

Reducing wastage of drugs in obstetric anaesthesia

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Background

The contribution of anaesthesia to climate change is widely acknowledged ⁽¹⁾. Intercollegiate guidelines have summarised recommendations to reduce the environmental burden of the operating theatre ⁽²⁾. Multiple recommendations relevant to obstetric anaesthesia are made including point 5, “minimise drug waste”.

Obstetric anaesthesia often involves pre-preparation of drugs for time critical anaesthesia provision. US studies suggest that approximately 50% of pre-prepared emergency drugs are wasted ⁽³⁾. Environmental consequences of drug wastage include emissions related to manufacture, transport, incineration, and residual microplastics and drug effects in wastewater. However, concerns regarding perceived loss of drug potency and sterility is a concern and patient safety should not be compromised during attempts to reduce wastage.

Frequent pre-preparation of drugs, staff changeover and absence of evidence-based guidelines may make us more prone to wastage. Drug wastage was thought most likely to occur at the start of each shift, potentially due to labelling, uncertainty regarding date of drug preparation and anaesthetist preference for particular GA drugs.

A general anaesthetic (GA) drug box has recently been introduced to the obstetric emergency theatre to improve the storage of relevant drugs in preparation for category 1 Caesarean section.

Aims

- Survey anaesthetists on current practice regarding drug handling, storage, and on the most appropriate use of the GA drug box
- Undertake a literature review for safe storage durations of common obstetric emergency and GA drugs
- Produce recommendations for appropriate and individualised storage of commonly used drugs to reduce wastage

Methods

An online 18 question survey was sent to all anaesthetists working in obstetrics. Thirteen respondents answered regarding practice of drug pre-preparation, GA drug usage, storage conditions and durations of individual drugs, syringe labelling and use of the GA drug box.

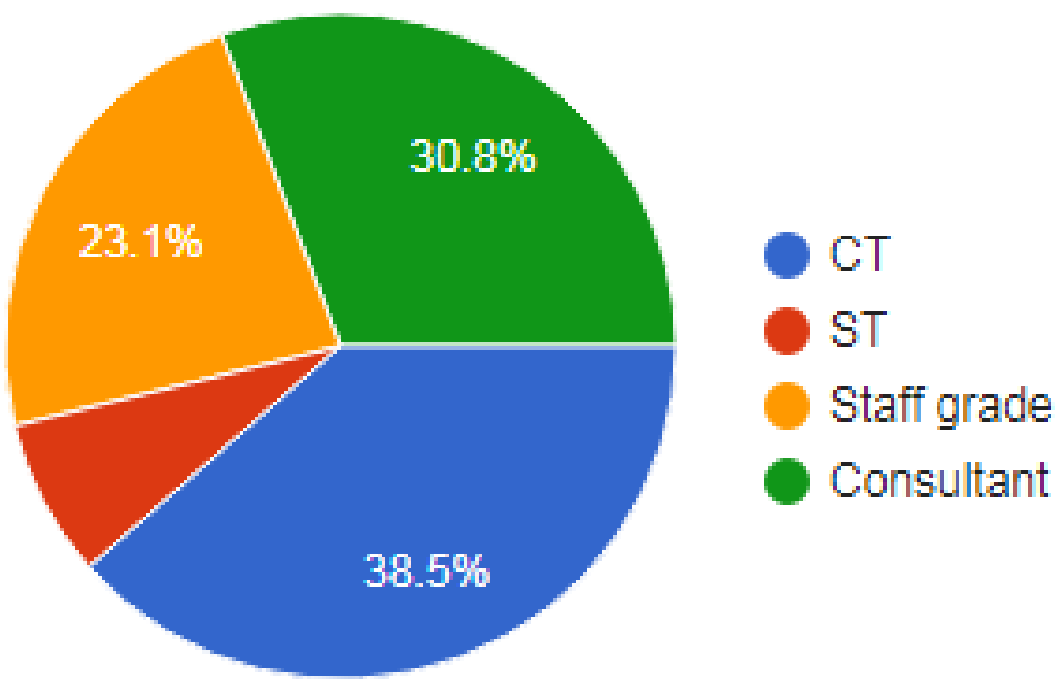
Anaesthetists were surveyed at 14 consecutive shift starts about drug wastage at that particular time regarding – which drugs were already pre-prepared on arrival, labelling and wastage for any reason.

