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P01. Comparison of continuous and intermittent administration of extradural ropivacaine with fentanyl for analgesia during labour

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Method: Forty primigravid women requesting epidural analgesia in early labour gave consent to a study of two modes of administration. In all patients an epidural catheter was inserted at L2/3 or 3/4. After a 5-mL test dose, a further 10–15 mL of 0.2% plain ropivacaine was titrated to produce analgesia and bilateral sensory block to T10. Patients were randomly assigned to receive an infusion of ropivacaine 2 $mg \cdot L^{-1}$ plus fentanyl 2 $\mu g \cdot L^{-1}$ at 10 mL h^{-1} starting immediately, or hourly 10-mL boluses of the same solution injected at 2 $mL \cdot min^{-1}$, starting 30 min later. Delivery pumps were identical. Analgesia was recorded by a blinded assessor using a Visual Analogue Scale (VAS; 0–100 mm) and a Verbal Rating Score (VRS; 0 = no pain, unaware of contraction; 1 = aware but not painful; 2 = painful) at 5-min intervals until time zero, and then at 30-min intervals. If analgesia was deemed inadequate at any time, up to two additional 10-mL boluses of the study mixture were given. Sensory block was measured bilaterally using a short bevelled 27 swg dental needle. Motor block was assessed bilaterally using both a modified Bromage score (0–3) and a straight-leg raising scale (0–5). Maternal pulse rate and blood pressure were recorded regularly and fetal heart rate was monitored by cardiotocograph. Hypotension ($\geqslant$30% decrease in systolic blood pressure) was treated in one patient in the continuous infusion group (after an additional bolus) using ephedrine 6 mg. Fisher's exact test and Kaplan Meier survival analysis were used to analyse non-parametric data, and Student's *t*-test for parametric data.

Results: There were no differences between the two groups in demographics, duration of labour, mode of delivery or neonatal outcome; nor were there differences in sensory or motor block, or in the occurrence of unilateral block. 12 (60%) patients in the infusion group required one or more additional boluses compared to 4 (20%) patients in the bolus group (95% CI: 9.6 to 61.7%, $P < 0.05$). Therefore the bolus group had a lower total drug dose than the infusion group ($P = 0.02$).

Conclusion: In agreement with previous work,[1] the intermittent bolus group required less rescue medication, and a lower total drug dose to maintain similar pain scores, sensory and motor block compared to the continuous infusion group. This represents a reduction in interventions and anaesthetic workload, and the approach may have wider application.

Reference

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P02. Patient controlled analgesia for labour: a pilot study

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Introduction: Opioids are widely used for pain relief in labour, as there is a need for an acceptable alternative to epidural analgesia. Although the general move has been to consider short-acting opioids via the i.v. patient-controlled analgesia (PCA) route,[1] the role of longer-acting opioids has not been evaluated. The aim of this pilot study was to evaluate differing opioids in labour, delivered using an i.v. PCA device.

Method: Following ethical approval, a partial double blind randomised control trial was set up with five patient groups; four PCA groups using diamorphine, fentanyl, morphine and pethidine and a control group receiving i.m. pethidine 100 mg 4 hourly. All PCA groups received an equivalent volume of loading and on demand bolus dose, with a lock-out time of 10 min. Equivalent bolus doses for each PCA group were diamorphine 1 mg, fentanyl 20 μg, morphine 2 mg, pethidine 20 mg, with a loading dose 2.5 times the bolus dose. All mothers were permitted to use adjuvant analgesia or to withdraw from the study and opt for epidural analgesia if preferred. Pain during contraction was assessed on a verbal numerical scale of 0–10 and sedation scored between contractions on a scale of 1–4 (1 = awake, 4 = unrousable).

Results: 24 mothers were recruited to the pilot study. The mean hourly doses of i.v. PCA opioid delivered were: diamorphine 3.97 mg, fentany l 89 μg, morphine 12.9 mg, pethidine 74.1 mg. the median scores at time 0, time 1–2 h and time 1 h-delivery were:

	Pain scores (0–10)			Sedation (1–4)	
	T0	T1-2	T1-dell.	T0	T1-del.
Diamorphine	7.5	4.5	5.5	1	1.5
Fentanyl	5	5.5	8	1	2
Morphine	7.5	8	8	1	1.5
Pethidine	7	6.5	7	2	1.5
Pethidine i.m.	7.5	6	7	1	1.5

All the mothers used adjuvant Entonox for analgesia. Ten of the 24 mothers requested conversion to epidural analgesia. The incidence of maternal side effects was low. An Apgar score of less than 7 was recorded in 7 babies in the PCA groups. At 24-h follow-up, the median dissatisfaction scores were diamorphine 4, fentanyl 2, morphine 4, pethidine 3 and i.m. pethidine 7, (1 = very good, 10 = very poor).

Discussion: Pain scores in the diamorphine group showed a clinically significant improvement, particularly in the two hours following i.v. loading. Despite little reported change in overall pain scores during labour, at 24-h follow-up mothers had high satisfaction scores in all PCA groups.

Reference

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P03. Obstetric and neonatal outcomes following continuous epidural infusion *versus* patient controlled epidural analgesia in labour

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Introduction: Patient controlled epidural analgesia (PCEA) provides analgesia for labour comparable with that of continuous epidural infusion (CEI), with the benefit of reducing total dose of local anaesthetic administered.[1,2] This study aimed to confirm analgesia and maternal satisfaction during transition of unit policy from CEI to PCEA. In addition, we wished to study the effects of each regime on progression of labour, method of delivery and neonatal outcome.

Methods: With the approval of the clinical governance support team, 80 patients were recruited to receive either CEI (n = 40) of 0.1% bupivacaine 10 mL/h plus fentanyl 2 μg/ml with additional manual top-ups as required, or PCEA (n = 40) of 10-mL boluses of identical solution with a 30-min lock-out. Volume of local anaesthetic (LA) given, epidural block height, bolus doses (both PCEA and manual top-ups), side effects, progression of labour, delivery method and neonatal Apgar scores were recorded. The data were analysed using unpaired t-tests and χ^2 tests as appropriate.

Results: The results are summarised in the table (mean ± SD [95% CI]). There were no significant differences in maximal block height, side effects, pain scores, motor block or overall maternal satisfaction between PCEA and CEI groups.

	CEI	PCEA	P
LA (mg/h)	18.0 ± 8 (15.6–20.9)	12.2 ± 4.7 (10.8–13.7)	0.000007
Total LA (mg)	92.8 ± 32.7 (81-105)	70.2 ± 34.1 (60–80)	0.003
Extra top-ups	1.0 ± 1.1(0.6–1.3)	0.4 ± 0.8 (0.1–0.7)	0.005
Failure to progress	65%	65%	0.99
Caesarean sections	30%	52%	NS
Instrumental delivery	35%	13%	NS
Apgar score 1 min	8.3 ± 1[8.0–8.6]	8.6 ± 0.8 [8.3–8.8]	0.29
5 min	9.2 ± 0.5[9.0–9.4]	9.0 ± 0.3 [8.9–9.1]	0.06

Conclusion: This study confirms that PCEA is an effective alternative to CEI in labour, with the benefit of significantly reducing both local anaesthetic administration and the need for extra anaesthetist intervention, without compromising method of delivery or neonatal Apgar scores. This unit has adopted the PCEA regime as standard protocol as a result of the outcomes demonstrated by this study.

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P04. Epidural block: does choice of spinal interspace affect analgesia at delivery?

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Introduction: We have shown previously[1] that spontaneous vaginal delivery (SVD) is painful for about 25% of mothers with epidural analgesia, and that the most powerful predictor of this outcome is pain in labour.[2] In a departmental audit restricted to mothers with good analgesia in labour, SVD was painful in 20%, and interspace was found to be an independent factor for this outcome (n = 2613; $P > 0.05$). We decided to investigate this further.

Methods: Data from five units* using the Wansbeck Epidural Audit System[3] was pooled and analysed. The database contains 15875 records. We extracted 6577 cases that had SVD with a complete set of follow-up data. Of these mothers, 5816 rated analgesia for first stage as excellent or satisfactory, and these cases were sub-divided by interspace into groups. These groups were compared with respect to pain on delivery (POD): pain-free (PF), comfortable (Com), uncomfortable (Unc), painful (Pful).

Results: Overall mothers rated POD as (%): PF 43; Com 34; Unc 16; Pful 8. No epidurals were sited above T12 or below L5. The groups were comparable in terms of onset, stage of labour when the epidural was inserted, indication for epidural and parity. Breakdown of POD by interspace is given in Table 1.

Table 1: POD by spinal interspace (%)

Interspace	PF	Com	Unc	Pful
T12L1 (n = 31)	35	32	17	8
L1L2 (n = 529)	37	32	21	8
L2L3 (n = 3225)	42	34	15	7
L3L4 (n = 1913)	44	34	14	7
L4L5 (n = 118)	42	31	17	8

Discussion: In this larger study, we found that interspace had no effect on analgesia for unassisted vaginal delivery in mothers with good analgesia in labour. However, the finding that delivery was rated uncomfortable or painful by about 24% of mothers despite a well functioning epidural suggests there is room for improvement. We should pay more attention to analgesia for the second stage of labour.

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P05. Birth plans for labour analgesia: tell me what you want, what you really, really want!

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Introduction: The government report "Changing Childbirth"[1] emphasised the need for maternal choice and patient-centred care. A parturient will often document her wishes for labour and delivery in a birth plan. Failure of staff compliance with a documented birth plan may lead to litigation. It is known that women will request epidural analgesia despite no advance planning.[2] Informed consent is necessary before epidural insertion but is difficult to obtain from a parturient in severe pain, who may already have received Entonox or opioids. We therefore aimed to assess the predictive value of a birth plan for labour analgesia.

Methods: This was a retrospective survey of 100 women selected at random. Parturients were interviewed 21–72 h post partum about their antenatal wishes for labour analgesia, reasons for this choice, the actual analgesia received, what analgesia they would wish for future labours, and their general satisfaction. Medical notes were examined for a previously documented birth plan and the labour partogram.

Results: In the antenatal period, 80% of all women had documented a birth plan for labour analgesia. For nulliparous patients, the most common reason for antenatal choice of labour analgesia was friends' rather than professional advice. Whilst 28% had planned epidural analgesia, 72% actually received it. This change is significant ($P = 0.039$). Most parous women planned to use what they had had in a previous labour for analgesia; 44% planned whilst 48% received epidural analgesia. No patient was unhappy that she had received epidural analgesia when she had not actively planned this. Of those who had received epidural analgesia 98% said that they would request this in subsequent labours compared with 76% of those who had used Entonox only and 68% of those who had received pethidine.

Conclusions: If a parturient has planned to use epidural analgesia for labour, she will most likely receive it. Nulliparous women frequently request epidural analgesia despite no advance planning. Whilst it may be good professional practice for anaesthetists to read the birth plan before epidural insertion, we must be prepared to accept a change from the written instructions as most nulliparas' expectations of labour pain are falsely low. As maternal satisfaction with epidural analgesia is high, many women will plan this for subsequent labours and advise friends likewise. The anaesthetic workload in labour ward will therefore increase.

References

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P06. Who should provide antenatal information about epidural analgesia?

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Introduction: There is significant variability between maternity units as to who provides information about the risks and benefits of epidural analgesia in labour. Following 'Changing Childbirth,'[1] anaesthetist-led antenatal sessions were discontinued in our unit (4500 deliveries/annum, 25% epidural rate). Currently, information is provided by midwives with no formal anaesthetic input. This prospective audit examines mothers' views on the quality of that information and whether they would support reintroduction of anaesthetist-led antenatal classes.

Methods: 126 consecutive mothers who had received epidural analgesia for labour were asked questions on the source of antenatal information, how it compared to their experience of epidural analgesia and whether they would have attended an anaesthetist-led antenatal session if afforded the opportunity.

Results: 81% had received information from their midwife, 41% from friends or relations, 29% from books or the internet and 21% from non-anaesthetic doctors. Only medically complicated women had the opportunity to meet an anaesthetist antenatally (<2%). In all other cases, information was provided by the anaesthetist only immediately before siting the epidural. Insertion of the epidural, quality of pain relief and side effects were better than expected in 72%, 71% and 62% and worse in 9%, 8% and 6% respectively. The overwhelming majority of mothers would either *definitely* (42%) or *probably* (39%) have attended an anaesthetist-led antenatal session if given the opportunity.

Discussion: While these results might suggest that the antenatal information provided by non-anaesthetists was overly pessimistic, it is well recognised that questioning mothers on the first post-partum day is biased by their overall birth experience.[2] The need to provide accurate information on epidural analgesia and concerns about the ability to gain adequate consent in labour would seem to mandate that women have the opportunity to speak to anaesthetists in the antenatal setting. Lack of resources and political pressure to 'normalise' labour make this ideal difficult to realise. The positive response from the mothers in our survey would appear to provide significant support for the reintroduction of anaesthetist-led antenatal sessions.

References

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P07. The availability and value of information resources about labour analgesia used by antenatal women

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Introduction: There is a wide variety of information resources about labour analgesia available to pregnant women including leaflets and Internet information provided by hospital maternity services, including our own.[1] Awareness of how these information resources are used and rated by antenatal women may be of benefit in improving the information resources provided by maternity services. We undertook a survey of antenatal women to ascertain what resources were used and how useful women found these resources.

Method: In a large maternity hospital setting, women attending antenatal clinics were invited to complete an anonymous questionnaire. The questionnaire asked which methods of labour analgesia the woman had received information about, what was the source of their information, how useful did the woman rate this source (using a 5-point scale) and whether she had easy access to the Internet. The woman was also asked whether this was her first pregnancy and how many weeks pregnant. The first 100 completed questionnaires were analysed.

Results: 55% of women in their first pregnancy but only 30% of women with a subsequent pregnancy were not aware of any information about modes of labour analgesia. The highest rated sources of information used by women in their first pregnancy were the media (TV/radio/books/magazines) and relatives or friends. For women in a subsequent pregnancy previous experience, midwife/GP and relative/friend were the most common and highest rated sources of information. Our hospital information leaflet was also rated highly but only cited by 25% of women. The hospital website and Internet resources were used by only 12 and 25% of women respectively and were not considered useful, despite over 70% of women having easy access to the Internet.

Conclusion: Women most commonly use interpersonal resources, which are also highly rated. Hospital leaflets may be highly rated but are not commonly used. Despite common access to the Internet, World Wide Web and hospital web resources are rarely used and are not rated useful.

Reference

1. Available at the following URL on the web: http://www.addenbrookes.org.uk/serv/clin/women/preg/labour1.html

P08. Real-time vs. postnatal maternal satisfaction scores in labouring parturients with regional analgesia

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Background and Goals: Maternal satisfaction is not solely dependent on the quality of labour analgesia and might be unreliable when assessed postnatally.[1] We assessed maternal satisfaction while the parturient was in labour (real-time) to see if it was comparable with scores obtained 21–48 h postnatally.

