Main sources of information were antenatal classes (100% of women), books (77%) and friends (73%). Antenatal classes provided the most useful information (68%). Verbal information, either one to one or group, was preferred but supporting written information was desirable; 68% wanted information to be delivered by a midwife, only 20% by an anaesthetist. The majority (68%) wanted information after 30 weeks gestation but before the onset of labour. All women felt able to make informed decisions about labour analgesia; 47% wanted to know all risks of epidural analgesia; 35% did not want to know about itch, lack of effect on backache caesarean section rate.

Conclusion: Most women want to be well informed of the risks of epidurals. Verbal information should be delivered in third trimester. If midwives are to deliver this information, anaesthetists must ensure on-going education, as previous work has revealed deficiencies in midwifery knowledge of epidural analgesia.[3]

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P51 Anaesthetic interventions during vaginal twin deliveries

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Introduction: Vaginal twin pregnancies are associated with increased perinatal morbidity and mortality (e.g. acute fetal distress, malpresentations), and anaesthetic intervention may be necessary to facilitate emergent delivery.[1] A previous survey by our group showed that 69% of California institutions perform vaginal twin deliveries in the operating room (OR), and 54% require an anesthesiologist to be present during vaginal twin deliveries. The aim of this study was to assess the frequency and the type of anaesthetic interventions for vaginal twin deliveries performed in the OR.

Methods: Following IRB exemption approval, we conducted a retrospective chart review of all vaginal twin deliveries undertaken between 1/1/2000 and 12/30/2003 at Lucile Packard Children's Hospital, Stanford, California, which averaged 5200 deliveries per year, with a 70% epidural rate, and a 24% cesarean delivery (CS) rate. By policy, all vaginal twin deliveries were performed in the OR with an anesthesiologist in attendance. We determined the duration of anesthesia care per delivery, and the frequency and type of anesthetic interventions.

Results: 81 patients underwent attempted vaginal twin delivery over the 36-month study period, and 80 patients had epidural blockade in-situ prior to attempted vaginal delivery. The median (range) anaesthetic time per delivery was 60 (20-380) minutes. In the OR, 21% of vaginal twin deliveries received an anaesthetic intervention: 15 patients received epidural "top-ups" with local anesthetic to augment the preexisting epidural block, 1 patient received intravenous sedation (midazolam 1 mg), and 1 received medication to treat hypotension. Five emergency CS were necessary (6.2% incidence) for non-reassuring fetal heart rates in Twin B. Two of these emergent five CS were performed using the preexisting epidural catheter and three CS required general anaesthesia (2 were stat GAs and 1 was an urgent GA after a failed epidural top-up).

Conclusion: No consensus currently exists regarding where vaginal twin deliveries should take place (e.g. the OR, the patient's laboring room) and if an anesthesiologist needs to be immediately present. For the 81 patients studied, 27% required anaesthetic interventions with 6% needing immediate interventions for urgent and emergent CS.

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P52 The importance of neuroactive pregnanolone in pregnancy

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Introduction: Pregnanolone isomers (PIs) modulate $GABA_A$ receptors influencing the permeability of chloride ion channels. The free PIs with a hydroxy group in the 3α position are the most efficient endogenous analgesics but sulfation may reverse their neuromodulating effect as well as influence their transport in various physiological situations.

Method: To evaluate the dependence of the ratio of conjugated to free (C/F) PI on the configuration of the hydroxy group and hydrogen in position C3 and C5, respectively and on physiological status, allo-pregnanolone, isopregnanolone, pregnanolone and epipregnanolone and their polar conjugates were measured in the serum of women in the follicular (F, n=15) and luteal (L, n=16) phase and in maternal (M, n=8) and umbilical serum (U, n=8) using GC-MS. For statistical analysis, a multi-way ANOVA with interactions and regression was used.