1. Greener NHS » Delivering a “Net Zero” National Health Service. <https://www.england.nhs.uk/greenernhs/publication/delivering-a-net-zero-national-health-service/>. 2. Green Theatre Checklist | RCSEd. <https://www.rcsed.ac.uk/professional-support-development-resources/environmental-sustainability-and-surgery/green-theatre-checklist>. 3. Xiao MZX, Abbass SAA, Bahrey L, Rubinstein E, Chan VWS. A Roadmap for Environmental Sustainability of Plastic Use in Anesthesia and the Perioperative Arena. *Anesthesiology*. 2021 Oct 1;135(4):729–37.

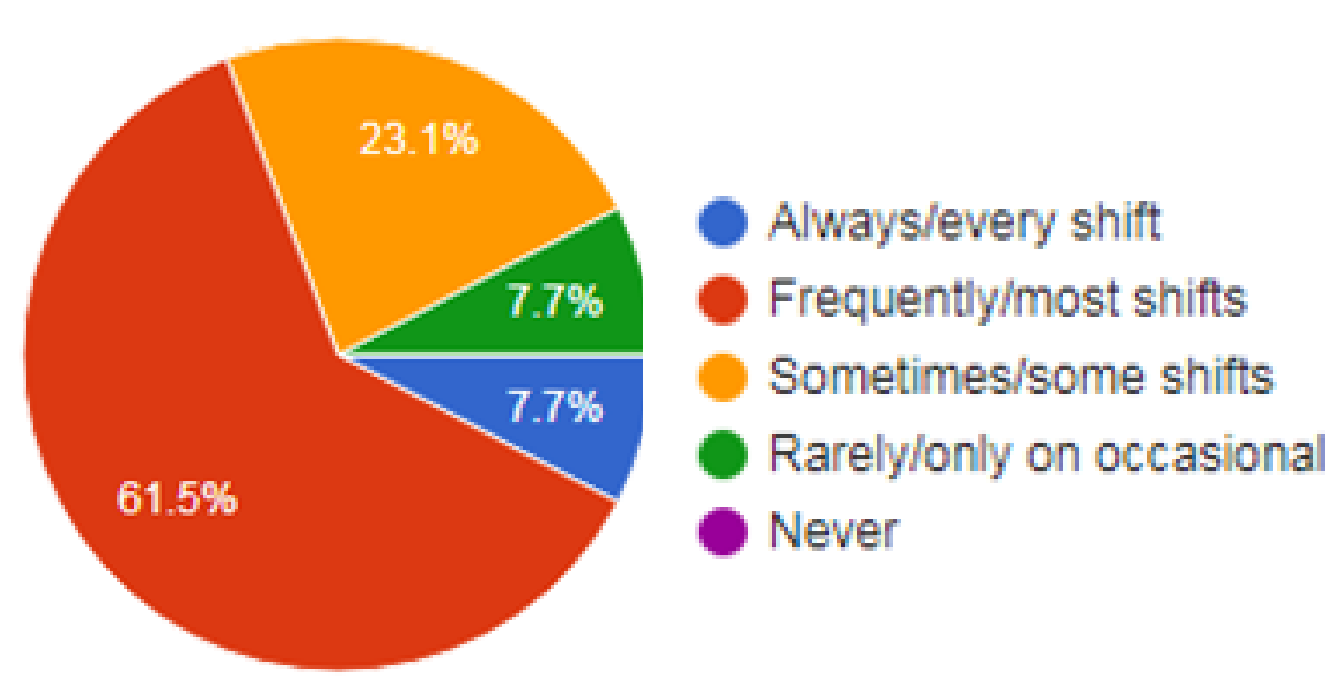
Results

Demographic and overall wastage

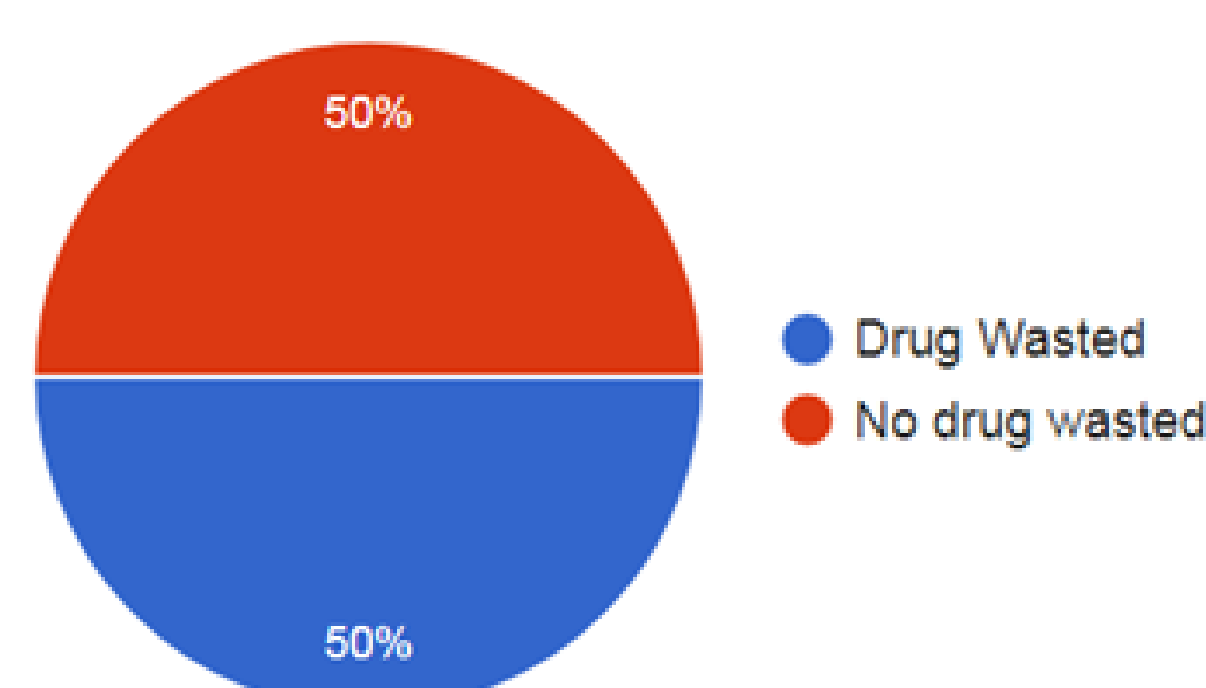
A. Grade of respondent



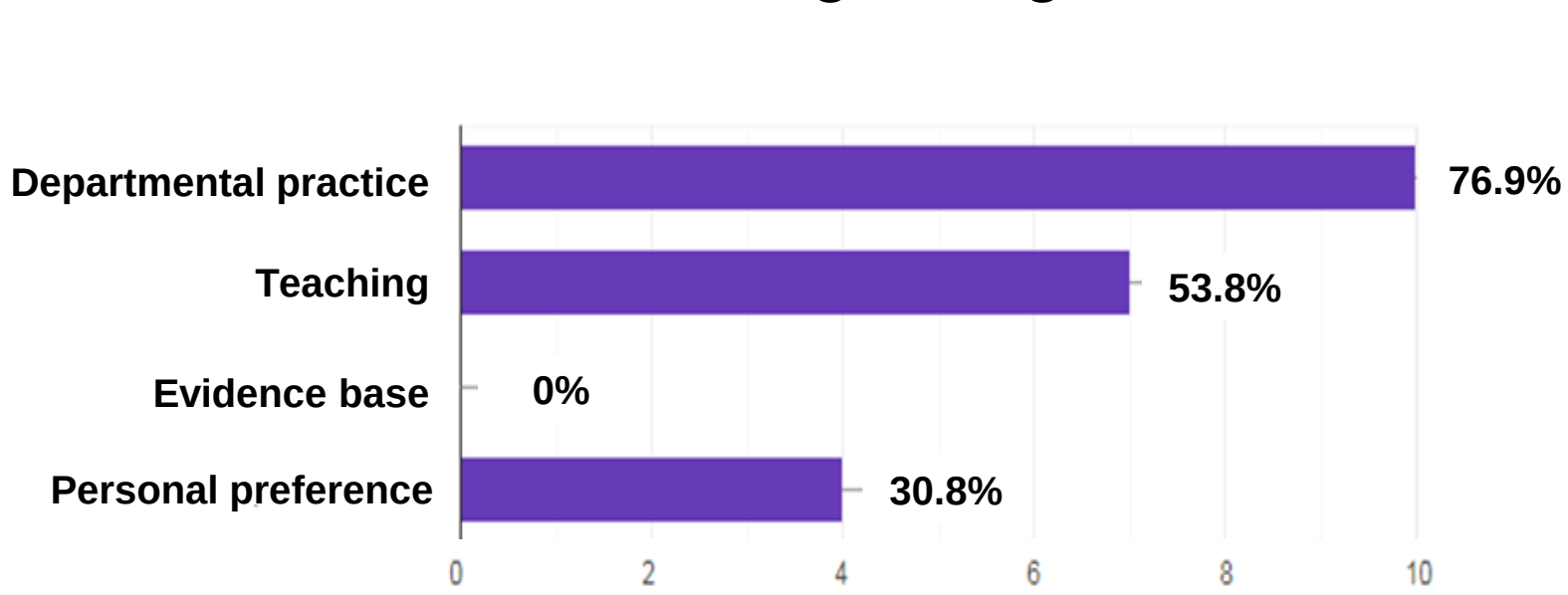
B. Perceived frequency of drug wastage