Methods: A prospective cohort study of 73 women requesting regional analgesia for labour. Midwifery staff were trained to assess maternal satisfaction with verbal rating score (VRS) and pain with visual analogue score (VAS) at one-hourly intervals. Data on type of analgesia, complications and outcome of labour were also noted. Data were analysed with paired t-test, Friedman one-way ANOVA and Wilcoxon signed-ranks test.

Results: 93% of women had epidurals and 7% CSEs; 69% received epidural infusions (0.1% bupivacaine + fentanyl 2 μg/mL) and 30% midwife top-ups (0.25% bupivacaine 10 mL) according to protocol. Mode of delivery: 22% emergency caesarean section, 38% instrumental and 40% SVD. Most common reason for anaesthetic intervention was sacral discomfort (23%) and missed segment/unilateral block (34%). Twenty minutes after initiation of regional analgesia there was a significant decrease in pain (VAS 0 = 78 mm, VAS 20 min = 28 mm, $P < 0.0001$). During labour mean VAS was <30 mm in all time periods. 85% and 86% of women respectively were satisfied with analgesia when questioned during labour (real-time) and postnatally.

Table: Maternal satisfaction scores

Maternal satisfaction	Real-time $n = 50$	Postnatal $n = 50$	P
VRS < 2 (dissatisfied)	7	7	0.36
VRS > 2 (satisfied)	43	43	0.15
Median score	2.5	3	0.192

Conclusions: Satisfaction rates were similar to those usually quoted.[2] Differences in maternal satisfaction were not statistically significant when measured during labour or postnatally. We conclude that the assessment of maternal satisfaction is valid even when used postnatally.

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P09. The introduction of pain scores for the early assessment of adequate epidural analgesia in labour

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Introduction: We introduced pain scores to assess the early adequacy of analgesia and to help the anaesthetist make an early decision about re-siting an ineffective epidural for labour analgesia.

Method: All pain scores were based on a verbal numerical score: 0 = no pain and 10 = the most severe pain. Our normal labour ward protocol for establishing epidural analgesia is 10-mL epidural boluses containing 0.1% bupivacaine with fentanyl 2 μg/mL given at 10-min intervals with assessment of blood pressure, sensory and motor block before the next dose. The anaesthetist gives the top-ups until the mother is comfortable and further top-ups are then administered by the midwife. During this audit, the mother was asked to give a baseline pain score and further pain scores at 10-min intervals until she was happy with her pain relief. If the pain scores were not improving after three doses, the epidural was re-sited without further delay.

Results: 112 audit forms were collected, 11 were excluded due to incomplete data. Of the remaining 101 mothers, 91 had adequate analgesia within 30 min and a further four within 40 min. Six epidurals were re-sited. Of the 91 mothers who were seen the following day, 90 were satisfied with their epidural (98%). One mother was unhappy with her epidural despite early pain-relief because of a quick delivery.

Table: Median pain scores before epidural insertion and until the mother was comfortable

	Baseline	10 min	20 min	30 min	40 min
1 bolus $n = 14$	8.5	2.5			
2 boluses $n = 49$	8	6	2		
3 boluses $n = 28$	9	7	5	1	
4 boluses $n = 4$	9.5	9	8	5	2
Resited $n = 6$	8	7	7	7	

Nine epidurals, which worked well initially, needed additional top-ups of bupivacaine and fentanyl given by the anaesthetist. All mothers in this group either had a twin pregnancy or a fetus in a persistent OP presentation. In this audit, there were two epidural failures when topped up for a caesarean section.

Conclusion: During this audit period there was a very high level of patient satisfaction with epidural analgesia. The simple use of a VAS allowed early detection of a failing epidural. Epidurals that worked well from the outset mostly continued to work well throughout labour and were reliable for operative delivery. We have introduced the assessment and documentation of a VAS as routine practice during the establishment of epidural analgesia.

P10. Prevention of hypotension after spinal anesthesia for cesarean section: 6% pentastarch versus Ringer's solution

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Introduction: Spinal anesthesia for cesarean delivery is associated with a strong risk of hypotension. Estimating the risk and treatment of this complication may significantly reduce maternal and neonatal morbidity and mortality.[1] The goal of the present study was to compare the efficacy of pentastarch and Ringer's solution for pre-infusion in patients undergoing elective cesarean section under spinal anesthesia.

Method: After local ethics committee approval and informed consent, we performed spinal anesthesia in 270 women presenting for elective cesarean section. Patient were divided into two groups in a prospective, randomised, double-blind manner; the first group received pre-infusion with 8 mL/kg 6% pentastarch (Refortan, Berlin-Chemie/Menarini Group), and second – with Ringer's solution in the same dose. We compared the incidence of spinal-induced hypotension in each group. Hypotension was defined as a decrease in systolic arterial pressure to less than 70% of baseline values or 90 mm Hg. Spinal anesthesia was induced at L3-4 interspace using a 22-gauge Whitacre needle. After subarachnoid injection of 0.5% bupivacaine solution (11–15 mg) with fentanyl (10 μg), blood pressure was measured with one-minute interval for the first 20 min and thereafter at 2-min interval. The state of the newborn was assessed by Apgar score at 1 and 5 min and by umbilical artery pH. Relative ephedrine requirement was estimated using the Man-Whitney U-test and other variables using Student's t-test and χ^2. A P-value of <0.05 was considered statistically significant.

Results: Fetal outcome was similar in the two groups. There was no difference in umbilical artery pH between those whose mothers had been hypotensive (pH 7.33) and those that were normotensive (pH 7.33). Significantly more patients in the Ringer's solution group ($n = 78$, 57.8%) became hypotensive than in the pentastarch group ($n = 12$, 8.9%) ($P < 0.0001$). Because no significant shifts of the heart rate were found before or after pre-infusion, the significant decrease in frequency of hypotension after pre-infusion with 6% pentastarch solution can be attributed to the increase in stroke volume. Linear regression analysis showed that the only significant variable was type of fluid used for pre-infusion.

Conclusion: Pentastarch solution is effective for pre-infusion in cesarean section under spinal anesthesia and provides an alternative to vasoconstrictors.

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P11. The ED95 of hyperbaric bupivacaine in spinal anaesthesia for caesarean section

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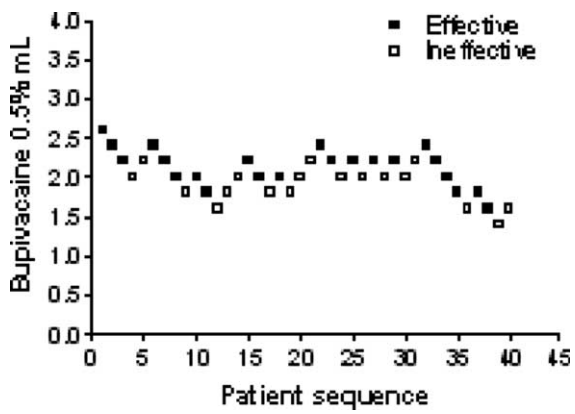
Introduction: Application of sequential allocation to dose finding allows determination of the ED50. The combination of low variability and large sample size allows estimation of ED95 with reasonable precision. The aim of this study was to determine the ED95 of hyperbaric bupivacaine to achieve a block height of T5 as measured by light touch, using the sequential allocation technique.

Method: In this prospective study, we recruited 40 women of ASA grade I or II, height 150–180 cm, weight 50–120 kg and scheduled to have elective caesarean section with a single healthy fetus. An epidural needle was sited by midline approach at L2-3 in the sitting position with an 18-gauge Tuohy needle by loss of resistance to saline. No test dose was given. Intrathecal injection was given via a 27-gauge Whitacre needle at L3-4 using the midline approach. The dose of hyperbaric bupivacaine for the first patient was 13 mg and for subsequent patients depended on whether the height of the block in the previous patient reached a level of T5 when assessed by light touch. If the block did not reach T5 in 20 min, an epidural bolus was given before surgery. Analysis used the Dixon-Massey formula[1] for the up-down dosing technique. Power calculation based on our epidural studies[2] gave a sample size of 40.

Results: The ED50 of hyperbaric bupivacaine required for a block height of T5 was 9.95 mg (95% CI 9.0–10.9). The ED 95 was 13.55 mg (95% CI 10.1–17 mg).



Conclusions: The ED95 of hyperbaric bupivacaine, required to achieve a block height of T5 when assessed by light touch, in spinal anaesthesia with a 27-gauge Whitacre needle in the sitting position for caesarean section was 13.55 mg.

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P12. ED50 of intrathecal bupivacaine with fentanyl for caesarean section, and the effect of epidural volume extension

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Introduction: Intrathecal bupivacaine with fentanyl is widely used for the provision of anaesthesia for caesarean section (CS). There is however, little published information about the dose response relationship of these drugs for spinal anaesthesia. With epidural volume extension (EVE), normal saline is injected into the epidural space immediately after intrathecal injection, and has been shown to extend spinal anaesthesia[1] possibly resulting in reduced intrathecal dosage requirements for CS. The aim of this study therefore was to determine the ED50 of heavy bupivacaine with fentanyl 25 μg and to examine the effect of epidural volume extension (EVE) on the ED50.

Methods: Following ethics committee approval, 52 women receiving CSE for CS were randomised into two groups to receive CSE either with EVE or without EVE (NEVE) in the left lateral position. Those allocated to the EVE group received 0.9%w/v saline 7 mL via the epidural needle before threading the epidural catheter. Using a double blinded, up-down sequential allocation technique they received varying doses of heavy bupivacaine with fentanyl 25 μg. Anaesthesia was assessed using touch to ethyl chloride spray. An effective dose, defined as achieving a sensory block to touch to the xiphisternum after 20 min with no requirement for an epidural top-up before 45 min, directed a 1-mg decrement of heavy bupivacaine for the next patient within that group. An ineffective dose directed a 1-mg increment of bupivacaine. ED50 was calculated using the method of Dixon and Massey.

Results: Patient characteristics were similar in the two groups. The ED50 of bupivacaine with fentanyl for CS was 6.0 mg (Table). There were no significant differences in ED50, percentage drop in blood pressure or ephedrine usage between the two groups.

Group (N = 26)	ED50 (mg) (95% CI)	Drop in syst BP%	Ephedrine usage (mg)
NEVE	6.0 (4.9–7.1)	22.5	23.3
EVE	5.2 (3.8–6.6)	16.8	20.8

Conclusion: Under the conditions of this study, low doses of bupivacaine with fentanyl intrathecally are effective for CS. EVE has little effect on dosage reduction or side effects.

Reference

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P13. Assessing the block for caesarean section: what do we mean by touch?

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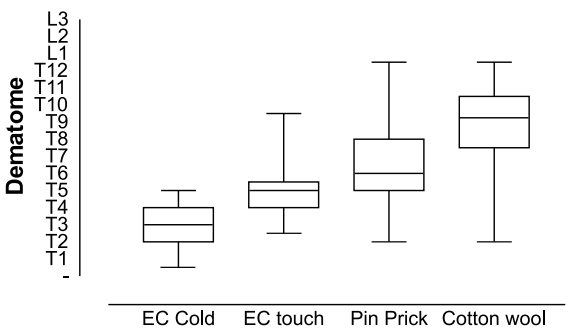
Introduction: There is a wide variation amongst anaesthetists on how best to test the level of block for caesarean section (CS). Cold sensation with ethyl chloride (EC) is commonly used, but in order to achieve successful regional anaesthesia in all patients for CS it has been suggested that loss of touch to the dermatomal height of T5 should be achieved.[1] However, there are differing methods of assessing level of block to touch. We decided to compare the dermatomal heights achieved in patients with successful blockade using common methods of testing: EC cold and touch, blunt pin prick and cotton wool.

Method: After obtaining verbal consent, we assessed 46 women who had received regional anaesthesia for CS using bupivacaine with fentanyl. Once the attending anaesthetist was confident that the patient was ready for surgery, we asked patients when they first felt any sensation, using EC spray, blunt pin prick (using a Neurotip®), and stroke with cotton wool as well as when they felt cold with EC spray. We defined the height of block as the dermatomal level above which sensation was first felt.



Results: All patients had successful regional anaesthesia for CS. There was a significant difference in dermatomal height between all methods of assessment (Friedman test, $P < 0.0001$). Comparison between groups in pairs were all significantly different except for EC touch vs pin prick (Dunn's multiple comparison test, $P < 0.05$).

Conclusion: In patients with successful anaesthesia commonly used methods of assessment give significantly different dermatomal levels. A wider range of dermatomal levels was observed with touch than with cold. We found no significant difference between EC touch and pin prick suggesting that these two tests may be equivalent, but numbers studied were small. When the dermatomal level to touch is determined, the type of test for touch must be documented.

Reference

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P14. Male anaesthetists: a risk factor for caesarean section under general anaesthesia?

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Introduction: General anaesthesia for caesarean section is associated with an increase in maternal morbidity and mortality.[1,2] A yearly audit of obstetric anaesthesia suggested a sex bias in the number of general anaesthetics performed for caesarean section. The aim of this study was to explore this impression.

Methods: A retrospective observational study was conducted using prospective data obtained from yearly audits of anaesthetic practice on the delivery suite for the period 1991 to 2001. Anaesthetics for all procedures during this period, excluding those performed by consultants, were examined. The total number of general and regional anaesthetics for male and female trainees was compared using χ^2 test with Yates correction.

Results: A total of 5820 anaesthetics by 117 male and 51 female trainees were analysed. The difference in incidence of general anaesthetics performed between male and female trainees is strongly significant, $P < 0.00001$. The results are outlined in the table below.

Trainees	GA	RA	Total Anaesthesia
Male (70%)	1201* (31%)	2709 (69%)	3910
Female (30%)	465* (24%)	1445 (76%)	1910
All	1666 (29%)	4154 (71%)	5820

*P <0.00001

Discussion: Males use general anaesthesia to a greater extent than female trainees for procedures on the delivery suite. The reason for this difference is purely speculative. All trainees are exposed to the same balance of elective and emergency work. Consultants were eliminated, as the majority of their work is elective. Our data did not distinguish between anaesthesia performed for caesarean section from that performed for other procedures on the delivery suite. The vast majority of procedures were for caesarean section (67% of general anaesthesia and 86% of spinal anaesthesia).

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P15. Caesarean section under general anaesthesia: an audit of practice

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Introduction: There is potential for increased morbidity and mortality following caesarean section under general anesthesia.[1]

Method: We conducted a retrospective audit of all caesarean sections performed under general anaesthesia in 2001. Standards were those suggested by the RCA and our delivery suite protocol.