Results: In all cases, the conjugates markedly prevailed over the free PI. In U, a higher C/F was found in 3α-PI compared to the 3β-PI (P <0.001). C/F in 5α-PI did not differ among the groups F, L and M but it was lower in U (P <0.0001). In 5β-PI, C/F did not differ between F and L but decreased in the sequence F=L>M>U (P <0.0001). In F and L, C/F was higher for the 5β-PI (P <0.0001), no difference was found in U and the situation was opposite in M (P <0.01). In the 5β-PI of the liver origin but not in 5α-PI (originating in various tissues including those specific for pregnancy), C/F negatively correlated with the levels of corresponding free steroids (P <0.0001 and P <0.01 for P3α5β and P3β5β, respectively).

Conclusion: The results indicate decreased sulfation capacity for 3β-PI in pregnant women. This may explain the relatively high proportion of neuroinhibiting unconjugated pregnanolone (3α-hydroxy-5β-pregnane-20-one) among pregnanolone isomers in pregnancy only. Respecting the well known effects of pregnane steroids on the CNS and their actions on the peripheral nervous system, the aforesaid findings support the recently suggested pregnancy-stabilizing role of pregnanolone.

P53 Anaesthetists' perception of 15° of left lateral table tilt before and after education

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Introduction: It has been accepted that the position of a patient undergoing caesarean section should have a left lateral tilt of 15° to prevent aortocaval compression and resultant cardiovascular instability.[1] It is also accepted that the estimation of the angle of tilt is unreliable.[2]

Aim: To confirm the underestimation of lateral tilt. To investigate if this improves following education of the degree of tilt required and if the skill is retained.

Method: Following the advice of a local ethics committee representative, ethics committee approval was not required. Eleven anaesthetists were recruited. A protractor and plumb line were attached to a level table. Each anaesthetist was asked to tilt the table blindly to their perception of 15°, three times. The angle of each tilt was noted. The anaesthetist was then shown a 15° tilt and asked to tilt the table blindly again three times. A similar exercise was repeated three months later. The results were analysed using the paired students t test.

Results: Of the 11 anaesthetists recruited, only nine were available for follow up, therefore two were excluded. Mean tilt pre-education was 10.8° (8.33-13.67°) and post-education 13.89° (11.33-16.33°) P =0.0004. Follow-up mean tilt was 11.21° (8.33-14.0°: P =0.03).

Conclusion: Anaesthetists do underestimate 15° of tilt. The estimation improves with education but degrades with time. Estimation of the degree of tilt is often unreliable and therefore increases the risk of hypotension resulting from aortocaval compression with a sympathetic block that occurs with regional anaesthesia. It would therefore seem prudent to use a measuring device to tilt the table accurately to 15° as is recommended by traditional teaching.

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P54 Do as you do rather than do as you say: trainees copy what is being done rather than following written protocols

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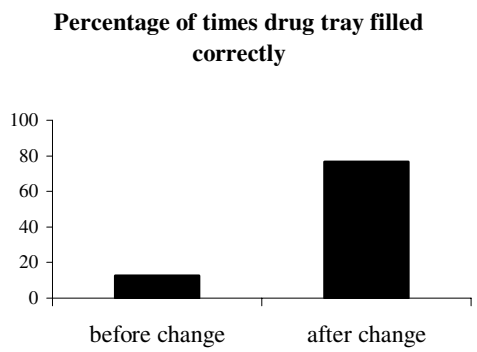
Introduction: In our unit we have a ready-made tray of anaesthetic drugs for emergency caesarean section under general anaesthesia. The drugs are prepared daily by the trainees and kept in a fridge in the anaesthetic room. The protocol for what should be in the tray is written on the fridge door and on both sides of the tray that the drugs are kept in. We noticed that what was in the drug tray rarely correlated with the protocol. We implemented a new system to see if this could be improved.

Methods: We audited the contents of the tray on random days over a 6-month period. We then introduced a new drug tray containing labelled slots where each ampoule or syringe should be so any missing items would be instantly spotted. A copy of the protocol was also put on the lid. We then re-audited the contents over a 3-month period.

Results: In the initial audit there were a total of 32 observations. On four occasions the drug tray contents were correct. On another four occasions the tray contained everything in the protocol but with some additions. The drugs were not changed four times. Usually trainees replaced what was in the tray rather than following the protocol. After the change the correct items were present 13 times out of a total of 17.