C. Frequency drug wastage at shift start



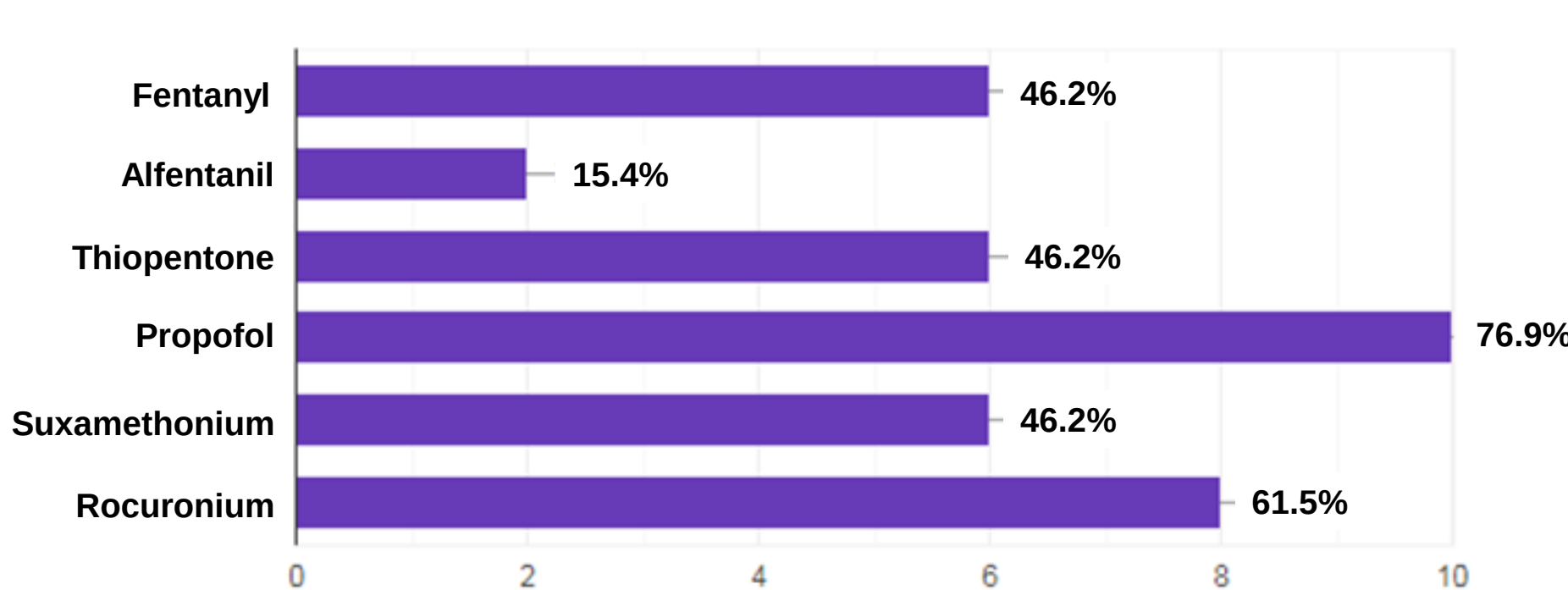
D. Rationale for drug storage durations



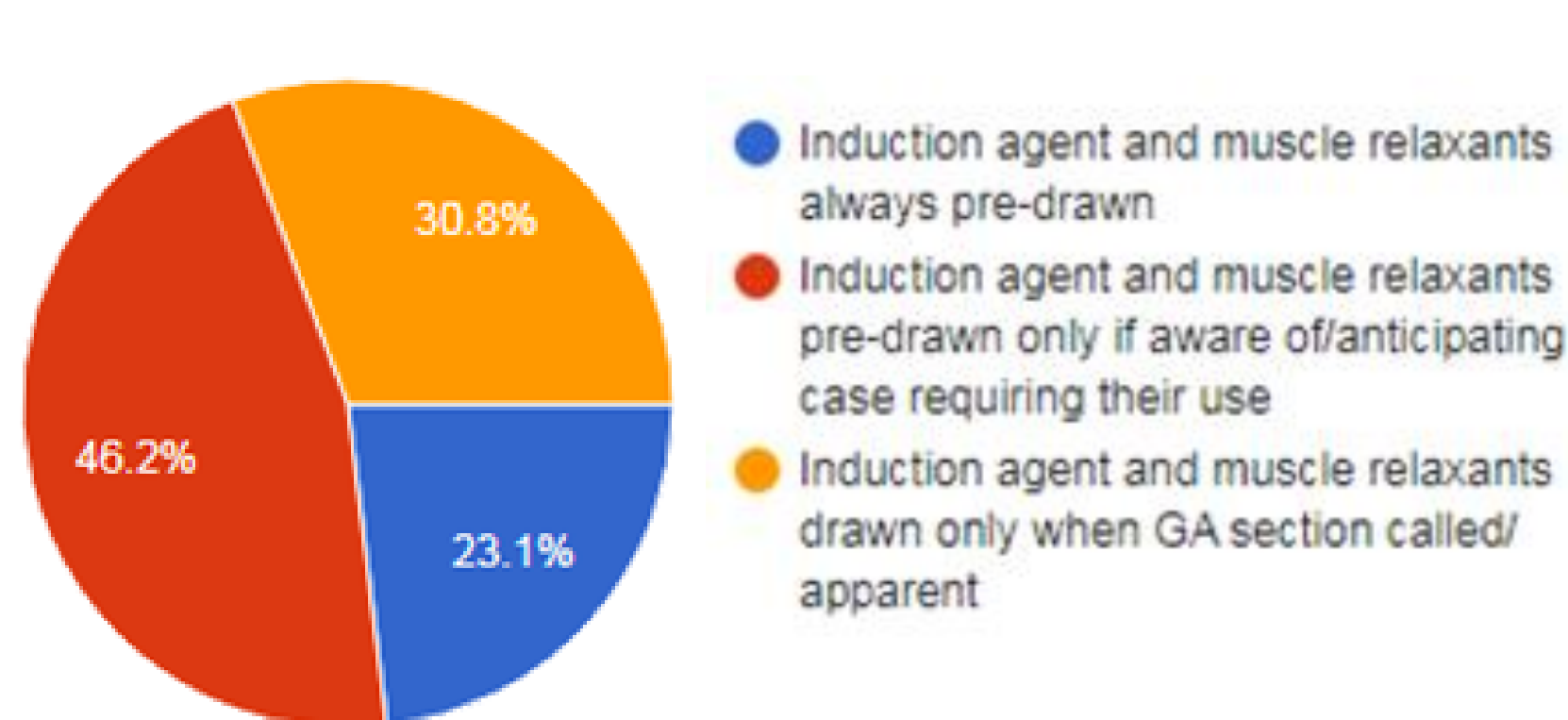
- A. Survey respondent grades were representative of anaesthetic staff on labour ward.
- B. Survey data showing high frequency of drug wastage on shift. The majority (61.5%) waste drugs at the start of most shifts.
