Improving safety and standardisation of epidural top-ups for operative delivery: a quality improvement project

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Introduction

Epidural top-ups are commonly undertaken on UK labour wards for operative delivery, and are frequently administered in emergencies. This places cognitive demands on anaesthetists, particularly out of hours. Availability of equipment and clear guidelines are essential to support safe practice. Pre-prepared equipment trays, alongside clear top-up recipes and checklists, may improve safety and efficiency[1]. Despite this, there is no nationally recommended epidural top-up recipe or standardised equipment list[2]. This project evaluated local practice and introduced a standardised top-up system incorporating both a drug recipe and equipment checklist.

Methods

With audit committee approval, we conducted a baseline assessment of epidural top-up practice in our tertiary maternity hospital. This comprised of anaesthetist survey and prospective audit of epidural top-up tray contents.

Based on identified gaps, a standardised epidural top-up recipe and equipment checklist was developed and introduced. A re-audit of top-up tray contents was repeated following implementation.

Results

Staff survey

22 anaesthetists responded to our baseline survey. Responses from residents demonstrated familiarity with standardised approaches, with 90% reporting prior use of epidural top-up recipes at previous trusts, and 82% stating they would find a local recipe helpful.

Reported drug choices varied. The most common mixture was lidocaine with adrenaline (0.1mL of 1:1000) and sodium bicarbonate (2mL of 8.4%), used by 64% of consultants and 55% of residents.

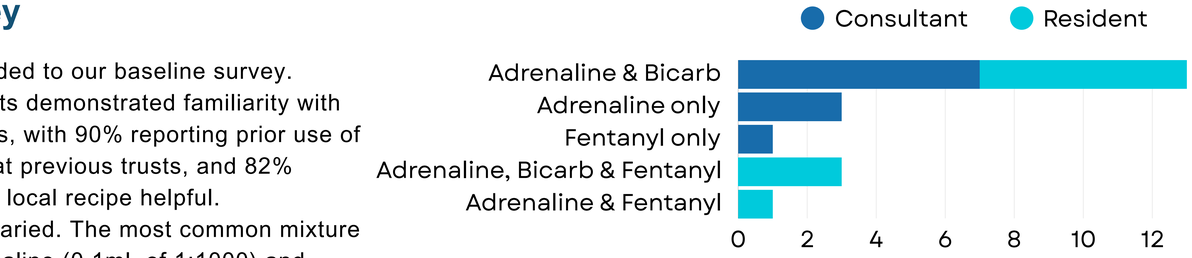

Figure 1. Survey responses '*What do you routinely add to 2% Lidocaine in epidural top-ups for operative delivery?*'

Intervention

The standardised epidural top-up checklist and instructions (below) were made avaliable in obstetric theatres alongside the pre-existing top-up equipment tray (right).

Epidural Top-Up Tray Contents

Drugs
2% Lidocaine 20mL
8.4% Sodium Bicarbonate 10mL
1:1,000 Adrenaline 1mL

Equipment
20ml NRfit syringe + NRfit needle
2ml Luer syringe + filter needle
1ml Luer syringe + filter needle
NRfit yellow bung
Lidocaine drug label

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Epidural Top-Up Instructions

1. Draw up **20mL 2% Lidocaine** into 20mL NRfit syringe
2. Draw up **2mL 8.4% Bicarbonate** into 2mL Luer syringe
3. Draw up 2mL 8.4% Bicarbonate into the 20mL NRfit syringe via NRfit needle to make 22mL total
4. Mix well, expel 2mL to make 20mL total
5. Draw up **0.1mL 1:1,000 Adrenaline** into 1mL Luer syringe
6. Draw up via NRfit needle into remaining 20mL Lidocaine/Bicarbonate mixture

Check for negative aspiration
Give 3mL test dose, wait 90 seconds then assess
Give remaining volume slowly until block adequate
The mixture should be given fresh to prevent degradation

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Impact of change

Baseline audit of epidural top-up trays demonstrated poor immediate availability of essential equipment. Notably, over a five-day snapshot period across two emergency theatres, syringes for adding sodium bicarbonate were present 0% of the time, and drug labels only 50% of the time.

Following introduction of an equipment checklist, availability of equipment in top-up trays improved; syringes for sodium bicarbonate increased from 0% to 60%, drug labels from 10% to 80%, and sterile bungs from 50% to 80%.

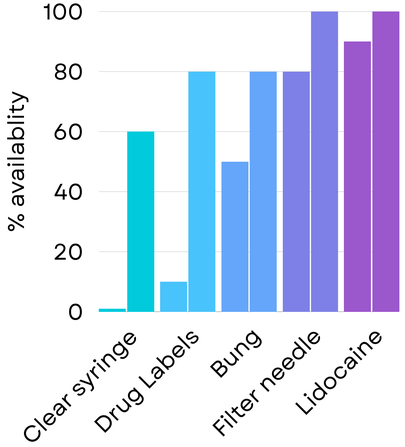

Figure 2. Equipment avaliability before and after checklist implementation

Discussion

This project demonstrated wide variation in epidural top-up practice and deficiencies in equipment availability on a busy tertiary labour ward. Introduction of a standardised recipe and equipment checklist improved availability of drugs and equipment, addressing structural and human factors contributors to risk.

These interventions may be particularly beneficial during emergencies and for staff less familiar with the department.

Limitations include reliance on self-reported survey data and absence of patient outcome measures. Future work could evaluate patient outcomes and staff perceptions following longer-term use.

Key Points

- **There is significant variation in epidural top-up drug preparation among anaesthetists.**
- **Avaliability of essential equipment for epidural top ups in emergency theatres was inconistent**
- **Introduction of a standardised checklist improved equipment availability within top-up trays.**
- **Most residents have prior experience with epidural top-up recipes and value local standardisation.**

1. *Greig PR, Zolger D, Onwochei DN, et al. Cognitive Aids in the Management of Clinical Emergencies: A Systematic Review. Anaesthesia. 2023. 78(3):343-355*
2. *Bamber JH, Lucas DN, Plaat F, et al. Obstetric anaesthetic practice in the UK: a descriptive analysis of the National Obstetric Anaesthetic Database 2009-14. British Journal of Anaesthesia. 2020. 125(4):580-587*