Discussion: We demonstrated a clear improvement in adherence to the protocol by presenting the information in a way that was difficult to ignore. It seems that trainees prefer to follow what they see rather than a written protocol. Our results have important implications for trainee protocols. To ensure trainee adherence to protocols they must accurately reflect practice on the unit and be presented in such a way that they cannot be ignored.

P55 Audit of induction training for senior house officers new to obstetric anaesthesia

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Introduction: The European Working Time Directive (EWTD) has had a direct impact on training time for junior anaesthetists. We sought to determine the level of experience trainees had before a rotation in obstetric anaesthesia and the number of procedures carried out in an induction period. The OAA has recently published guidance on senior house officer (SHO) training that suggests a minimum of 20 sessions are necessary to achieve competency.[1]

Method: We asked 13 consecutive trainees to use their logbooks to identify experience before and during a one-month induction period.

Results: The following table shows two audit cycles before and after EWTD introduction.

		Days	Epidurals	Spinals	GA Sections	Top up for Section	Months in anaesthesia	Anaesthetics with distant supervision
2003 - 2004	1	17	7	15	3	2	14	38
	2	12	11	16	0	1	11	4
	3	14	10	12	1	2	12	6
	4	9	8	9	1	1	24	57
	5	12	24	21	1	2	25	>200
	6	7	1	7	2	1	28	>200
	7	10	9	7	1	1	28	>200
2004 - 2005	8	17	15	44	7	1	12	12
	9	8	6	6	0	1	13	-
	10	11	19	37	6	1	12	19
	11	11	13	29	1	0	13	24
	12	17	11	40	2	3	13	35
	13	13	9	19	4	3	12	20

Conclusion: With the exception of one trainee in the past 2 years, we have always managed to meet or exceed the recommendations of the OAA despite the constraints of the EWTD. This has consistently provided our trainees with adequate numbers of regional techniques in obstetric anaesthesia before having distant supervision. Tutorials are targeted where practical experience is less available, e.g. epidural top-up and general anaesthesia for emergency caesarean section.

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P56 Survey of obstetric airway training amongst anaesthetic registrars in Barts & London School of Anaesthesia

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Introduction: In the latest CEMACH report there were seven direct maternal deaths due to anaesthesia, of which four were related to airway problems.[1] Concerns were expressed by the Royal College of Anaesthetists about the adequacy of airway training for junior anaesthetists on obstetric rotas.

Method: An email survey, approved by the programme director, was sent twice to all 97 anaesthetic specialist registrars (SpRs) in the Barts and The London School of Anaesthesia rotation. Non-respondents were contacted by telephone. We surveyed their experience with caesarean sections under general anaesthesia and various aspects of airway management.

Results: The response rate was 52%.
Year 1 and 2 SpRs had conducted 3-60 (median 15) caesarean sections under general anaesthesia; 62% of these were unsupervised; 52% of these SpRs have had no formal airway training.
Of the total years 1-5 SpRs, 68% of caesarean sections under general anaesthesia have been unsupervised; 14% have done an airway module, 34% an airway workshop and 44% airway simulator training; 76% have used an intubating laryngeal mask, 46% a Pro-Seal laryngeal mask and 16% h; 40% are confident with intubation in the left lateral position; 26% of trainees have been involved in a failed obstetric intubation; 26% of all trainees have had training in the use of cricothyroid puncture, 44% in assembly and use of jet ventilation and 86% have had experience with fibreoptic intubation.

Conclusion: Trainees in the early stages of their careers are usually rostered for obstetric on call duties, but it is of concern that these are the least experienced in advanced airway management. Trainees are exposed reasonably well to caesarean sections under general anaesthesia though most of these are unsupervised and valuable training opportunities are lost. A large number of trainees have had no formal training in the management of difficult airways. Despite being an integral part of our trust's failed intubation algorithm, the majority of trainees are not trained in the use of jet ventilation or cricothyroid puncture. Although most of the trainees are confident with fibreoptic intubations, the majority do not have sufficient skills to deal with an unexpected failed intubation.

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P57 Anaesthesia for parturients with mitral stenosis: a case series

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Introduction: The anaesthetic management of mitral stenosis in pregnancy is controversial.[1] We present a series of four patients managed by a multidisciplinary team in our unit.