Results: Of the 4273 maternities at the Princess Anne Hospital in 2001, 924 deliveries (21%) were by caesarean section, 81 (9.2%) under general anaesthesia. Of these 75 patient notes were obtained for review. Forty of the general anaesthetics (53.3%) were given for obstetric reasons, 30 (40%) anaesthetic, 3 (4%) other medical reasons, and two (2.7%) not stated. Obstetric indications were: fetal bradycardia 16 (40%), APH/abruption 7 (17.5%), anterior placenta praevia 7 (17.5%), cord prolapse 5 (12.5%), fetal acidosis 4, (10%), and eclampsia 1 (2.5%). Anaesthetic indications were: failure of regional before surgery 13 (43.3%), patient refusal 7 (23.3%), failure of regional during surgery 6 (20%), coagulopathy 2 (6.7%) and sepsis 2(6.7%). The conversion rate from regional to general anaesthesia was 2.83% for elective and 1.09% for emergency caesarean section; 81.1% of the elective general anaesthetics were used for teaching. Thirty-one general anaesthetics (41.3%) were for class 1 emergencies; of these 35.5% were delivered within 15 min as per protocol. Nineteen (25.3%) were Class 2; of these 36.8% were delivered within the required 30 min. Reasons for delay included: transfer from delivery suite to theatres in 17, anesthetic reasons in 15 and obstetric reasons in 12 patients. Some patients had more than one factor causing delay.

Conclusions: We met the <3% standard for conversion of regional to general anaesthesia for emergency caesarean section, but just fell short of the <1% for elective. There was a significant delay in getting patients to theatre. Recommendations: (1) emphasis on testing level of block; (2) time sheets for patient transfer to aid identification of causes for delays; (3) reclassification of emergency caesarean section in line with the RCOG National Sentinel Caesarean Section Audit report.[2]

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P16. An retrospective audit of the use of general anaesthesia for caesarean section

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Introduction: The use of general anaesthesia for caesarean sections has declined in the past twenty years as regional anaesthesia is preferred. We wished to study why general anaesthesia was used for caesarean section in our unit.

Methods: All patients who received general anaesthesia for caesarean section in a calendar year were identified. A random sample of half this population was selected to have their casenotes retrieved. Using a structured form, the indications for general anaesthesia were extracted from the casenotes.

Results: General anaesthesia was used in 134 caesarean sections (4% of all elective caesarean sections and 8% of all emergency caesarean sections). Maternal request was the indication for general anaesthesia in 45% of elective caesarean sections and 22% of emergency caesarean sections. General anaesthesia was required for failed regional anaesthesia in 17%, all of which were emergency cases. Four per cent of epidural and 0.3% spinal anaesthetics had to be converted to general anaesthesia.

Conclusions: The number of general anaesthetics administered for caesarean sections in our unit is lower than national rates.[1,2] Our audit suggests that if the number of general anaesthetics is to be lowered further then we should investigate why epidural anaesthesia fails and whether our use of spinal anaesthesia for emergency cases can be increased. There may also be a role for improving patient education to reduce the number of maternal requests for general anaesthesia.

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P17. Anaesthesia for caesarean section: a ten year survey in a UK region

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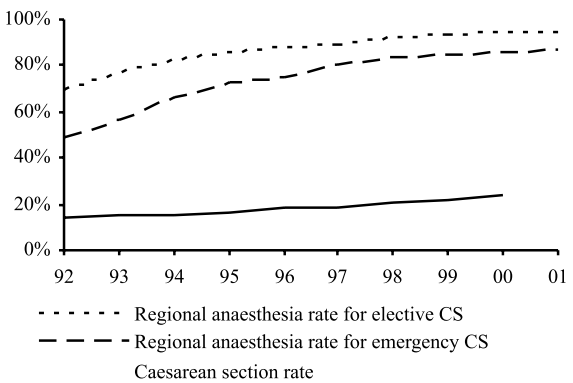
Introduction: Over the past generation there has been a rise in the rate of caesarean section (CS). This rise has been accompanied by an increased use of regional anaesthesia (RA). We present data on anaesthesia for CS in the South Thames-West (STW) region of the UK.

Methods & Results: For some years obstetric anaesthetists in the STW region have collected data on obstetric anaesthetic interventions. We have accurate data on rates of CS and anaesthetic technique for CS in hospitals in the region for the last decade. The CS rate rose from 13.9% (range 10.5–19.7%) in 1992 to 23.6% (18.5–27.3%) in 2001. During the same period the rate of RA for elective CS rose from 69.4% (48.9–83.9%) to 94.6% (89.6–98.5%) and for emergency CS rose from 49.3% (18.4–66.3%) to 86.8% (81.6–95%). In 2001 spinal anaesthesia was used in more than 90% of elective CS. During the period of our study 1.3% of RAs for elective CS and 4.9% of RAs for emergency CS were converted to general anaesthesia.



Discussion: The CS rate has nearly doubled in the last decade and there is no indication that the rate of increase is slowing; the CS rate in each of the last four years is above the line of trend. The RA rate for both elective and emergency CS has risen and there has been a convergence of anaesthetic practice. In 2001 the CS rate and the RA rate for both elective and emergency CS were higher than both the England and Wales average and the average in SE England. The widespread use of spinal anaesthesia for elective CS may limit the opportunities to teach other techniques. The failure of RA for both elective and emergency CS is unacceptable.

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P18. Anaesthetic delivery times for caesarean section at Queen Elizabeth Central Hospital, Blantyre, Malawi: is a 30-minute informed to start of operative delivery time achievable?

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Introduction: Perinatal mortality rates at Queen Elizabeth Central Hospital are thought to be higher than the published Malawian urban figure of 35 per 1000 total births. The timely provision of anaesthesia is clearly important for those neonates born by caesarean section. In 1998, The Association of Anaesthetists of Great Britain & Ireland and the Obstetric Anaesthetists' Association together decreed that in fetal emergencies the time from informing the anaesthetist to the start of operative delivery should not exceed 30 min.[1] The aim of this study was to assess how close our institution is to achieving the 30-min target.

Method: The study was carried out with the approval of the professor of the anaesthetic department. For each caesarean section performed during a three-week period in April 2002 a timesheet questionnaire was completed by a qualified anaesthetist. The time from informing the anaesthetist to the start of operative delivery was subdivided into its component times. Key time points and explanations for delays were recorded. The urgency of the procedure was recorded and analysis focused on the clinically relevant emergency and urgent cases. Time interval data are expressed where appropriate as a median, range and percentage exceeding an accepted or 'reasonable' duration.

Results: For 78 consecutive patients the median [range] times from informing the anaesthetist about a case to the start of operative delivery (I-KTS time) were 20 [6–75] and 41 [17–136] min for emergency and urgent cases respectively. In 69.2% of emergency cases, the 30-min target was achieved. Delays occurred in all the component time intervals examined. The anaesthetist was in theatre before the patient in 38 out of 52 cases (73%). Many significant delays were apparently not perceived by the anaesthetist

Conclusion: We were pleasantly surprised by the proportion of our emergency cases that fell within the 30-min gold-standard I-KTS time. An I-KTS time of less than 30 min should be routinely achievable in more optimal conditions. The delayed arrival of patients in theatre needs to be addressed. Education and repeated audit cycles using a timesheet may improve the anaesthetists' awareness of delays and decrease our I-KTS times.

Reference

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P19. Complications following obstetric anesthesia in an obstetric referral center: a prospective evaluation in 6976 patients over a 4-year period

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Introduction: Both obstetric general (GA) and regional (RA) anesthesia have been associated with morbidity and mortality. Respiratory complications following GA and post dural puncture headache (PDPH) and central nervous system complications following RA, are the most important reasons for serious morbidity.[1–3] As part of routine quality control, we prospectively evaluated all obstetric anesthesia procedures for four years.

Methodology: We report on all patients who underwent obstetric anesthesia between Jan 1998 and Dec 2001. Prospectively gathered evaluation forms and patient charts were systematically reviewed. Demographic data were recorded and the relevant medical and obstetric history was noted. The type of anesthesia performed as well as the complications that occurred were noted. If complications occurred, their follow up was reviewed.

Results: In the four-year period of analysis, 6976 patients underwent obstetric anesthesia. Data for 601 parturients were incomplete and therefore excluded. Thus the data from 6375 patients were used in the final analysis. Serious complications occurred in 1/87 patients undergoing GA and in 1/172 undergoing RA. In all women with complications, recovery was complete. Serious complications are presented in the table.

General anaesthesia	Difficult intubation	1 (1/174)
	Mendelson's syndrome	1 (1/174)
Regional anaesthesia	PDPH	28 (1/222)
	Neurologic complications*	6 (1/1034)
	Total spinal anesthesia	2 (1/3101)
	Infections	0

*Neurologic complications: two cerebrovascular incidents; four isolated nerve injuries of the lower extremities.

Discussion: The overall serious complication rate of our obstetric anesthesia service was 0.6%. This is comparable to literature data reported. The incidence of serious problems was higher in the GA group. Both problems in the GA patients were potentially life-threatening. Fortunately all patients, both in the GA and RA groups, recovered fully. The incidence of neurologic problems and PDPH is similar to that reported in the literature.

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P20. Survey of anaesthetic management of twin deliveries

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Introduction: There is often conflict between anaesthetists, obstetricians and midwives regarding the management of twin deliveries. It is commonly believed that the caesarean section rate for the second twin is in the order of 10%. The controversy is whether the mothers should receive an epidural top-up at full dilatation ready for an immediate caesarean section if required, or whether she should be managed expectantly, accepting that alternate forms of anaesthesia may have to be employed should an immediate caesarean section be required.

Method: With OAA approval, we surveyed each UK maternity unit, by means of a questionnaire, to determine their current practice. We attained a 75.9% response rate.

Results: Despite few actual protocols, most units (71.2%) advise patients to have epidural analgesia, although few (8.1%) see women with twin pregnancies in the antenatal period. Most patients with two cephalic twins and a working epidural are managed on the labour ward on a standard delivery bed without the presence of an anaesthetist. Only 8.3% are topped up in readiness for immediate caesarean section. If an instrumental delivery was anticipated for cephalic twins, an increasing percentage were delivered in theatre on an operating table with an anaesthetist present, although only 23.4% were prepared for immediate caesarean section. If one twin was breech but a vaginal delivery was still planned, over half (58.4%) were delivered in theatre but still only 35% were sufficiently topped up for immediate caesarean section.

Conclusion: General anaesthesia for twin pregnancy carries a significant morbidity and mortality. There appears to be a discrepancy between the number of units actively recommending epidural analgesia for women expecting twins, and the fact that there is no consensus as to the best way to manage the epidural for safe delivery of both babies, with minimal risk to the mother. A low percentage of epidurals are sufficiently topped up for immediate section, so presumably these ladies are subjected to other forms of anaesthesia if caesarean section is necessary. Given the huge variation in current practice for managing twin deliveries, would some national guidelines not be appropriate?

P21. A survey of the management of failed or inadequate regional anaesthesia for caesarean section

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Introduction: Regional techniques are the preferred methods of anaesthesia for caesarean section. A recent survey showed a conversion rate to general anaesthesia (GA) of 10.6% due to pain,[1] but there is no consensus as to how to manage this.

Methods: An extensive questionnaire was circulated to delegates of the Obstetric Anaesthetists' Association Annual Meeting in May 2002. Clinicians were asked how they would manage an inadequate block, using a spinal (S) or epidural (E), in categories 1, 2 and 3 caesarean sections, before skin incision, during opening of the peritoneum and after delivery of the baby.

Results: There was a return rate of 40% (206/515). Spinals (75%) and combined spinal epidural (CSE, 20.4%) were the preferred method of anesthesia for caesarean section. Failure of regional techniques was discussed by 92.3% of clinicians at the pre-operative visit but only 25.2% quoted a rate.

Table: First line management of inadequate block before skin incision.

Method (%)	Category [Spinal (S) or Epidural (E)]					
	1 S	1 E	2 S	2 E	3 S	3 E
GA	98	87.4	56.4	38.5	11.8	9
S	2.0	10	31.9	46	52.9	54.7
New E	0	0.5	8.8	3.5	28.4	16.9
CSE	0	1.5	2.9	10.5	4.9	15.4

Conversion to GA was the first line management for pain felt during opening of the peritoneum in category 1 (S-65.1%, E-60.2%), category 2 (S-53.4%, E-43.7%) and category 3 caesarean section (S-45%, E-32%). Intravenous opiates (i.v) were the second, and nitrous oxide the third most commonly used first line agents using both spinal and epidural. After delivery, only 15% (S) and 11% (E) opted for GA as first line. Top-ups were the most common option in the epidural group (31.4). Opiates followed by nitrous oxide were then the most popular agents in both groups.

Discussion: Inadequate regional anaesthesia does occur despite our best efforts and is a large source of litigation against the obstetric anaesthetist. Our survey shows that clinicians do discuss this problem with patients. GA in these situations is a key tool particularly in Category 1 and 2 patients despite our increasing use of regional techniques. A variety of methods were used to supplement blocks and this reflects the lack of a perfect regime.

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P22. A survey of obstetric practice: elective caesarean section, the place for partners

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Introduction: Caesarean section is exceptional amongst surgical procedures because it has emotional implications for the mother and the father. It does however carry anaesthetic and surgical risks, and reports in the literature detail sudden, unexpected and severe complications following spinal anaesthesia.[1,2] Our current practice in Sheffield is not to allow the partner in until the block is established to avoid the partner being present when any complications at the onset of regional anaesthesia occur. We are currently reviewing this practice and felt it would be useful to carry out a national survey of practice before revising our policy. We thought that it would also be interesting to survey unit protocols for general anaesthesia.

Method: Having gained approval from the OAA, 254 surveys were distributed to lead obstetric anaesthetists nationally. The survey consisted of a sheet for regional anaesthesia and another one for general anaesthesia.

Results: Of those surveyed 78% of forms concerning regional anaesthesia were returned. Of these 81% said that spinal was their preferred mode of regional anaesthesia. The majority (48%) of replies stated that they routinely allowed partners in from the start of anaesthesia to completion of surgery, 38% allowed them in once the block was in, and 10% after surgery had started. The principal reason for allowing them in all the time was to calm and support the mother (39%). The principal reasons given for admitting partners after the regional block was given was that the system works (23%), lack of space (22%) or in order to check the block (19%). Reasons given for admitting partners after knife to skin were to check the block was working (63%). Only 5% of units mentioned patient safety as a reason for excluding the partner. Of those surveyed 62% of forms concerning general anaesthesia were returned. Of these 7% allowed partners in to witness the birth of the baby. The principal reason for excluding partners was that their presence was of no benefit to the mother (36%).

Conclusion: The majority of units surveyed allow partners to be present the whole time for elective caesarean sections under regional anaesthesia. This suggests that severe complications of spinals are rare and may lead us in Sheffield to revise our policy.

