

Optimising Labour Analgesia: Introducing a Two-Tier Programmed Intermittent Epidural Bolus Approach

R. Snooks, A. Prichard, M. Nordblad, E. Cumber, I. Pavlu, S. Shah, C. Papageorgiou

Anaesthetic Department Hillingdon Hospitals NHS Trust , London, United Kingdom

Introduction

- Programmed Intermittent Epidural Bolus (PIEB) analgesia for labour has been shown in the literature to provide superior pain control and reduces the risk of motor weakness.¹
- It appears to be evolving into the preferred method of epidural analgesia delivery in the US,^{2, 3} and now is becoming an increasingly popular choice in the UK.
- We have used the same PIEB Standard Protocol (SP) since 2015 in over 8000 deliveries.
- In 2022 a second Enhanced Protocol (EP) was introduced, providing higher doses of local anaesthetic, with the aim of reducing call-backs and maintaining low side effect profiles for those requiring higher doses of analgesia.
- With this methodology, clinicians can personalise labour analgesia, improve parturient experience and reduce workload for anaesthetic and midwifery teams.

Evidence

SCIENTIFIC REPORTS

OPEN

A Systematic Review and Meta-Analysis Comparing Programmed Intermittent Bolus and Continuous Infusion as the Background Infusion for Parturient-Controlled Epidural Analgesia

Jiqian Xu^{1,2,3}, Jie Zhou⁴, Hairong Xiao^{1,3}, Shangwen Pan³, Jie Liu², You Shang³ & Shanglong Yao^{1,3}

ived: 1 March 2018
pted: 14 January 2019
shed online: 22 February 2019

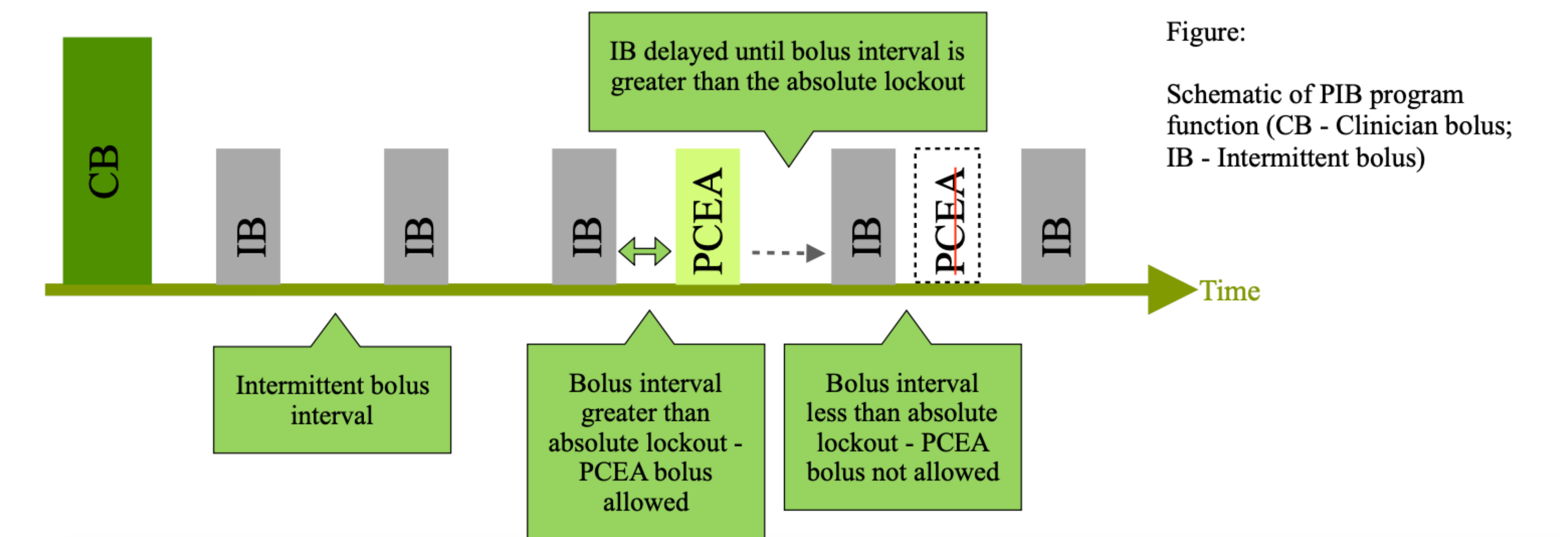
Implementation of Programmed Intermittent Epidural Bolus for the Maintenance of Labor Analgesia