Cases: On presentation, functional impairment, as classified by the New York Heart Association, was III or IV in all cases, but improved with medical management before delivery. Patients 1 & 2 required anaesthesia, one for evacuation of retained products of conception (ERPC) at 18 weeks gestation, the other for elective caesarean section at 38 weeks**.** Both had a combined spinal-epidural (CSE). Anaesthesia was initiated with intrathecal hyperbaric bupivacaine 5 mg + fentanyl 25 μg, and extended with 2-mL doses of epidural 0.5% plain levobupivacaine at 10-min intervals, until a satisfactory sensory level was achieved. Patient 3 underwent induction of labour at term. Analgesia was provided using a CSE: intrathecal diamorphine 400 μg was followed by 5-10-ml boluses of a mixture of 0.1% plain bupivacaine + fentanyl 2 μg/ml. Patient 4 was a grand multip who laboured without analgesia. Patients 2, 3 and 4 were given Syntocinon 5 units post partum. Patients 1 and 2 were transferred to intensive care postpartum, while patients 3 and 4 were monitored on the high dependency unit on the labour ward.

Case	Gestation	valve area/cm^2	Monitoring
1	18 weeks	1.0	invasive
2	38 weeks	1.3	invasive
3	40 weeks	1.2	invasive
4	39 weeks	1.4	Non-invasive

Outcome: Patient 1 developed systemic hypotension exacerbating her pre-existing pulmonary hypertension post-ERPC. She required inotropic support and nitric oxide. Percutaneous balloon valvuloplasty lead to significant clinical improvement. Patient 2 had an episode of ventricular standstill immediately before surgery. Repeated episodes postoperatively necessitated implantation of a permanent pacemaker. Patients 3 and 4 underwent uneventful postnatal recovery. The three live-born infants had no perinatal complications.

Conclusions: These four very different cases demonstrate how a combined spinal-epidural technique can be adapted to provide safe anaesthesia or analgesia for parturients with mitral stenosis.

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P58 Phaeochromocytoma in pregnancy; vaginal delivery with a successful outcome: a case report

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Introduction: Phaeochromocytoma occurring in pregnancy carries a significant risk to mother and fetus.[1] We present a case where multidisciplinary input achieved a successful vaginal delivery in a patient with a diagnosed phaeochromocytoma.

Case history: A 22-year-old woman in her third pregnancy with Von Hippel Lindau syndrome was diagnosed with phaeochromocytoma late in the third trimester, following urinary catecholamine screening. She was asymptomatic. Magnetic resonance imaging confirmed a right adrenal mass and excluded the presence of associated intracranial and spinal haemangioblastomas. She was prescribed phenoxybenzamine, an α-adrenergic antagonist. Given her favourable obstetric history, stable blood pressure and established α-blockade, the decision was made by obstetricians, anaesthetists, endocrinologists and endocrine surgeons to attempt vaginal delivery. Following induction of labour, continuous invasive blood pressure monitoring was started and epidural analgesia established. Intravenous phentolamine and magnesium sulphate infusion were to be used in the event of any hypertensive episodes. Oxytocin infusion was required to augment contractions. The first stage of labour lasted 5 h, with a precipitous ssecond stage. She had two hypertensive episodes successfully treated with i.v. phentolamine boluses. She delivered a healthy baby. Oxytocin 5 units was administered for the third stage. She continued to be monitored for hypertensive episodes post partum. She remained well and was discharged home on day 6. She underwent an uneventful right adrenalectomy 4 months following delivery.

Discussion: 10% of phaeochromocytomas are associated with familial syndromes such as Von Hippel Lindau syndrome. The literature would convincingly support elective caesarean section as the favoured mode of delivery and combined removal of the tumour in any mother with a diagnosed phaeochromocytoma.[1] The decision to allow vaginal delivery was made because of her favourable obstetric history, stable blood pressure, time available for optimisation and the 24-h availability of experienced multidisciplinary staff in the event of difficulties.

Conclusion: The successful outcome for our mother and her baby shows that vaginal delivery is an option in the carefully selected patient, when individualised care is planned and provided by a multidisciplinary team.