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P23. Training in obstetric anaesthesia in the UK: a national survey

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Introduction: Training and assessment in obstetric anaesthesia are about to become competency based. The aim of this survey was to provide an insight into current training in obstetric anaesthesia.

Methods: A postal questionnaire was sent out to the lead obstetric anaesthetists in 258 centres. Each consultant was asked to distribute a separate questionnaire to three trainees on the obstetric rota.

Results: The final response rate was 81% for consultants and 43% for trainees.

- 22% of centres were non-compliant with the Association of Anaesthetists' guideline of one consultant session per 500 deliveries.
- The majority of teaching is carried out on elective caesarean section lists (97%) and during 1:1 supervision on labour ward (83%).
- 59% of centres have academic teaching sessions.
- 93% of consultants thought training could be improved by increasing consultants' sessions.
- 74% of trainees had undergone a training module in obstetric anaesthesia (average length three months).
- 58% of respondents had been involved in other areas of anaesthesia during the daytime.
- 87% of trainees had not undergone modular training but covered obstetrics out of hours.
- In 30% of cases, back-up was provided by a senior trainee.
- 40% of cover was still provided by consultants without fixed obstetric sessions.
- The most widely disliked aspect of obstetric anaesthesia was related to difficulties with other professionals.
- The amount and intensity of out of hours work, working in isolation and being made to feel like 'a technician', were other factors mentioned by trainees.

Discussion: Training in obstetric anaesthesia varies greatly between centres. Where modular training is practised it is often in name only. The aspects of obstetric anaesthesia disliked by trainees may reflect deficiencies in training. Many consultants commented on the decreased availability of trainees on labour ward. The introduction of shift and partial shift systems in response to the reduction in junior doctors' hours, means the actual time available to teach trainees is increasingly reduced. This will need to be addressed.

P24. Prophylactic administration of ranitidine to women in labour : an audit cycle

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Introduction: Women in labour may require emergency general anaesthesia. A serious complication may be aspiration of gastric contents into the respiratory tract. It is therefore important to identify women who may progress to operative delivery and to decrease the volume and increase the pH of their gastric contents. This can be achieved effectively using a combination of regular intra-muscular ranitidine plus sodium citrate immediately before induction of anaesthesia.[1] Our unit has a protocol that identifies "high risk" labour and these women are given i.m. ranitidine by midwives. We present an audit of this administration of prophylactic ranitidine.

Methods: Data for the initial audit loop was collected by casenote review for all women undergoing emergency operative procedures during a one week period. Obstetric history, events during labour, details of ranitidine administration and the mode of delivery were recorded. Following analysis of these data our protocol for midwife administration of ranitidine was widely publicised and a programme of staff education introduced. A repeat one-week audit was performed 6 months later. A further one week audit of all women in labour was carried out to assess the frequency of unnecessary ranitidine administration.

Results: Ranitidine was given to 15/18 women (83%) in the first audit and 21/24 (87.5%) in the repeat audit, although prescribing patterns differed between the audits. The protocol for ranitidine administration was correctly applied in 17% of cases in the first audit, and 46% in the follow-up audit. Only 28% of patients in the first audit received optimal antacid prophylaxis (i.e. >1 h before delivery) versus 52% in the repeat audit. Review of all women in labour (n = 128) identified 65 who had indications for ranitidine. Of these 43 (66%) went on to instrumental or operative delivery.

Conclusion: Ideal antacid prophylaxis can be difficult to achieve in practice, despite education and encouragement of staff to be proactive in the administration of ranitidine. Our protocol does predict most patients likely to have operative deliveries, and the importance of antacid therapy in these patients should be stressed.

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P25. Recovery from anaesthesia in obstetrics: an audit of midwifery skills in the recovery area

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Introduction: Guidelines concerning the recovery from anaesthesia have been clearly documented.[1,2] AAGBI[1] have published up-to-date recommendations for immediate post-anaesthetic recovery. The standards recommended should be applied to all areas where an anaesthetic is administered, which include the obstetric unit. In 2002 the Cardiff and Vale NHS Trust has a 27% caesarean section rate, 11% under general anaesthesia. A safe recovery area is therefore essential. The OAA is currently undertaking a national survey into recovery practice. In our units midwives care for patients during recovery, although post-anaesthetic recovery is a small part of their training. We therefore decided to examine whether the recovery skills and knowledge of midwives in our unit met expected standards.

Method: Thirty midwives were assessed over a two-day period. They were asked to complete a questionnaire about their confidence in post-anaesthetic recovery and to act out a basic life support scenario in which they were required to manage an apnoeic patient. They were marked on their performance by two anaesthetists.

Results: 100% of midwives should be able to manage the airway appropriately. A sample of the results were as follows:

- 50% of midwives felt that their airway management skills were inadequate.
- 43% of midwives did not feel confident using a bag and mask, and interestingly of those who felt confident, 71% were unable to use it properly.
- The basic manoeuvre of opening the airway was omitted by 53% of midwives.
- Despite 100% of midwives feeling confident in managing a patient after spinal anaesthesia, only 67% felt happy managing one after GA.

Conclusion: Immediate post-anaesthetic recovery is important and should be managed by staff with appropriate recovery skills. In view of the fact that a significant number of midwives were not confident in or capable of managing post-anaesthetic airway complications, changes need to be made. For example:

- Regular targeted training and assessment of the midwives.
- Having dedicated recovery staff for all postoperative obstetric patients.

We await with eager anticipation the results of the national survey to see how other units manage the recovery of their patients.

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P26. Audit of anaesthetic record-keeping during caesarean section

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Introduction: The Obstetric Anaesthetists' Association and the Royal College of Anaesthetists have recently published guidelines for anaesthetic record-keeping during a caesarean section.[1,2] Our aim was to audit the standard of record-keeping in our maternity unit.

Methods: The absence or presence of predefined data items in the anaesthetic charts of 50 women who had undergone caesarean section was noted. As a consequence of this audit, a reminder sticker was developed and introduced, which prompted for the exact times when the anaesthetist was ready, the anaesthetic/top-up was started, the skin and uterus were incised and delivery occurred. This sticker was made available to anaesthetists attending all caesarean sections. Approximately one year after the sticker's introduction the audit was repeated, using the charts of another 53 women.

Results: Number (proportion) of predefined data items recorded before (Audit 1; $n = 50$) and after (Audit 2; $n = 53$) introduction of a reminder sticker.

	Audit 1	Audit 2	*P* value
Anaesthetist's name	50 (100%)	52 (98%)	NS
Date of surgery	49 (98%)	50 (94%)	NS
Operation	49 (98%)	46 (86%)	NS
Surgeon's name	12 (24%)	19 (35%)	NS
ASA grade	10 (20%)	40 (75%)	<0.0001
Urgency of surgery*	15 (30%)	40 (75%)	<0.0001
Anaesthetic/top-up*	23 (46%)	45 (84%)	<0.0001
Anaesthetist ready*	5 (10%)	37 (69%)	<0.0001
Skin incision*	5 (10%)	39 (73%)	<0.0001
Uterine incision*	0 (0%)	26 (49%)	<0.0001
Delivery*	4 (8%)	42 (79%)	<0.0001

*times prompted by sticker.

Discussion: The sticker is a cheap, useful and convenient prompt for the recording of critical events during caesarean section. In addition, the sticker appeared to prompt recording of other data items e.g. ASA grade, although we only specifically looked at five of these, of which three were already commonly recorded. The sticker (in electrical format) is available from the authors on request.

References

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P27. Syntocinon management of the third stage at caesarean section: an audit of the introduction of a 5-unit bolus

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Introduction: The most recent Confidential Enquiry into Maternal Deaths (1997–1999)[1] recommends the use of no more than 5 units of Syntocinon as a slow i.v. bolus. In February 2002 the use of 5 units of Syntocinon was introduced at the Queen Mother's Hospital (QMH) to replace the previous routine 10-unit bolus. Retrospective audit of routine hospital information showed only 50% compliance with this new regimen. This was felt to result from obstetric requests for 10 units. We therefore aimed to assess the use of 5 units of Syntocinon and its efficacy and safety compared with the routine use of 10 units.

Methods: A prospective questionnaire completed by the anaesthetist at time of caesarean section recorded variables including dose of Syntocinon bolus, need for Syntocinon infusion, fall in BP (in first 82 cases), estimated blood loss and grade of staff involved. This audit data was collected over three months between September 2002 and January 2003. Retrospective audit of 120 caesarean sections from late 2001 (10 units of Syntocinon) was compared with the current data for blood loss and use of Syntocinon infusion. Looking at hypotension, the current data were compared with data from an audit of elective caesarean section under spinal anaesthesia at QMH in 1995 (10 units of Syntocinon).

Results: 148 questionnaires were returned. Two were excluded (placenta praevia and abruption). 129 patients (88.3%) had a 5-unit bolus of Syntocinon, nine (6.2%) received a 10-unit bolus, eight (5.5%) had 5+ further 5-unit boluses a few minutes later on surgical request.

	2002/3	2001	*P*
Regional anaesthesia	95%	89%	0.61
Proportion elective	49%	40%	0.26
Blood loss <1000 mL	91.1%	94.2%	0.81
Blood loss <1500 mL	100%	99.2%	0.95

Also there was no statistically significant difference in the number of patients requiring a Syntocinon infusion to augment uterine tone whether 5 or 10 units were used ($P = 0.25$). Any hypotension was transient with an average fall of 11.8% in mean BP and 5/79 falling below 90 mmHg systolic, one requiring ephedrine. This too was comparable to the data from 1995.

Conclusion: In our routine use at caesarean section, 5 units of Syntocinon is an effective and safe alternative to our previous standard dose of 10 units.

Reference

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P28. An audit of blood transfusions in obstetrics

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Introduction: Blood transfusions are an integral part of medical care, yet there is a wide variation in their use.[1] They carry a significant risk of reaction and infection.[2] Transfusion reactions are common, occurring in up to 12% of blood recipients.[3] There is also increasing evidence that patients tolerate, and physicians accept anaemia more than previously. We audited our practice in Sheffield to see whether it was consistent with current recommendations.

Method: All women who gave birth in the Jessop Wing between 01/04/01 and 01/04/02 and received blood products were identified from obstetric and coding databases. Of this cohort of 157 patients, 144 sets of notes were obtained. Each of the patient's notes were reviewed noting the type of delivery, number of transfusions administered, pre- and post-transfusion haemoglobins, the apparent reason for transfusion and the estimated blood loss. For the purposes of this audit a 'low postnatal haemoglobin' was <8 g/dL with no apparent symptomatology.

Results: The overall transfusion rate was found to be 2.7%. Patients were twice as likely to receive blood after an emergency caesarean section as they were after an elective one. Of those patients transfused 16% had a haemoglobin >8.1 g/dL, only 43% of whom were actually symptomatic; 49% had a post-transfusion haemoglobin >10.0 g/dL and 4% a haemoglobin >12.0 g/dL. In 18 (11.5%) of the cases it appeared from studying the notes that the reason for transfusion was purely based on a low haemoglobin, (<8.0 g/dL).

Mode of delivery	Number of patients	Number transfused
Normal	3549	51 (1.4%)
Elective caesarean section	503	19 (3.8%)
Emergency caesarean section	773	49 (6.3%)
Forceps	336	18 (5.4%)
Ventouse	545	20 (3.7%)

Conclusion: In keeping with a previous audit at the North Staffordshire Hospital,[3] our results indicate that too many of our patients are receiving blood transfusions. We should remember that donated blood is a limited resource, and should be treated as such: efficiently, conservatively, and appropriately.[3]

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P29. Impact of obstetric anaesthetic high risk referrals on supporting specialties

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Introduction: Management of high-risk pregnancy should always be based on a multidisciplinary team approach.[1] This unit has a protocol-driven referral service for clinic assessment of obstetric patients deemed high risk for anaesthesia. The aim of this study was to define the number of high-risk patients who were managed by obstetric anaesthetists alone, compared with those requiring additional input from supporting specialties.

Methods: This was a retrospective analysis of the obstetric anaesthesia high-risk database, covering completed pregnancies for the year from 1st January 2002. This details referrals from both the medical obstetric clinic and the antenatal clinic for senior anaesthetic review. The attending anaesthetist had access to resources such as local protocols, internet and textbooks. An Excel spreadsheet was used for data collection and analysis.

Results: There were a total of 89 cases of which 60 required no further supporting specialty referral. The commonest reasons for anaesthetic review overall were obesity (23), back problems (15) and allergy (9).
The 29 supporting specialty referrals were as tabulated:

Specialty	Number of Referrals
Cardiology	11
Heamatology	7
Immunology	3
Neurology	1
Orthopaedics	4
Pharmacology	1
Renal Medicine	1
Rheumatology	1

Conclusions: In this unit 67% of high risk referrals for anaesthetic assessment had a management plan formulated by the attending anaesthetist without consulting other specialties. The remaining 29 were spread over eight specialties. The commonest referral of cardiology saw all 11 patients having echocardiography. (This compares with a total of 5203 elective echocardiography procedures in this hospital over the same period.) We conclude that a high-risk assessment service is unlikely to a have a significant impact on supporting specialty workload and can be accommodated within the existing resources of a major teaching hospital.

Reference

1. Schneider M C. Anaesthetic management of high-risk obstetric patients. Acta Anaesthesiol Scand 1997; 41: 163–165.

P30. Care of the obstetric patient with cardiac disease: a retrospective survey of 61 parturients

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Introduction: There is an increasing number of women who become pregnant with significant cardiac morbidity.[1] This audit reviews 61 parturients who were seen in an obstetric anaesthetic clinic from July 1998 with a history of cardiac disease.

Method: Identified from clinic records, 61 case records were reviewed with agreement from the hospital audit department. A detailed birth plan had been written in all the patient's notes with information on whether an epidural for labour was advised, type of anaesthetic for planned caesarean section and the seniority of the anaesthetist who should be involved in the care.

Results: Women's ages ranged from 17–43 years. They were seen first in the clinic from 18 to 38 weeks' gestation and problems ranged from arrhythmic to complex multiple congenital lesions. At first consultation: 51 were New York Heart Classification (NYHC) I, 8 NYHC II and 3 NYHC III. Six presented for the first time during pregnancy; 17 required regular cardiac medication before conception. All had an ECG and 54 had an echocardiogram as part of their ante-natal work up. Those with significant disease had monthly serial echos. There was no anaesthetic input in 11 because of uncomplicated or rapid delivery; 21 women had been advised to have epidural analgesia for labour and 17 received it; 26 mothers in total had an epidural although two in addition had a GA for emergency caesarean sections. Of the 18 planned and 9 urgent sections, there were 14 low dose CSEs, 6 spinals and further planned "cardiac" GA. One mother was sent for urgent valvotomy elsewhere. A consultant anaesthetist was present in all 19 cases where one was advised and 8 mothers were advised and received invasive monitoring. Postpartum complications included 13 with PPH >500 mL, one myocardial infarction, three awaiting AVR and two mothers were placed on the heart-lung transplant list. There was one post partum death in a mother with Ehlers Danlos syndrome. There were two mid-trimester terminations, one for a deterioration in maternal condition and the other for a warfarin embryopathy. There was one neonatal death and five neonates had congenital heart disease.