Brendan Carvalho, MBBCh, FRCA, MDCH,* Ronald B. George, MD, FRCPC,† Benjamin Cobb,* Christine McKenzie, MD,* and Edward T. Riley, MD*

Table 3. Institutional PIEB Parameters

	Stanford University	IWK Health Centre Dalhousie University
Epidural initiation	Bupivacaine 0.125% + sufentanil 10 µg (15 mL)	Ropivacaine 0.2% + fentanyl 100 µg (10 mL)
CSE initiation	Bupivacaine 2.5 mg + sufentanil 5 µg (30%–35% initiated with CSE)	Bupivacaine 2 mg + fentanyl 10 µg (15%–20% initiated with CSE)
Epidural maintenance solution	Bupivacaine 0.0625% + sufentanil 0.4 µg/mL	Ropivacaine 0.1% + fentanyl 2 µg/mL
Epidural catheter	19-gauge wire reinforced, single-orifice catheter (Perifix FX Springwound; B. Braun Medical Inc, Bethlehem, PA)	19-gauge wire reinforced, multiple-orifice catheter (DuraFlex; Smiths Medical, St. Paul, MN)
Prior CEI/PCEA settings	CEI: 12 mL/h/PCEA: 12 mL bolus, 15-min lockout interval	CEI: 6 mL/h/PCEA: 6 mL bolus, 10-min lockout interval
Initial PIEB/PCEA settings	PIEB: 8 mL every 45 min (first bolus 45 min)/PCEA: 10 mL, 15-min lockout	PIEB: 6 mL every 30 min (first bolus 15 min)/PCEA: 6 mL, 10-min lockout
Current PIEB/PCEA settings	PIEB: 9 mL every 45 min (first bolus 30 min)/PCEA: 10 mL, 10-min lockout	PIEB: 8 mL every 45 min (first bolus 15 min)/PCEA: 6 mL, 10-min lockout

Equipment



CADD Solis Pumps + NR Fit system – Smiths Medical

STANDARD (SP) 7mls bolus – 60 mins – PCEA Dose 6mls – Lockout 20mins

ENHANCED (EP) 9mls Bolus – 45 mins – PCEA Dose 6mls – Lockout 20mins



Methods

- The project was registered as a service evaluation and approved by the local NHS audit department during October 2022.

Inclusion Criteria

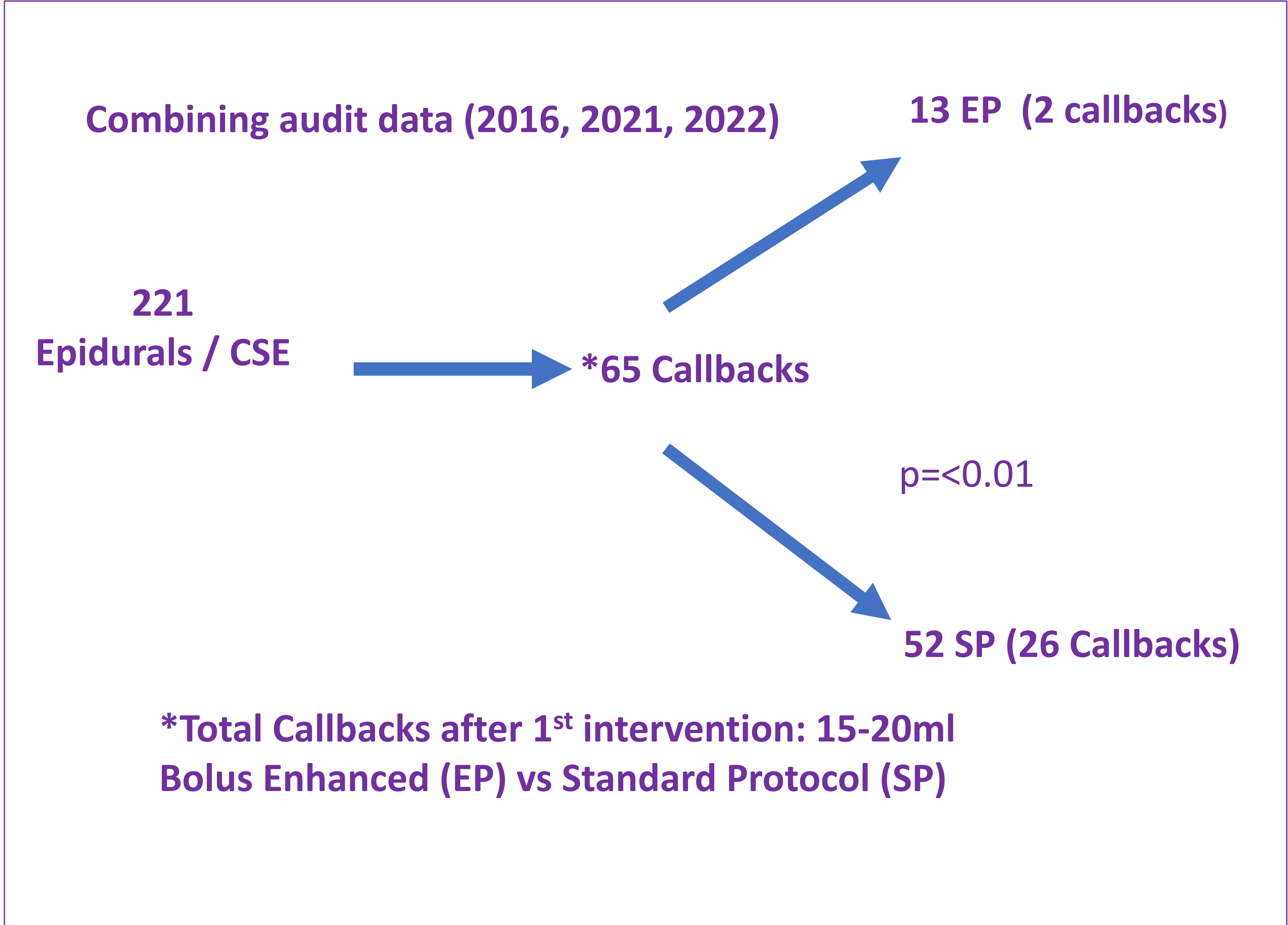
- All functioning labour room epidurals requiring clinician intervention.