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P59 A case of subglottic stenosis in pregnancy

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Introduction: Subglottic stenosis in pregnancy presents a challenge to anaesthetists, obstetricians and ENT surgeons. We highlight through our case report the important issues surrounding diagnosis and management of this rare problem.

Case report: A 24-year-old primigravida was referred to the antenatal clinic at 29 weeks gestational age. She presented with progressively increasing shortness of breath and tiredness. She had been treated over the past five years for asthma with regular nebuliser therapy and occasional oral steroids. Ten years previously she was admitted to intensive care with a life-threatening attack of vasculitis, thought to be Wegener's granulomatosis. She required intubation and ventilation for two weeks but made a full recovery. On admission to the labour ward she was hypertensive with a blood pressure of 205/105 mmHg, but without proteinuria or oedema. All her investigations were normal. She was put on maximal therapy for asthma but showed no signs of improvement. A consultant obstetric anaesthetist suspected upper airway obstruction and arranged urgent nasendoscopy which showed critical narrowing of the upper airway due to subglottic stenosis. At 30 weeks she underwent laser division of her larynx using an open airway technique. Postoperatively she noticed a significant improvement in her breathing, but over the next two weeks she developed full blown preeclampsia with pulmonary oedema. This necessitated emergency caesarean section at 33 weeks under spinal anaesthesia. Post partum the mother's breathing improved considerably and she had definitive laser surgery after 6 months.

Discussion: Subglottic stenosis is a rare condition that may be difficult to diagnose. The initial symptom is usually shortness of breath rather than stridor.[1] Many patients are wrongly diagnosed with asthma and recurrent bronchitis before the discovery of subglottic stenosis. Our patient had two potential risk factors: a history of previous intubation and Wegener's granulomatosis. This was further complicated by the pregnancy and the impending preeclampsia. As a learning point we would like to stress upon having high index of suspicion of upper airway obstruction in patients who present with shortness of breath refractory to standard medical therapy.

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P60 Anaesthesia for caesarean section in mothers with malignant vasovagal syndrome

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Introduction: Malignant vasovagal syndrome is a severe subtype of vasovagal syncope, which is associated with severe bradycardia or asystole and hypotension. We describe our anaesthetic management of two patients with a diagnosis of malignant vasovagal syndrome requiring caesarean section. We discuss the presentation and diagnosis, and use a literature review as a basis on which to discuss the pros and cons of regional versus general anaesthesia in such patients.

Case 1: A 31-year-old primigravida required a category 2 caesarean section for a non-reassuring fetal heart trace. Past medical history included a diagnosis of malignant vasovagal syndrome controlled with ß-blockers. Caesarean section was performed under general anaesthesia in order not to provoke severe brady-arrhythmia or hypotension and was uneventful. She did not require vasoconstrictors or vagolytics peri-operatively.

Case 2: A 28-year-old multiparous female was admitted for category 4 caesarean section. She had been diagnosed with malignant vasovagal syndrome before her pregnancy on tilt table testing. General anaesthesia progressed uneventfully, although she did develop self-limiting ventricular bigeminy without cardiovascular compromise intra-operatively.

Conclusion: Though the pathophysiology is incompletely understood, severe bradycardia and/or hypotension may occur in malignant vasovagal syndrome through an abnormal response to reduced venous return.[1] Spinal is more likely than general anaesthesia to provoke asystole,[2] and unmasking of malignant vasovagal syndrome by central neuraxial blockade has been described.[3,4] Sympathetic blockade during spinal anaesthesia may trigger an abnormal Bezold-Jarisch reflex and may be more likely to provoke asystole in patients with malignant vasovagal syndrome. General anaesthesia may be safer in such patients.

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P61 Uterine artery balloon occlusion and embolisation at caesarean section in the presence of a large cervical fibroid: a case report

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Introduction: Caesarean section in the presence of a cervical fibroid is a well-known risk factor for catastrophic haemorrhage, often requiring hysterectomy. We describe an elective section involving balloon occlusion of the uterine arteries to prevent major haemorrhage, followed by uterine artery embolisation (UAE) to treat the fibroid.