Conclusion: The management of the mother with cardiac disease can be challenging, requiring a consultant anaesthetist for elective and emergency delivery. Early consultation and carefully written plans in an obstetric anaesthetic clinic improve communication and the management of all pregnant women with cardiac disease.

Reference

1. Prospective multicentre study of pregnancy outcomes in women with heart disease. Circulation 2001; 104: 515–521.

P31. An audit of thromboembolism risk assessment of mothers in labour

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Introduction: Thromboembolism remains the leading direct cause of maternal death in the UK.[1] Following the introduction of the RCOG guidelines on thromboprophylaxis,[2] deaths after caesarean section have fallen dramatically.[1] An audit in our department also reflected this.[3] The most recent report on confidential enquiries into maternal deaths found that deaths from thromboembolism after vaginal deliveries have unfortunately not improved.[1]

Methods: For a period of 6 weeks, we prospectively audited the presence or absence of risk factors and the use of thromboprophylaxis in women admitted in labour to our unit. The mothers were classified as moderate or high risk according to RCOG risk assessment profile. Staff caring for the mothers was not aware of the audit.

Results: A total of 290 women were reviewed during this period, of whom 79 were considered to be at some risk of thromboembolism (table). Only eight mothers received any form of thromboprophylaxis. On the other hand none of the women in the audit developed deep vein thrombosis or pulmonary embolus.

	n	Number given thromboprophylaxis
Mod risk	58	0
High risk	21	8 (38%)

Discussion and conclusion: Interestingly, the eight who received prophylaxis did so because they were delivered by emergency caesarean section. Following this audit, we have established protocols for risk assessment and thromboprophylaxis in women delivering vaginally on our unit. The last two reports on confidential enquiries into maternal deaths recommended that all women with risk factors should be carefully screened and consideration should be given to a wider use of thromboprophylaxis during vaginal deliveries. Despite this there is still a lack of awareness of risk factors and the need for thromboprophylaxis. We reiterate the confidential enquiries' recommendations that each unit develop guidelines, which can be applied within the requirements of their own units.

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P32. Pregnancy induced hypertension: time to redefine?

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Introduction: Current *WHO* guidelines define pregnancy-induced hypertension (PIH) as a diastolic pressures of 90 mmHg or more on two consecutive readings 4 h or more apart.[1] In the most recent Confidential Enquiries into Maternal deaths (CEMD), PIH is similarly defined as a diastolic pressure $\geqslant 90$ mmHg.[2] Definitions of PIH continue to rely on absolute levels of pressure with little consideration of patients' initial booking pressure measurements. We would like to report a series of women who developed eclampsia in our unit in whom a diagnosis of PIH was not made because their blood pressures remained 'normal' according to the above definitions. These women had significant increases in diastolic pressure in comparison to their low booking pressures.

Method: We retrospectively surveyed our units critical incident database over a three-year period to identify women who developed eclamptic seizures. The medical records of these women were reviewed.

Results: Over the period surveyed, seven women had witnessed seizures during pregnancy. Of these women with eclampsia, we identified four who did not have diastolic blood pressures above 90 mmHg at any stage. On the other hand they did have significant rises in diastolic pressure around the time of seizure, compared to their readings at booking.

Discussion: Our review shows that definitions of PIH which are based on absolute blood pressure thresholds alone as recommended by WHO and the CEMD can result in patients with preeclampsia not being identified until they develop eclampsia. Various groups have proposed revisions to the definition of PIH so that significant increases in baseline blood pressure are taken into account.[3] In our review, all four women who were missed had such rises. We believe that women who have increases in diastolic pressure of 15 mmHg or more (or a 20% rise from their booking pressures) warrant close observation. We suggest this should be reflected in guidelines on PIH.

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P33. Per-operative oesophageal Doppler monitoring in a parturient with Eisenmenger's syndrome

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Introduction: Maternal mortality in Eisenmenger's syndrome most frequently occurs in association with caesarean section[1] where both regional and general anaesthesia may have deleterious effects on cardiovascular function. Haemodynamic instability may be successfully measured using a pulmonary artery flotation catheter, although its benefits may be limited by technical insertion difficulties, cardiac dysrhythmia and catheter-related thromboembolic complications. In this report, the per-operative use of the oesophageal Doppler monitor (ODM) is described in a parturient with Eisenmenger's syndrome undergoing caesarean section.

Case report: A 26-year-old primigravida with Eisenmenger's syndrome (secondary to uncorrected secundum ASD) was admitted for oxygen therapy and thromboprophylaxis at 20 weeks' gestation. On examination she was dyspnoeic and cyanosed. During admission she developed type II heparin induced thrombocytopenia (platelet count 61×10^9/L) and an ultrasound scan confirmed the presence of a grade IV placenta praevia. Unexpectedly at 29 weeks she developed clinical signs of pulmonary thrombo-embolism with worsening hypoxaemia and required an emergency caesarean section. General anaesthesia consisted of i.v. ketamine 120 mg and fentanyl 500 μg with isoflurane 0.5% in 100% O_2. Following induction an ODM (Deltex Medical Ltd, Chichester, UK) was inserted in addition to antecubital central venous and radial artery catheters. Intra-operative ODM findings are shown in the table. At delivery oxytocin was given i.v. at 30 units/h. Blood loss was 550 mL. The patient was successfully extubated at 48 h and discharged from the intensive care unit after 11 days. Mother and baby were discharged from hospital six weeks after delivery.

Table: Intra-operative haemodynamic variables

ODM	Induction	20 min	40 min
CO (L/min)	6.1	7.9	6.1
FTc (ms)	361	348	325
PV (cm/s)	130	163	135
SVR (dyn.s.cm^{-5})	751	544	881

Discussion: The ODM is a simple and useful tool for assessing haemodynamic stability in the critically ill obstetric patient. Current modifications to the probe, which allow naso-oesophageal placement in awake patients, may widen its future scope in obstetrics.

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P34. Anaesthetic management of achondroplasia for caesarean section

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Introduction: Achondroplasia is an autosomal dominant disorder and is the most common form of dwarfism. Decreased rate of endochondral ossification leads to shorter tubular bones, hence short extremities and relatively normal trunk. These patients usually require caesarean section for delivery. Patients with achondroplasia may have foramen magnum stenosis and kyphoscoliosis therefore causing problems with endotracheal intubation as well as regional anaesthetic techniques. We report three cases, two for emergency and one for elective caesarean section, all managed under spinal anaesthesia.

Case reports: Patient A, a 22-year-old primip,122 cm in height, required emergency caesarean section. She was given 500 mL of crystalloid preloading and spinal anaesthesia with 1.3 mL of 0.5% heavy bupivacaine. A sensory level of T4 was obtained. A healthy male baby was delivered with no perioperative problems.

Patient B, a 19 year-old-primip, 120 cm in height, required emergency caesarean section. Spinal anaesthesia was established after some technical difficulty because of mild kyphoscoliosis. She was given 0.8 mL of 5% heavy lidocaine. A sensory level of T6 was achieved. Intraoperatively she needed ketamine 10 + 10 mg supplementation because of discomfort. She delivered a healthy male baby.

Patient C, 24 years old, 123 cm in height, required an elective repeat caesarean section. She was preloaded with 500 mL of crystalloid solution and a spinal with 1.3 mL of 0.5% heavy bupivacaine. A sensory level of T2 was obtained, resulting in bradycardia and hypotension, which were corrected with atropine and vasopressors. She delivered a healthy female baby and there were no other problems.

Discussion: General anaesthesia and epidural techniques have been used successfully in these patients for caesarean section. There were only two reported cases of use of spinal anaesthesia for caesarean section in the literature and there is paucity of data regarding the optimal dose of local anaesthetics for central neuraxial blockade. We conclude that spinal anaesthesia is safe and effective in achondroplasia.

Reference

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P35. Dose response to spinal diamorphine in the presence of regular NSAID therapy: a study in patients undergoing caesarean section

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Introduction: Previous workers have studied the optimal dose of spinal diamorphine for analgesia after elective caesarean section in the absence of regular NSAIDs.[1,2] NSAIDs reduce parenteral opiate requirement[3] and itching.[4] We wished to establish whether regular administration of paracetamol and diclofenac would reduce the dose of spinal diamorphine that was required for good postoperative analgesia whilst reducing opiate-induced side effects.

Methods: Following ethical approval 120 women undergoing elective caesarean section were randomised to one of four groups, double blinded. Spinal anaesthesia was performed with 0.5% heavy bupivacaine and either placebo or one of three different doses of diamorphine (100, 200 or 300 μg). Regular paracetamol and diclofenac were administered postoperatively. Breakthrough pain was treated with subcutaneous diamorphine boluses.

Results: There was a dose dependent increase in analgesia and itching (number of times reported) with spinal diamorphine. The incidence of nausea was similar between groups.

Dose of spinal diamorphine μg	0 (n = 26)	100 (n = 29)	200 (n = 27)	300 (n = 28)
24-h dose of s.c. diamorphine mg (mean (SD))	16.9 (10.1)	12.9 (9.8)	10.64 (8.67)*	6.88 (6.48)**
Post op itching moderate or severe /nil or mild	2/74	11/76*	17/64**	21/59**

*$P < 0.01$ cf control **$P < 0.001$ cf control

Conclusions: The use of regular NSAIDs did not reduce the trend towards itching with higher doses of spinal diamorphine, although requirement for postoperative opioids was approximately 50% of that previously reported.[1,2]

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P36. The effects of intrathecal diamorphine on gastric emptying after elective caesarean section

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Introduction: At present there is no consensus regarding the ideal period of postoperative starvation after elective spinal caesarean section. Previous work has shown that gastric emptying was significantly slower in the first few hours after caesarean section under spinal anaesthesia than it was on the third postoperative day.[1] We wished to identify the contribution that intrathecal diamorphine made to this delayed gastric emptying.

Method: Forty women undergoing elective caesarean section under a standard spinal anaesthesia were randomly allocated to receive in addition 1 mL containing either diamorphine 300 μg or 0.9% saline. Thirty minutes after completion of surgery, a baseline venous sample was obtained before administering a 1.5-g dose of soluble paracetamol in 100 mL of water. Further venous samples were collected 15, 30, 45, 60, 90 and 120 min after ingestion of paracetamol. Paracetamol concentrations were measured by enzymatic assay method using Beckman CX-7 automated analyser. Statistical analysis included the unpaired t-test with Welch correction.

Results: The time to maximum concentration (Tmax) was significantly longer in the diamorphine group (control 41.8 (20.8) min: diamorphine 72.6 (41.9) min ($P < 0.01$)). During the 2-h study period, mean (SD) morphine consumption via a patient controlled analgesia (PCA) device was significantly higher in the control group (control 9.3 (3.6) mg; diamorphine 2.1 (2.1) mg; ($P < 0.01$)). Results are expressed as mean {SD}.

	Control	Diamorphine	P-value
T max (min)	41.8 {20.8}	72.6 {41.9}	0.008
C max (μmol L^{-1})	110.7 {47.7}	87.6 {38.7}	0.11
AUC (μmol min L^{-1})	9503.8 {3528.1}	7707.5 {2780.0}	0.09

Conclusion: Intrathecal diamorphine may contribute to the delay in gastric emptying that occurs immediately after elective spinal caesarean section. Morphine consumption via the PCA in the control group may have masked the true magnitude of the effect of intrathecal diamorphine on gastric emptying.

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P37. Oral intake following caesarean section: a survey of postoperative fasting times and a telephone survey of practice in other units

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Introduction: Early feeding after caesarean section has not been shown to increase gastrointestinal symptoms or ileus[1] and it has been shown to reduce postoperative opioid requirements.[2] At the time of the survey, our unit had no guidelines for establishing oral intake after caesarean section. Our impression was that women were often not offered food or drinks for unnecessarily prolonged periods postoperatively.

Method: One hundred and nine patients were reviewed 24 h after caesarean section. Data were collected including urgency, type of anaesthesia and use of opioids. The patients were asked when they first drank and ate postoperatively.

Results: The table shows time (h) to first drinking and eating after different types of anaesthesia: mean (range).

	n	1st drink	1st food	Dissat
Elective regional	50	11.7 (7.5–18)	19.0 (8–28)	17/41
Urgent regional	50	11.6 (7.5–23)	18.1 (9–30)	9/36
General	9	12.9 (7.5–16)	23.5 (17.5–34)	0/3

Dissat = number of those commenting who were dissatisfied about postoperative feeding

There was no correlation between opioid consumption and time to feeding in any of the three groups. The managers of eight local units were contacted in a telephone survey. In five of these, no written guidelines for feeding after caesarean section were in use. Only three units used a patient-led approach.

Conclusion: Women were fasted for prolonged periods after caesarean section. Guidelines need to be in place, and a patient-led approach could improve satisfaction.

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P38. A comparison of intravenous patient-controlled analgesia (PCA) morphine and subcutaneous (s.c.) morphine for analgesia after caesarean section

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Introduction: PCA morphine is an effective method of providing analgesia after caesarean section. Subcutaneous (s.c.) morphine is also used after various operations. A single study[1] comparing the two methods after cardiac surgery showed that s.c. morphine was as effective as PCA morphine. PCA pumps are very bulky and can compromise the mobility of mothers and their ability to hold and nurse their babies. In this study, we compared the analgesic efficacy and the side-effects of PCA and s.c. morphine after elective caesarean section.

Method: In a prospective randomised controlled trial, after ethics approval, 50 patients with singleton pregnancy, ASA I-II, were randomised to receive either PCA morphine (1 mg/mL, 3-min lock-out) or s.c. morphine for postoperative analgesia. The operation was performed under spinal anaesthesia. At the end of surgery, PCA was connected to the patient or a s.c. cannula was inserted on the upper chest, 10 mg of morphine was given and a local protocol followed for s.c. morphine. Morphine consumption, pain scores (on a 100-mm scale) and nausea scores were noted 6, 12 and 24 h postoperatively. The Mann-Whitney *U*-test was used to analyse the data.

Results: There were no significant differences between PCA and s.c. groups in morphine consumption, pain and nausea scores at 6, 12 and 24 h after surgery.

Table: Median values at 24 h

		PCA	s.c.	95% CI
Morphine dose		38	40	−5.0, +8.0
Pain score	rest	13	10	−4.0, +6.0
	dynamic	20	22	−6.99, +5.0
Nausea		0	0	−0.001, −0.002

Conclusion: The study showed that s.c. morphine is comparable to PCA morphine for postoperative analgesia and side-effects, and it can be a satisfactory alternative to PCA morphine for providing pain relief after caesarean section.