Exclusion criteria

- Non functioning epidurals.
- Including epidurals that failed to top up for LSCS.

- Parturients with inadequate analgesia received a clinician bolus of 10-15mls of 0.1% l-bupivacaine + 2mcg/ml fentanyl, then were started on the Enhanced Protocol.
- Data was collected at the point of care and demographic data retrospectively from the Euroking maternity system.
- Primary outcome: number of clinician call-backs.
- Secondary outcomes: motor block, adverse events and mode of delivery.
- This was subsequently compared with two previous registered service evaluations in 2016 and 2021.
- Data analysed and statistical calculations made using paired T-test.

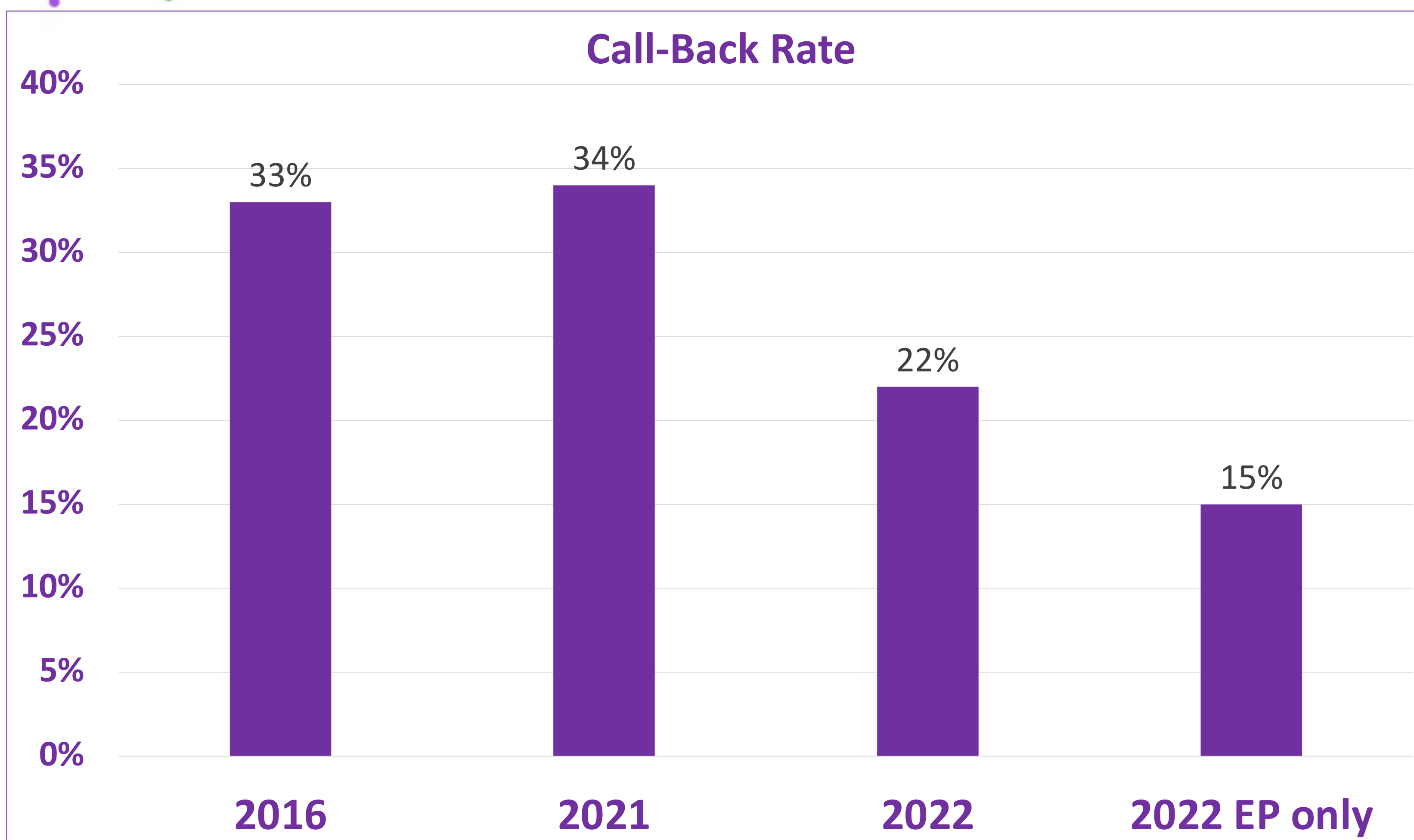
Results										
Audit	Age	Gest Range	Total number (EPI/CSE)	SVD	Instrumental	LSCS	Parity (Primp/Multip)	Call-back Rate	Motor Block	Adverse events (Low BP/Fet Brady)
2016 Pre EP	29.6	32-34	78 (60/18)	32%	35%	33%	48/78 (62%)	27/78 (33%)	1/78 (1.3%)	3/78 (3.8%)
2021 Pre EP	28.2	38-42	58 (41/17)	33%	31%	36%	42/58 (72%)	20/58 (34%)	2/58 (3.4%)	2/58 (3.4%)
2022 Post EP	25.4	36.4-42	85 (71/14)	31%	35%	34%	56/85(65%)	18/85 (22%)	2/85 (2.3%)	2(1EP) (2.4%)
p- values				0.39	0.36	0.47	0.48	<0.01	0.46	0.3