Case report: A 37-year-old female was booked at 11 weeks gestation in her third pregnancy. She was known to have a large cervical fibroid measuring 10×9×9 cm. Her previous two pregnancies resulted in elective sections due to the presence of the same fibroid, estimated blood losses being 2000 and 3500 mL respectively.

After multi-disciplinary counselling involving obstetricians, anaesthetists, radiologists and paediatricians, an elective section was performed at 37 weeks gestation. The procedure took place in the interventional radiology department, positioned within a separate building from the labour suite. Following successful insertion of a 25-gauge continuous spinal catheter (Braun Pajunk), both common femoral arteries, and hence both uterine arteries, were cannulated; 2-4-mm micro-balloons were inserted deep into both uterine arteries and inflated just before uterine incision. The baby was delivered within 30 s using a classical incision. After uterine closure the balloons were deflated to confirm haemostasis. The fibroid was then embolised using spongiostan gel foam. The procedure was completed uneventfully, with an estimated blood loss of 1200 mL. The continuous spinal catheter was removed at the end of the procedure, according to local hospital guidelines. Oral postoperative analgesia was successfully supplemented with PCA morphine. Recovery was uncomplicated, with no post-dural puncture headache, allowing discharge of both mother and baby within a week.

Conclusion: UAE has recently been used as an alternative to hysterectomy for the treatment of uterine fibroids, and has been employed in the management of post-partum haemorrhage (PPH). This case report describes its use in the *prevention* of PPH. It is also believed to be the first report of the simultaneous *treatment* of an existing fibroid, by UAE, at the time of caesarean section. The case involved the successful and uncomplicated use of a continuous spinal catheter. We also highlight the importance of a multi-disciplinary approach in the successful management of this case.

P62 Anaesthesia for the EXIT procedure: the value of fast track anaesthesia

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Background: The EXIT procedure (ex-utero intrapartum treatment) has been designed for anticipated management of the fetus with airway problems. General anaesthesia with a high concentration of inhaled anaesthetics is the standard for it, because optimal uterine relaxation is easily achieved, which is one of the anaesthetic goals. But using such anaesthesia can lead to maternal haemodynamic instability and fetal acidaemia. The use of remifentanil during caesarean section is suitable to blunt haemodynamic response, and because of the physical properties of the desflurane, it is the ideal agent for rapid titration when the situation demands a high concentrations for uterine relaxation and a low concentrations after extraction to avoid excessive bleeding. Therefore the combination could be ideal. We described an EXIT procedure using fast-track anaesthesia based on remifentanil plus desflurane.

Case report: A 27-year-old pregnant patient at 38 weeks of pregnancy with the diagnosis of fetal epignathus was schedule for EXIT and caesarean section. Metoclopramide and ranitidine were given 1 h preoperatively. Basic monitoring including bispectral index (BIS) was set up and an arterial line and two large-bore i.v. cannulae were inserted. To provide postoperative analgesia morphine 100 μg was injected intrathecally and was followed by rapid-sequence induction using propofol and suxamethonium. A remifentanil drip was started at 0.1 $\mu g \cdot kg^{-1} min^{-1}$ at induction. An end-tidal desflurane concentration of 3% in oxygen was achieved after 5 min and the BIS level reached 55-50. Three minutes before uterine incision the remifentanil was reduced to 0.02 $\mu g \cdot kg^{-1} min^{-1}$ and the desflurane increased to 7%; to complete the relaxation, nitroglycerin was given and to maintain the blood pressure etilefrine. The extraction process took 12 min. After the extraction, the desflurane was decreased to 3% and the remifentanil returned to 0.1 $\mu g \cdot kg^{-1} min^{-1}$. Within 7 min of discontinuing remifentanil and 5 min after discontinuing desflurane she reached BIS of 89, responded to verbal command, was fully awake and extubated. The postoperative course was uneventful.

Conclusion: This is the first Latin American report of an EXIT procedure. The combination of fast-track anaesthesia drugs such as remifentanil and desflurane can facilitate the EXIT procedure ensuring good uterine relaxation and also a good haemodynamic profile.