Reference

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P39. Postoperative pain relief, pruritus and nausea after cesarean section: comparison of intra-operative propofol and droperidol/pentazocine

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Introduction: Some cesarean section patients complain of the visceral pain following delivery of the fetus.[1] Epidural morphine is reputed to provide excellent relief of postoperative pain but is associated with complications such as pruritus, nausea, respiratory depression and urinary retention.[2] This study was designed to evaluate the effect of systemic medications given to relieve visceral discomfort during cesarean section on postoperative analgesia, pruritus and nausea following epidural administration of morphine/droperidol/bupivacaine.

Methods: Two groups of patients undergoing cesarean section under epidural anesthesia were studied. They were comparable in age, weight and height. After seeing their baby, 24 patients received propofol and 22 patients received droperidol/pentazocine. A 2-mg bolus of morphine/2.5 mg of droperidol was given at the end of the operation through the epidural catheter. Postoperatively morphine 5 mg + droperidol 5 mg in 0.125% bupivacaine 60 mL were infused continuously at a rate of 2 mL/h. The patients evaluated pain and pruritus (1 = none or little; 2 = tolerable; 3 = intolerable, nausea: 1 = none; 2 = present). The Mann-Whitney test was used for statistical analysis.

Results: Results (*n* and %) are shown on the table. The dose of propofol given was 15 ± 4 mL, droperidol 3.2 ± 1.3 mg and pentazocine 11.9 ± 3.8 mg. There were no significant differences between the two groups. No ECG abnormalities were noted.

	Pain			Pruritus			Nausea	
Score	1	2	3	1	2	3	1	2
Propofol	12	5	7	9	14	1	24	0
%	50	21	29	38	58	4	100	0
Droperidol/ pentazocine	15	3	4	13	8	1	21	1
%	68	14	18	59	36	5	95	5

Conclusion: Satisfactory prophylaxis of nausea was obtained in both groups. Further studies are necessary to determine if postoperative pain and pruritus are affected by these drugs.

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P40. The 'Managing Obstetric Emergencies and Trauma' (MOET) course: views of course participants

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Introduction: The MOET course was set up in 1998. Since then, 29 courses have been run in the UK in 11 centres. Three hundred and seventy-one obstetricians, 104 midwives, 85 anaesthetists and three accident and emergency doctors have attended these courses. We wished to find out the views of participants on the MOET course.

Methods: Questionnaires were sent to 200 recent course participants and they were asked to rank their opinion on the statements listed below: 1 = strongly agree and 5 = strongly disagree.

Results: We received 125 replies and the median scores were as follows:

- The MOET course should be compulsory for all senior obstetricians. 2
- It is desirable for senior obstetricians to attend a MOET course. 1
- The MOET course should be compulsory for all senior obstetric anaesthetists. 3
- It is desirable for senior obstetric anaesthetists to attend a MOET course. 1
- All practising midwives should attend a MOET course. 3
- The MOET course has improved your competence in dealing with obstetric emergencies. 2
- The MOET course has increased your confidence in dealing with obstetric emergencies. 2
- The MOET course has improved your competence in dealing with trauma in obstetric patients. 2
- The MOET course has increased your confidence in dealing with trauma in obstetric patients. 2
- The MOET course has improved your competence in dealing with neonatal resuscitation. 2
- The MOET course has increased your confidence in dealing with neonatal resuscitation. 2
- It is beneficial to learn about obstetric emergencies and trauma in a multidisciplinary setting. 1

Conclusion: Overall, course participants strongly agree that it is desirable for all senior obstetricians and obstetric anaesthetists to attend a MOET course. It was felt that the MOET course should be compulsory for senior obstetricians but not for senior obstetric anaesthetists or midwives. Participants felt that the MOET course improved both their competence and their confidence in dealing with obstetric emergencies, trauma in the obstetric patient and neonatal resuscitation. There was also strong agreement that it is beneficial to learn about obstetric emergencies and trauma in a multidisciplinary setting.

P41. Simulator-based learning for obstetric anaesthesia

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Introduction: Simulation-based training has been shown to be an effective tool.[1] The Obstetric Anaesthetic Training in the Simulator (OATS) course has been developed as a training course for year 1 SpRs and senior SHOs. This one-day course challenges candidates with a variety of obstetric-based high fidelity clinical scenarios, exploring knowledge and clinical abilities. Each scenario is followed by a debriefing involving group discussion and constructive feedback led by the course facilitators. The impact of the first five courses has been evaluated.

Method: Questionnaires were completed at the beginning and end of the OATS course. Candidates were asked to assess on a scale of 1 (not at all confident) to 10 (very confident) "*How confident are you in your ability to manage the following range of obstetric anaesthesia problems?*" In addition, they were asked "*Will today's course assist you in your daily practice?*" scoring 1 (not at all) to 10 (very much so). Data were evaluated using Wilcoxon signed ranks test (significance $P < 0.01$).

Results: Data were collected from 29 candidates attending 5 OATS courses. Mean anaesthetic experience was 35 months (SD 11 months). Data are median (IQR).

	Pre-course	Post-course	*P*
Site CSE	9 (7–10)	9 (8–10)	<0.01
Maternal arrest	7 (5–7)	7 (7–8)	<0.01
Failed intubation	7 (6–8)	8 (7–9)	<0.01
Dural puncture	8 (6–9)	9 (8–10)	<0.01
Haemorrhage	7 (6–8)	8 (7–9)	<0.01
Post-natal PDPH	8 (7–9)	9 (7–9)	<0.005
Eclamptic fit	7 (5–8)	8 (7–9)	<0.0005
Total spinal	7 (5–8)	9 (8–9)	<0.0005
Thromboembolism	5 (4–7)	7 (7–8)	<0.0005
Amniotic fluid embolism	5 (4–7)	7 (6–8)	<0.0005

Will today's course help you in your daily practice?"
Median (IQR) = 9 (8–10).

Conclusion: Attendance at the OATS course significantly improves trainees' confidence in their ability to manage a number of serious obstetric anaesthetic crises. In addition, trainees believe the course is helpful in their daily clinical practice. However, it is acknowledged that competence and performance does not necessarily follow confidence.

Reference

1. Forrest F, Taylor MA, Postlethwaite K, Aspinall R. Use of a high-fidelity simulator to develop testing of the technical performance of novice anaesthetists, Br J Anaesth 2002; 88: 338–344.

P42. Management of eclampsia: a pilot study on the effects of simulation on performance

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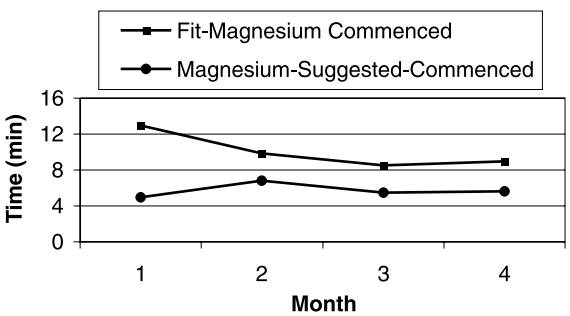
Introduction: Eclampsia is an uncommon clinical emergency, with an incidence in the UK of 4.9/10 000 maternities.[1] Consequently many medical staff will be inexperienced in its acute management. Simulated critical incidents are now increasingly used in medical practice to prepare for such rare events. We conducted a pilot study investigating the effects of a programme of eclampsia scenarios on team performance.

Method: Over a four-month period, monthly identical scenarios of an antipartum eclamptic fit were performed in a delivery room. Anaesthetic, obstetric and midwifery staff assumed appropriate roles, with an actress as the patient. Timings from onset of seizure to clinical interventions were recorded, and post-scenario comments were sought as to how future performance could be improved.

Results: Time from seizure onset to administration of magnesium sulphate ranged from 13 to 9 min. A number of difficulties relating to magnesium administration were noted, resulting in a relatively constant time of about 6 min from recommendation of magnesium to its actual commencement. Timings of calling for appropriate help, adoption of left lateral position and oxygen administration were more variable.



Conclusion: Simulated "eclampsia drills" can potentially improve team performance through education and familiarity. They may also highlight important system deficiencies and suggest remedies for these.

Reference

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P43. Obstetric "fire drills" survey

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Introduction: The confidential enquiries into maternal deaths in the UK have recommended that all obstetric units should organise regular "fire drills" for cases of massive haemorrhage.[1] The Department of Health recognises that medical simulation centres may have a role in such training to "expose staff to risk situations with no actual patients involved."[2] This survey was compiled to ascertain the level of implementation, experiences with location and staffing, the attitudes of anaesthetists towards them and the potential role for medical simulation centres.

Method: OAA-approved questionnaire were sent to the lead consultant obstetric anaesthetist of all UK units.

Results: Questionnaires were posted to 260 units and 203 completed forms were returned (78% response). Only 92 units (45%) had run "fire drills": of these, 61% had run less than 3 in the last year. Haemorrhage was the commonest scenario used (at 84% of units). Additional drills included maternal cardiac arrest (39%), collapse (33%) and convulsions (32%). All units except one, which involved midwives alone, ran multi-disciplinary scenarios. At most units drills were run on labour ward (82%) or in obstetric theatre (33%). Although only 5% of units used simulation centres, 59% of respondents felt they would be suitable. At 29% of units protocols had changed as a result of running the drills. The majority, 111 units (55%) had not run "fire drills". The most frequently cited reasons were "no time" (37%), "no funding" (30%), "no staff" (19%), "don't know" (15%) and "not worth the effort" (5%). Nevertheless, 49% of these units stated that they were intending to introduce them soon. Most respondents, 93% of the "fire drill" and 74% of the "non fire drill" groups, agreed that other multidisciplinary training exercises would be of value to their units.

Conclusions: This survey suggests that just under half of UK obstetric units have implemented "fire drills" for critical situations. Only 18% of all units have run more than two drills in the past year. The commonest reason for not implementing drills was lack of resources. The majority of anaesthetists appear to appreciate the value of multi-disciplinary team training. Whilst the clinical environment may be the most appropriate location for "fire drills", fitting this in with daily duties on a busy labour ward is proving difficult for many units. Where available, simulation centres may offer an alternative location for multi-disciplinary training.

References

1. Confidential Enquiry into Maternal Deaths in the United Kingdom 1994–1996 and 1997–1999.
2. Building a Safer NHS for Patients. Department of Health 2001.

P44. A simple technique to reduce the incidence of loss of local anaesthetic solution during injection for spinal anaesthesia

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Introduction: Previous workers have shown that significant quantities of local anaesthetic may be lost in the form of drops spilled from the connection point between the spinal needle and the syringe at injection for spinal anaesthesia.[1] This loss of local anaesthetic may lead to inadequate anaesthesia, possibly resulting in an inferior block. It was our clinical impression that local anaesthetic was lost less frequently if the syringe was attached to the spinal needle before the spinal fluid had been allowed to enter the hub of the spinal needle. We investigated this using the *Rouilly* LP simulator.

Method: The *Rouilly* LP simulator for lumbar puncture injection contained saline 0.9% representing cerebrospinal fluid. A series of spinal injections were performed using 25-gauge Sprotte needles. A 5-mL syringe was then firmly connected to the hub of the needle and 3 mL of 0.9% saline injected over 10 s. On 10 occasions saline was allowed to flow freely from the hub of the needle before connecting the syringe, whereas on another 10 occasions the syringe was connected to a dry needle hub. Any loss of the injectate from the connection site was then recorded.

Statistics: Fischer's Exact Test was used (SPSS programme) assuming significance at $P < 0.05$.

Results: Significantly more drops of injectate were lost from the wet hub connection ($P < 0.02$).

	Fluid loss		Total
	Loss	No loss	
Spinal hub dry	3	7	10
Connection wet	9	1	10
Total	12	8	20

Discussion: We have shown that it is possible to reduce significantly the incidence of loss of injectate from the hub of the spinal needle by using "dry connection" to the syringe. This is a simple technique that should help ensure that all of the local anaesthetic solution is instilled so that a satisfactory spinal block is achieved.

References

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2. Levy JH, Islas JA, Ghia JN, Turnbull C. A retrospective study of incidence and causes of failed spinal anesthetics in a university hospital. Anesth Analg 1985; 64: 705–710.

P45. Mechanism of epidural paresthesia: is it the catheter or the needle?

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Introduction: The incidence of paresthesia with epidural catheter placement in the obstetric population is reported as high as 44%. Clinically, such paresthesias mostly occur as the catheter tip initially emerges from the tip of the needle. We postulated that the stiffness of the catheter and the angle of the epidural needle tip determine the force an epidural catheter exerts on surrounding tissues as it exits the needle. To test this hypothesis, we constructed a model to test in vitro the force exerted when a variety of epidural catheters are passed through different epidural needles.

Methods: Force was measured with a compression gauge and angle at the tip of an epidural catheter identified with a 4× magnified protractor. The maximum force acting on the compression plate with catheter advancement was measured 10 times for each catheter/needle combination. Catheters studied were: 20-gauge Kendall SafeTrak® bullet tip (kbt) (copolymer), 20-gauge Kendall SafeTrak® open tip (Teflon®) (kut), 20-gauge Portex bullet tip (nylon) (pbt), and the 19-gauge Arrow® FlexTip Plus™ (wire spiral polyurethane) (s). Epidural needles were 18-gauge Husted® (h), 18-gauge winged Weiss® (w), 18-gauge winged Espocan® (e), and 17-gauge Tuohy (winged) (t). Mean and standard error were determined for each catheter/needle combination and compared by ANOVAR and Dunnett's Multiple Comparison Test with $P = 0.05$ as significant (JMP 4.04 software).

Results: The angle of needle tip was $e = 22°$, $h = 2°0$, $t = 25°$, $w = 18°$.

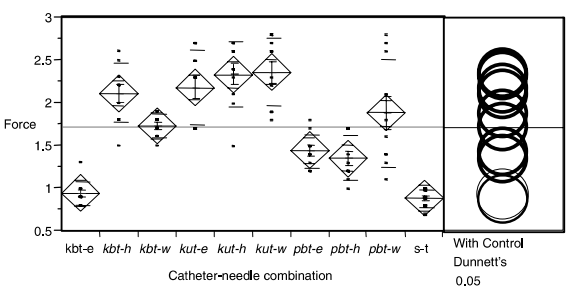

Figure: Force vs catheter-needle combination.

Discussion: Our study demonstrated that there is an association between needle type and catheter combination and the force exerted on tissues with catheter advancement. The Kendall Bullet tip catheter pushed through an Espocan needle and Portex Bullet tip catheter advanced through Husted needle combinations were significantly better than the other polyamide catheter/needle combinations. When compared with the Arrow/Tuohy, only the Kendall Bullet Tip/Espocan combinations were similar. This in vitro study implies that both the needle and catheter chosen are important determinants in reducing the risk of paresthesia.