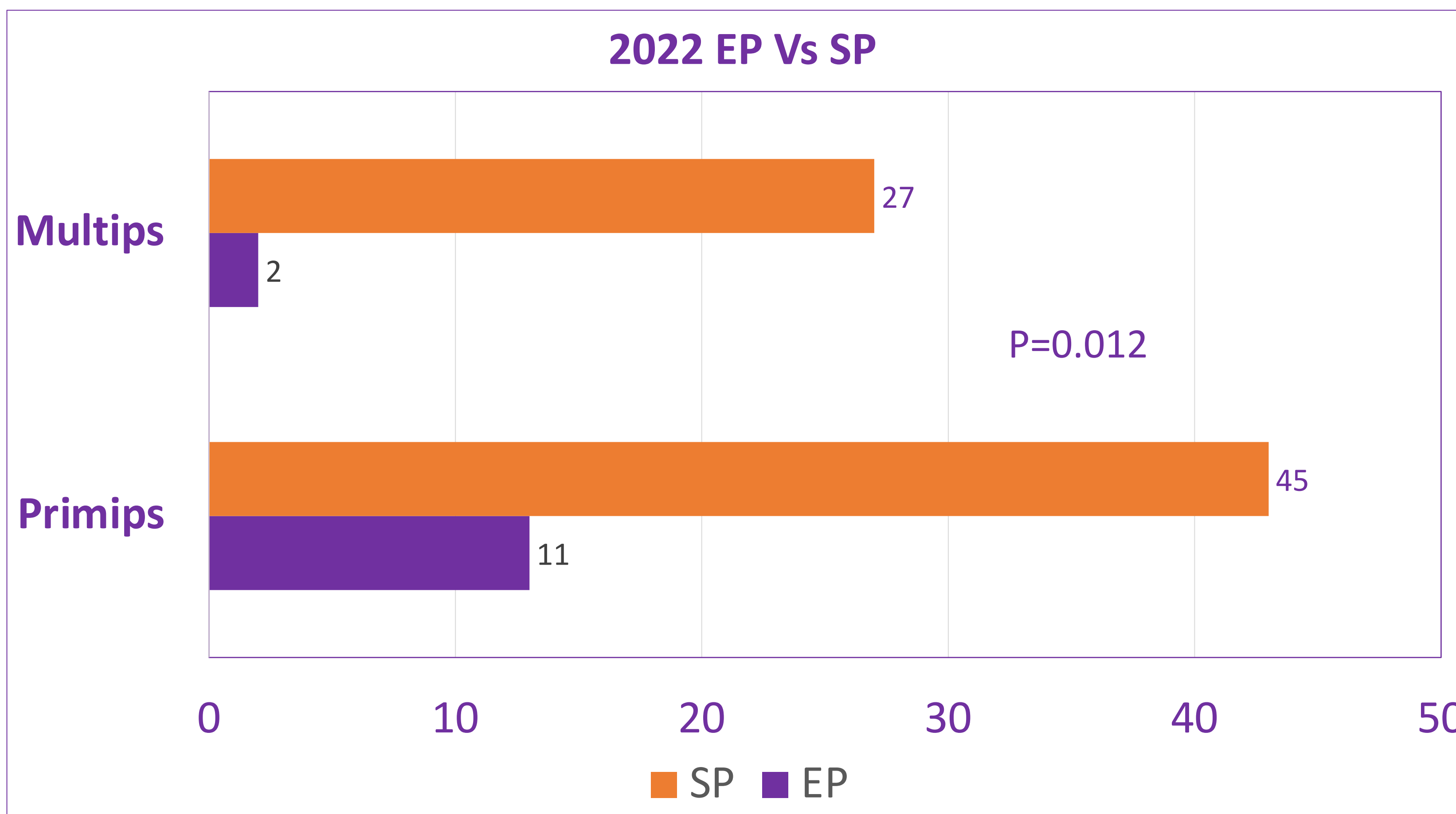
- October 2022: Complete data was collected on 85 parturients. Analgesia was initiated via epidural in 71 and via CSE in 14 parturients. A total of 13 parturients were transferred on the EP.
- 7 Epidurals were excluded as per exclusion criteria.
- There was no statistically significant change in rate of motor block, adverse events or delivery method.
- 11 placed on the EP were primiparous and augmented on oxytocin, compared to 2 out of 29 multiparous. This was deemed statistically significant (p=0.012).
- Evaluation of 65 call-backs from 221 labourers, combined from two previous audits in 2016 and 2021, demonstrated a statistically significant reduction in the call-back rate from 34% to 22% following the introduction of the Enhanced Protocol (p=<0.01).

Analysis

Call-Back Rate



2022 EP Vs SP



Outcomes

- Reduction in callback rate from 34% 2021 to 22% 2022.
- Low adverse event and motor block rates, no statistically significant change from previous evaluations.
- High follow up rate to detect adverse events, with >90% satisfied or very satisfied with epidural analgesia quality.

Positives

- Prospective & point of care data collection.
- Proactive in assessing epidurals for motor block.
- Recording of any adverse events.
- Clinician driven choice on use of protocols, after assessing quality of analgesia.
- All received 15-20ml bolus before the EP.
- Snap shot of current practice, minimally labour intensive project for participants.

Limitations

- Low powered – Only 13 on Enhanced Protocol.
- Potential selection bias data collectors also working on shift.

Declarations

- There were no conflicts of interest or financial sponsorships.

Conclusions

- The PIEB protocol used at our unit has provided comparative high quality and safe analgesia for the majority of parturients^{1,3}.
- Some may have higher analgesic requirements and will benefit from increased doses of analgesia and a therefore a more personalised approach.
- We noted a higher proportion of primiparous and long duration augmented labours required the Enhanced Protocol (p=0.012).
- The introduction of an Enhanced Protocol reduced call-back rates, potentially reducing anaesthetic and midwifery workload, without increasing adverse events.
- Methods to identify parturients who may benefit from the Enhanced Protocol warrants further investigation, such as the use of pain catastrophising screening tools.

References

- 1.Wang X, Yuan S. Programmed intermittent epidural bolus in parturients: A meta-analysis of randomized controlled trials. Medicine. 2022. 101(5): p e28742.
- 2.Callahan E, Yeh P, Carvalho B, George RB. A survey of labour epidural practices at obstetric anesthesia fellowship programs in the United States. Can J Anaesth. 2022.;69(5):591-596
- 3.Rooftooth E, Barbé A, Schildermans J, Cromheecke S, Devroe S, Fieuws S, Rex S, Wong CA, Van de Velde M. Programmed intermittent epidural bolus vs. patient-controlled epidural analgesia for maintenance of labour analgesia: a two-centre, double-blind, randomised study. Anaesthesia. 2020 Dec;75(12):1635-42.