P46. Is S1 motor block a reliable indicator of accidental intrathecal injection of levobupivacaine?

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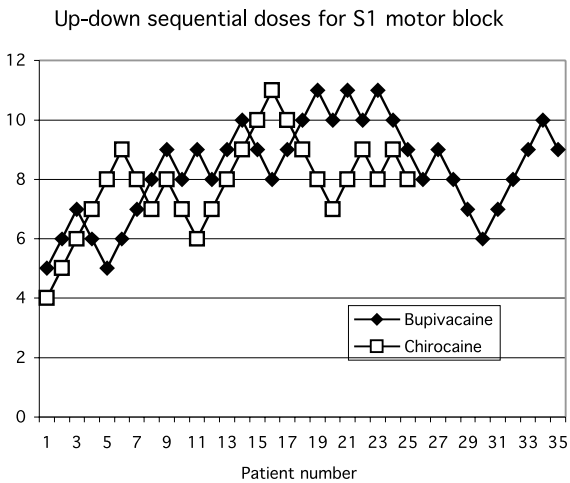
Introduction: In a recent paper[1] it was shown that S1 motor block, that developed 10 min after neuraxial injection, could be used as part of the initial assessment to determine if bupivacaine had been inadvertently injected intrathecally during epidural analgesia. The aim of this study was to compare bupivacaine with levobupivacaine to determine if S1 motor block develops in a similar way with latter.

Methods: A CSE technique with sequential allocation of a varying intrathecal dose was used for elective caesarean section. Thirty-five patients received bupivacaine with fentanyl in a fixed ratio of bupivacaine 1 mg to fentanyl 2 μg. A study responder had motor block of ankle planterflexion 10 min after injection. The next patient after a responder received 1 mg less of bupivacaine, the next patient after a non-responder received 1 mg more. The study was then repeated on a further 25 patients using the same study design with levobupivacaine and fentanyl in the same ratio.

Results: Calculations of the ED50 and confidence limits for S1 motor block 10 min after intrathecal injection using logistic regression were performed for both drugs. ED50 for bupivacaine with fentanyl: 8.4 mg (95% CI 7–10) and for levobupivacaine with fentanyl: 8.2 mg (95% CI 7.3–9.4).



The study was terminated slightly prematurely because of problems of pain during the caesarean section using these small intrathecal doses, despite using the epidural catheter in many cases.

Conclusion: We have shown that when bupivacaine and levobupivacaine are given intrathecally, S1 motor block develops in a similar way and therefore this test is a valuable assessment for either drug.

Reference

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P47. In vitro changes in heparin resistance during pregnancy using thrombolelastography (TEG®)

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Introduction: Guidelines recommend that regional blockade is not performed for 12 h following an injection of low molecular weight heparin. This is an arbitrary time which is not evidence based. During pregnancy, women become hypercoaguable and evidence suggests that pregnant women are resistant to heparin at >36 weeks' gestation.[1] We conducted an in vitro observational study in pregnant women to determine at which stage of pregnancy heparin resistance occurs.

Materials and methods: Venous blood was taken using a 22-gauge cannula from five pregnant staff volunteers (ASA I) at various stages of pregnancy. Two native blood samples were taken (the first 3 mL discarded) and thromboelastographs performed, in accordance with the Hemoscope manual. The first sample (control) consisted of 0.36 mL of native blood. The second sample consisted of 0.33 mL of native blood and 0.03 mL of heparinised saline resulting in 0.0083 units/mL of unfractionated heparin. Heparin effect was defined as heparin *r*-time minus control *r*-time. *r*-time is normally prolonged by heparin.

Results: Mean heparin effect at less than 20 weeks' gestation was 31.3 mm (95% CI 13.9 to 38.8). Mean heparin effect at more than 24 weeks' gestation was 8.82 mm (95% CI 3.1 to 14.5).

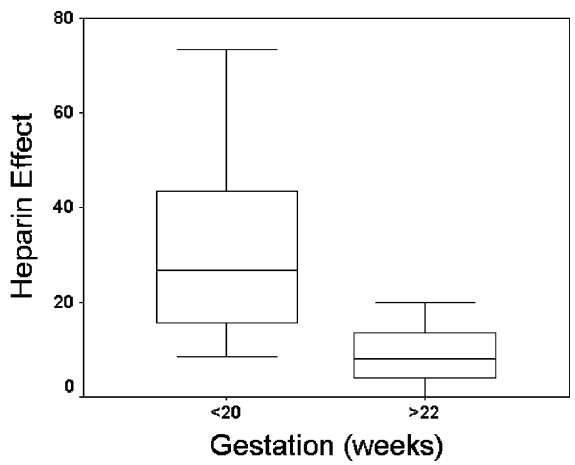

Figure: Box plot at less than 20 and more than 22 weeks' gestation.

Conclusion: Heparin resistance may occur between 20 and 22 weeks' gestation. The heparin concentration used in this study is below peak therapeutic range and was used as it demonstrates the maximum difference.

Reference

1. Lansbury AL, Monte S, Lyons GR. Evidence of heparin resistance in pregnancy: an in vitro study. European Journal of Anaesthesia 2002; 19: Abstract 586.

P48. Luer lock versus bayonette lock for spinal anesthesia during a combined spinal epidural technique

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Introduction: Failures of the spinal component of the combined spinal epidural (CSE) technique have been attributed to inability to aspirate CSF, movement of the spinal needle during spinal injection resulting in loss of injectate and loss at the syringe/spinal needle hub interface. Luer lock (LL) syringes have the advantage of attaching securely to the spinal needle hub thus decreasing the chance of fluid loss at this site. The main advantage of the bayonet lock (BL) syringe is that it requires very simple manipulation to secure it to the hub. We conducted an in vitro study to examine which syringe resulted in the least amount of spinal needle tip movement when injectate is delivered in a CSE technique.

Methods: A model was constructed using 3 cm of inflexible tape to simulate the interspinal ligament. The spinal needle was attached to a compression/strain gauge. The gauge was set to measure maximal compression/strain for each simulated intrathecal injection. A 3-mL LL syringe and a 3-mL BL syringe were used to simulate a spinal injection. The maximal force exerted on the strain/compression gauge by the syringes was recorded for the following CSE kits: matched needle through needle (18-gauge Weiss, 27-gauge Whitacre, Dura Safe™), unmatched (18-gauge Hustead, 5″ 27-gauge Gertie-Marx needle), matched straight needle through needle (Espocan® B. Braun). Ten sets of measurements for each kit were analyzed using ANOVA and {ıt t}-test with $P \leqslant 0.05$ as significant.

	DuraSafe $n = 10$	Unmatched $n = 10$	Espocan $N = 10$	ANOVA 2-sided
BL mean ± SEM in Newtons	1.14 ± 0.12	0.89 ± 0.14	0.94 ± 0.15	0.47
LL mean ± SE in Newtons	1.24 ± 0.12	1.03 ± 0.14^{++}	1.55 ± 0.15^{++}	0.04*
t-test *P*	0.56	0.48	0.01*	

*Significant; $^{++}$*t*-test $P = 0.02$*

Discussion: In an ideal needle-through-needle CSE technique, the operator should feel a dural pop when the spinal needle is placed, CSF should easily be aspirated, then injectate delivered. Unmatched needles may be more economical and versatile. Once CSF is located, unnecessary manipulation of the spinal needle should be avoided to assure continued intrathecal position. Our study applies to CSE where the needle hubs are not locked together. We demonstrate that LL causes most force to be transmitted to the needle tip during attachment of the syringe when using Espocan needles, probably because the Teflon-coated centering sleeve allows smoother placement of the spinal needle through the epidural needle. We also found that unmatched needles transmitted the least force during syringe manipulation, due to the forced curve of the Gertie Marx needle through the Husted. In summary, we advocate the use of BL needles in the CSE technique, especially when low resistance needles are used.

P49. Use of the pulse contour cardiac output (PiCCO) monitor in caesarean section in a parturient with mitral stenosis

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Introduction: We report the case of a 46-year-old woman with severe mitral stenosis undergoing elective caesarean section and tubal ligation under general anaesthesia at 36 weeks' gestation in her ninth pregnancy. We present the use of the less invasive pulse contour cardiac output (PiCCO) monitor throughout the peri-operative period.

Methods: Non-invasive monitoring was established before insertion of the invasive monitoring lines under local anaesthesia. A right internal jugular triple lumen catheter was introduced and a thermodilution catheter (PULSIOCATH PV2015L13) inserted into the right femoral artery. These lines were then connected to the pulse contour cardiac output monitor (PiCCO) and baseline haemodynamic variables were obtained before induction of anaesthesia.

Results: Throughout the peri-operative period continuous monitoring of blood pressure, cardiac output, stroke volume and systemic vascular resistance was possible with the use of the PiCCO monitor. With this information judicious use of fluid and vasoactive drugs maintained cardiovascular stability. Both mother and baby made an uneventful recovery.

Events	Ind	SI	Oxy	End
Heart rate (bpm)	98	107	120	98
Blood pressure (mmHg): systolic	117	85	104	100
Diastolic	74	57	60	65
Central venous pressure (mmHg)	1	5	12	7
Cardiac index (L min^{-1} m^{-2})	2.35	1.3	2.24	2.79
Systemic vascular resistance index (dynes s cm^{-5} m^{-2})	3158	3551	2950	2105

Ind: induction, SI: skin incision, Oxy: oxytocin, End: end of surgery.

Conclusion: Although the PiCCO has not been widely used in these groups of patients, the values obtained were not dissimilar to those of the pulmonary artery floatation catheter used in other investigators' case reports.[1] The continuous capability of the monitor allowed us to keep track of the changing trend of systemic arterial blood pressure, cardiac output and systemic vascular resistance during the operation and the postoperative period and to adjust treatment accordingly in real time.

Reference

1. Hemmings GT, Whalley DG, O'Connor PJ, Benjamin A, Dunn C. Invasive monitoring and anaesthetic management of a parturient with mitral stenosis. Can J Anaesth 1987; 34: 182–185.

P50. Caesarean section for severe preeclampsia: a survey of UK consultant obstetric anaesthetic practice

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Introduction: There is no accepted standard anaesthetic management of caesarean section in the severely pre-eclamptic patient.[1] We performed a postal survey of all UK consultant anaesthetist members of the Obstetric Anaesthetists Association (OAA) about their beliefs regarding this issue.

Method: A questionnaire was mailed in April 2002 to all consultant anaesthetists identified by the OAA. All non-responders were followed up with a second mailing. The questionnaire asked about the preferred anaesthetic technique for caesarean section in the severely pre-eclamptic patient, coagulation tests and results required before performing a regional technique, and the drugs chosen when performing general anaesthesia in this population.

Results: Of the 936 consultant anaesthetists surveyed, 637 replies were received (71.3%). The most frequently used anaesthetic technique for caesarean section in severe preeclampsia was single shot spinal anaesthesia (46.1%), 26.2% choosing combined spinal and epidural anaesthesia (CSE), 15.6% epidural anaesthesia, and 7.6% general anaesthesia. The median platelet count below which respondents would not perform regional anaesthesia was 80×10^9/L (47.1%), with 16.5% choosing a cut-off below 70×10^9/L. The most popular induction agent for general anaesthesia was thiopentone (86.6%). A wide range of drugs is used to attenuate the hypertensive response to intubation, with many using more than one agent. The most frequently used drug was alfentanil (75.2%), whilst labetalol (35.0%), magnesium sulphate (33.6%), and fentanyl (14.2%) are also popular choices; 5.8% are now using remifentanil for this purpose.

Conclusion: Despite an apparent lack of consensus in the literature regarding the superiority of one regional technique over another in severe preeclampsia, this survey demonstrates that in practice a majority of UK anaesthetists use spinal or CSE in this situation. A majority of anaesthetists would perform a regional technique for caesarean section when the platelet count is 80×10^9/L or greater, which broadly reflects the practice represented in a similar survey performed in 1998.[2] When general anaesthesia is performed in this population a wide range of drugs is used in the attenuation of the hypertensive response to intubation.

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2. Wee L, Sinha P, Lewis M. Central nerve block and coagulation: a survey of obstetric anaesthetists. International Journal of Obstetric Anesthesia 2002; 11: 170–175.

P51. Vasodilatation by magnesium in the dorsal hand vein

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Introduction: Magnesium affects blood pressure by modulating vascular tone and reactivity. In obstetrics, magnesium is administered to women to prevent eclamptic seizures and for tocolysis. Prior to studying α- and ß-adrenergic vascular sensitivity in women with preeclampsia, we sought to determine the effect of magnesium on venous tone.

Methods: Ten healthy non-pregnant women of childbearing age were studied. Response to magnesium sulfate ($MgSO_4$) was measured in a dorsal hand vein using the linear variable differential transformer (LVDT) technique.[1] Complete dose-response curves to $MgSO_4$ (0.625–2 g/h) were determined after 50% preconstriction of the vein with phenylephrine Total plasma magnesium concentrations at baseline and at the highest infused dose of $MgSO_4$ were determined. ED_{50} results are expressed as geometric mean (95% confidence interval). E_{max} results and magnesium concentrations are expressed as mean ± SD.

Results: The ED_{50} of $MgSO_4$ was116 μg/min (52, 252 μg/min) and E_{max} was 102% ± 20%, where 100% indicates a return to pre-phenylephrine baseline (Figure). Systemic magnesium levels were increased by the infusion (from 2.0 to 2.3 mg/dL, $P < 0.001$ by paired *t*-test) but concentrations remained normal.

Conclusions: This is the first in vivo demonstration of magnesium-induced venodilatation. The $MgSO_4$ dose resulting in vasodilatation using the LVDT/hand vein technique is two to three orders of magnitude less than the therapeutic doses of magnesium used for tocolysis or seizure prophylaxis. The vascular effects of systemically administered therapeutic doses of magnesium on vascular reactivity and drug response in preeclampsia will be of interest.

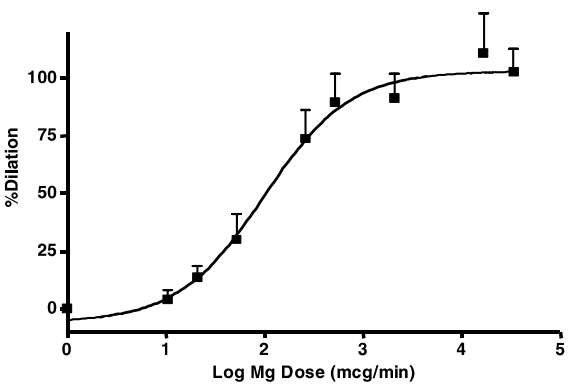

Figure: Dose-response curve for the 10 subjects. *X* axis: log of the $MgSO_4$ dose, *Y* axis: % return to pre-consriction baseline. Error bars are SEM.

Reference

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P52. Ambulatory epidural analgesia and the duration of labor

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Background and goals: Some obstetrical studies have shown the benefits of ambulation without epidural analgesia- on labor.[1,2] We tested the hypothesis that the development of an original method of ambulatory epidural analgesia (AEA) which allowed all parturients to walk[3] has specific advantages on mode of delivery (spontaneous vaginal, cesarean, forceps), consumption of local anesthetic (LA), oxytocin requirement, Apgar score and labor duration.

Material and methods: 221 parturients with uncomplicated, singleton and cephalic pregnancy, between 36–42 weeks' gestation, who presented in spontaneous labor or who were scheduled for induced labor were randomly divided to two groups: ambulatory group (AG) with ambulation, sitting in chair or semi-supine position and non-ambulatory group (NAG) with supine or lateral position. Parturients with preeclampsia and those who had had previous cesarean delivery were excluded. Both groups had intermittent epidural injection of 0.1% ropivacaine and sufentanil 0.6 μg/mL (R-S) for analgesia during labor. The first dose of R-S was determined according to the parturient's stature (10-18 mL); all repeated injections were 10 mL for all parturients. $P < 0.05$ was considered to be significant.

Results: Five parturients were excluded for fast delivery (3 AG vs 2 NAG). All parturients walked in the AG group. No significant differences were noted between AG and NAG in mode of delivery, consumption of LA, oxytocin requirement or Apgar scores in the 1st and 5th minute. Significant difference was noted in labor duration (173.4 (SD 109.9) min vs 236.4 (SD 130.6) min, $P = 0.001$).

Conclusion: Although walking with AEA shortens labor duration, it has no other effect on the outcome of labor. Even when using low doses of less concentrated LA that allowed all parturients to walk, epidural analgesia seems to deprive ambulation of its other benefits, perhaps because we have not yet found the most appropriate concentration or the best technique that would preserve ambulatory advantages during labor, with the privilege of pain relief, or maybe there are no real benefits of ambulation on labor.

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P53. Survey of audit practices in United Kingdom obstetric anaesthesia

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Introduction: Many obstetric anaesthetists have an interest in data collection, of measures both of clinical activity and of quality. Methods of collating these data to produce national statistics have included postal surveys and the Obstetric Anaesthetists' Association (OAA) National Obstetric Anaesthesia Database (NOAD). Both fall short of providing a national view, because response rates are incomplete. This survey was performed to assess how many units collect routine audit data, how this is done, and to measure any appetite for the development of a national audit program by the OAA.

Methods: A survey was emailed or posted to 245 lead anaesthetists in obstetric anaesthesia in the UK during the latter part of 2002. Replies were received from 156 (64%) at the time of preparing this abstract.

Results: Of those units responding, 93% perform routine epidural audit and 86% collect follow-up data. Obstetric theatre anaesthesia data is collected by 98%, and follow-up data by 83%. Methods include pen and paper (38%) and generic computer systems (48%), with only 12% using purpose-designed audit software. As many as 96% were in favour of the OAA providing an audit advice service and 90% were in favour of the OAA developing and distributing an audit software package that allows national data to be pooled.

Discussion: Audit of clinical activity is useful for both financial planning and the monitoring of clinical outcomes. It is an integral part of any clinical governance program. UK obstetric anaesthetists can take satisfaction in the high level of audit activity in our specialty. Whilst I doubt that there is a primary school student in the UK that doesn't have computer access, 38% of obstetric anaesthetists perform their audit with pen and paper! This fact, plus the widespread but disparate use of generic spreadsheets and databases, makes national data collection in the form of a database impossible at the current time. The survey revealed a lack of enthusiasm towards the duplication of effort and complexity involved in existing national audit projects, but near universal interest in the OAA exploring an audit option that assists local efforts and allows national data to be pooled. The views revealed in this survey warrant further consideration by the OAA.

P54. A critical analysis of the incidence of caesarean section in Latin America: a Colombian experience

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Introduction: Caesarean section increases the health risks for mothers and babies as well as the costs of health care. The rates for the Colombian Health Care System range from 30% up to 80%,[1] but there is a lack of information about the specific causes of caesarean section in Colombia. Our aims were to evaluate the incidence of caesarean section in our local health care system and to examine the main causes of it, and also determine the proportion of these that were not justified.

Method: After ethical approval, we reviewed the obstetrical records (from January to October 2002) of the Hospital Manuel Uribe Angel; which is the main reference centre for the north part of the City of Medellín. The caesarean section patients were identified and 200 cases were chosen randomly, looking for demographic and medical data, overall incidence of caesarean section, specific causes and the percentage of caesarean sections that we judged not to be justified and the reasons for them.

Results: 1067 deliveries were identified, with 438 by caesarean section (41.04%). The age groups were 18–35 years: 79.5%, >35 years: 10.5%, <18 years: 10%. All the patients had some degree of school education and 50.5% were primigravidae, in 35% it was the second pregnancy and 14.5% had three or more pregnancies. The main indications for caesarean section were dystocia (71%), fetal distress (12.5%), previous caesarean section (8.5%), pregnancy-induced hypertension (5%) and others (3%). We judged 37.5% of the caesarean section not to be justified and dystocia was given as the indication for 69.3% of these cases.

Conclusion: The overall incidence of caesarean section in our hospital is beyond the permissible range, and more than one-third of caesarean section are not justified. Since dystocia is the main cause, all our efforts must be directed to improving the accuracy of this diagnosis and also in the interventions to decrease the problem. This audit will be repeated in June 2003 to evaluate the recommendations.

Acknowledgement: We are grateful to the staff of the Hospital Manuel Uribe Angel who kindly provided this information.

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P55. Urgency of caesarean section: do obstetricians and anaesthetists agree?

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Introduction: A multi-centre assessment of a new urgency classification for caesarean section found a 90% correspondence between the obstetrician and anaesthetist if results were analysed using a four-point scale.[1] Initial inspection of the results at our hospital indicated a lower level of correspondence, and therefore a more formal study was undertaken.

Methods: We studied 400 caesarean sections carried out during Nov 00–Feb 01 and Apr–Jul 02. Urgency category was taken independently from the operation record (obstetrician) and from the anaesthetic audit record (anaesthetist).

Results: There was correspondence between the obstetrician and anaesthetist in 72% overall (75% in 2000/1, 68% in 2002) (Table 1). This compares with 84% in 180 cases in our hospital in 1999.[1] When non-correspondence occurred, it was more common for anaesthetists to give a lower urgency than obstetricians.

Table 1: Categories assigned by anaesthetists and obstetricians

Anaes / Obs	1	2	3	4	Total
1	**22**	16	4		42
2	14	**63**	39	2	118
3		16	**58**	12	86
4	1		8	**145**	154
Total	37	95	109	159	400

1: immediate threat to life of woman or fetus; 2: maternal or fetal compromise which is not immediately life-threatening; 3: needing early delivery but no maternal or fetal compromise; 4: at a time to suit the patient and maternity team.

Discussion: Ideally, there should be a high rate of correspondence between obstetricians and anaesthetists on the urgency of caesarean section as a result of good communication of clinical details,[2] leaving few genuine disagreements. Correspondence fell from initial validation to 2000/1 and then 2002, despite increased familiarity. Non-correspondence occurs frequently with certain clinical scenarios, possibly because of the brevity of definitions in the current classification. An alternative might be to give examples for particular clinical situations, although this approach may also incur problems.[3]

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P56. Survey of anaesthetic support staff in obstetric units in England and Wales

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Introduction: During obstetric emergencies, guidelines mandate rapid response times (of less than 30 min) from decision to operate and delivery. Parturients requiring anaesthesia have a right to the same standards of peri-operative care as all surgical patients, including appropriate anaesthetic assistance.[1,2] The aim of this survey was to assess the type of support available to anaesthetists in maternity units and the impact on elective and emergency work.

Methods: A postal questionnaire was sent to all the lead obstetric anaesthetic consultants in England and Wales registered with the OAA in 2001. The questions related to unit locality, residency status and on-call commitments of the anaesthetic assistant. The source of assistance for elective and emergency surgery and for labour analgesia blocks was explored.

Results: 195 of 257 units (76%) returned a completed questionnaire.

- 11% of units were isolated from the main hospital.
- 95% had a designated operating department person responsible for elective surgery.
- 58 (29%) experienced delays in managing emergencies, waiting for the anaesthetic assistant (regardless of whether the unit was within the main hospital site or separate). This rarely caused delay to elective work.
- The anaesthetic assistant was resident on call in the hospital in 168 units (86%), but not exclusively for the maternity ward.
- The anaesthetist was usually (76%) assisted by the midwife when inserting blocks for analgesia.
- More than 1/3 thought that it would be appropriate to have an anaesthetic assistant resident on 24-h call *exclusively* for labour ward (41%) and who could help with labour analgesia (36%).

Discussion: The results of this survey suggest that currently the recommended standards of care in terms of appropriate staffing are not being met consistently in obstetric units in England and Wales, and this has deleterious affects on emergency work.

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P57. The role of the anaesthetist in mother's experiences of elective caesarean section: a pilot study

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Introduction: Midwives play a critical role in the birth experiences of women. The expectations and experiences mothers have about their anaesthetist are less clear. Our aim was to collect pilot data to determine the relative role of the anaesthetist in mothers' experiences of caesarean section because of the fears and concern associated with it.

Method: After ethics committee approval, 40 healthy women for elective surgery were recruited at 36 weeks' gestation. Mothers completed a series of self-report measures before caesarean section, related to expectations, anxiety and pain during and following the caesarean section. They rated their birth experiences post partum, with particular reference to the anaesthetist and pain management. Statistical analysis (SPSS) was conducted using correlations.

Results: *Pain expectations:* Mothers expecting pain reported more postoperative pain ($r = 0.45$, $P < 0.05$) but if they believed that the anaesthetist could control pain effectively during caesarean section, they not only expected less pain ($r = -0.24$, $P < 0.05$), but actually reported less pain during the caesarean section ($r = -0.32$, $P < 0.05$). Such perceived control by the anaesthetist over pain during the caesarean section was also related to pain relief ($r = 0.60$, $P < 0.005$), support from the anaesthetist ($r = 0.38$, $P < 0.01$) and overall satisfaction with the anaesthetist ($r = 0.65$, $P < 0.001$).
Pre-operative fear: Mothers who were fearful of anxiety expected more support ($r = .29$, $P < 0.05$), reported more fear ($r = 0.37$, $P < 0.01$) and postoperative (emotional) pain was greater ($r = 0.45$, $P < 0.01$). Fortunately though, mothers expecting more support, receive it ($r = 0.35$, $P < 0.05$).
Pain during caesarean section: The amount of pain reported during the caesarean section (measured postoperatively) was positively correlated to postnatal (emotional) pain experiences ($r = 0.37$, $P < 0.05$) and negatively with the belief that the anaesthetist could control pain during caesarean section ($r = -0.58$, $P < 0.001$). Pain relief during caesarean section was reported as effective if mothers felt the anaesthetist supported her ($r = 0.44$, $P < 0.05$) and did not ignore her ($r = -0.46$, $P < 0.05$).
Patient satisfaction: Anaesthetic rapport was reassuring ($r = 0.57$, $P < 0.001$) and less isolating ($r = -0.46$, $P < 0.005$).

Conclusion: The anaesthetist plays a critical role for the mother during caesarean section. Specifically, it seems as if a greater focus on the patient by the anaesthetist is associated with greater birth satisfaction by the mother.

P58. Pre-operative anxiety and postoperative satisfaction in women undergoing elective caesarean section

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Introduction: The study aimed to quantify and describe preoperative anxiety in women undergoing elective caesarean section and its relationship with postoperative maternal satisfaction.

Method: In 85 women awaiting elective caesarean section anxiety was measured in the 24 h preceding surgery using the State-Trait Anxiety Inventory (STAI).[1] Perceived social support was measured using the Significant Others Scale.[2] Maternal satisfaction was assessed around the 3rd postoperative day using the maternal satisfactions scale for caesarean section (MSSCS),[3] yielding a total satisfaction score and subscale scores for anaesthetic, insertion of the needle, side effects and the atmosphere in theatre. Satisfaction with the pre-operative information from the anaesthetist was also measured at this time.

Results: Anxiety scores were comparable with those of general surgical/medical patients. Women were generally satisfied with the procedure. Lower pre-operative trait anxiety and state anxiety were associated with greater maternal satisfaction. Lower state anxiety was associated with higher satisfaction with insertion of the spinal needle and greater satisfaction with the degree to which they experienced side-effects of the anaesthesia. Lower trait anxiety was also associated with greater satisfaction with side-effects. Linear regression analysis indicated satisfaction with information from the anaesthetist and perceived emotional support from the partner explained 52% of the variance in postoperative maternal satisfaction.

Conclusion: Lower preoperative anxiety is associated with greater maternal satisfaction with elective caesarean section. Information and perceived support are also of importance.

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P59. Comparative obstetric mobile epidural trial (COMET): epidural fentanyl dose and neonatal outcomes

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Introduction: The Comparative Obstetric Mobile Epidural Trial (COMET[1]) randomised 1054 primiparous women requesting epidural analgesia to receive traditional i.e. intermittent boluses of 0.25% bupivacaine, combined spinal epidural (CSE) or low dose infusion (LDI), both using 0.1% bupivacaine and fentanyl 2 μg/mL. Neonatal effects were secondary trial outcomes, measured by Apgar scores at delivery, requirements for resuscitation and admission to the neonatal unit. Five-minute Apgar scores were the main pre-specified assessment. The results demonstrated a significantly higher incidence of low Apgar scores (≤7) at 1 min and of borderline significance at 5 min in the LDI group. High level resuscitation was also significantly greater for the LDI group. As the total epidural dose of fentanyl was highest in this group, this raised the possibility that systemic absorption was leading to fetal effects. Despite this, admission to special care did not vary between the trial groups.

Method: We performed regression analysis including a number of relevant variables: CSE, LDI, instrumental delivery (Inst), caesarean section (C/S), total dose of bupivacaine (tot bup) and total dose of fentanyl (tot fent), to detect whether fentanyl or any other factors independently predict low Apgar scores at delivery.

Results: The table shows the *P*-values for factors considered in the regression analyses as possibly predictive of a low Apgar score. LDI and instrumental delivery were independently predictive of low Apgar score at 1 min, but not at 5 min. Total fentanyl was not predictive of low Apgar score at either 1 or 5 min.

Apgar <7	CSE	LDI	Inst	C/S	Tot bup	Tot fent
1 min	0.18	0.04*	0.05*	0.14	0.25	0.14
5 min	0.33	0.28	0.77	0.74	0.95	0.98

*$P < 0.05$.

Conclusion: We found no relationship between dose of epidural fentanyl and low Apgar score. Within the dose range used, this provides reassurance over concerns regarding the neonatal effects of epidural fentanyl in the provision of labour analgesia.

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