- C. 50% of staff changeovers resulted in drug wastage. Age of drug was the most common indication for drug wastage (8) vs lack of labelling (3).
- D. Storage of drugs was based on departmental practice and norms (76.9%, 53.8%). No respondent stored drugs based on evidence.

GA drug box and usage

A. Drug use during obstetric GA



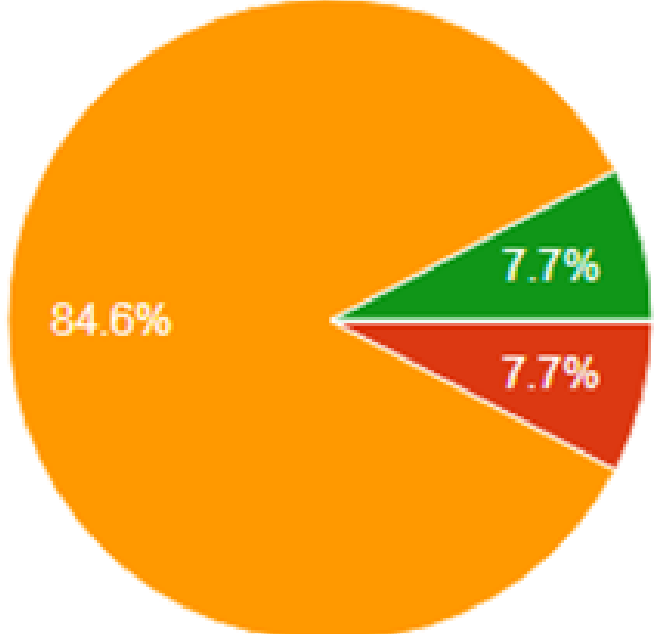
B. Opinions on pre-drawing GA drugs



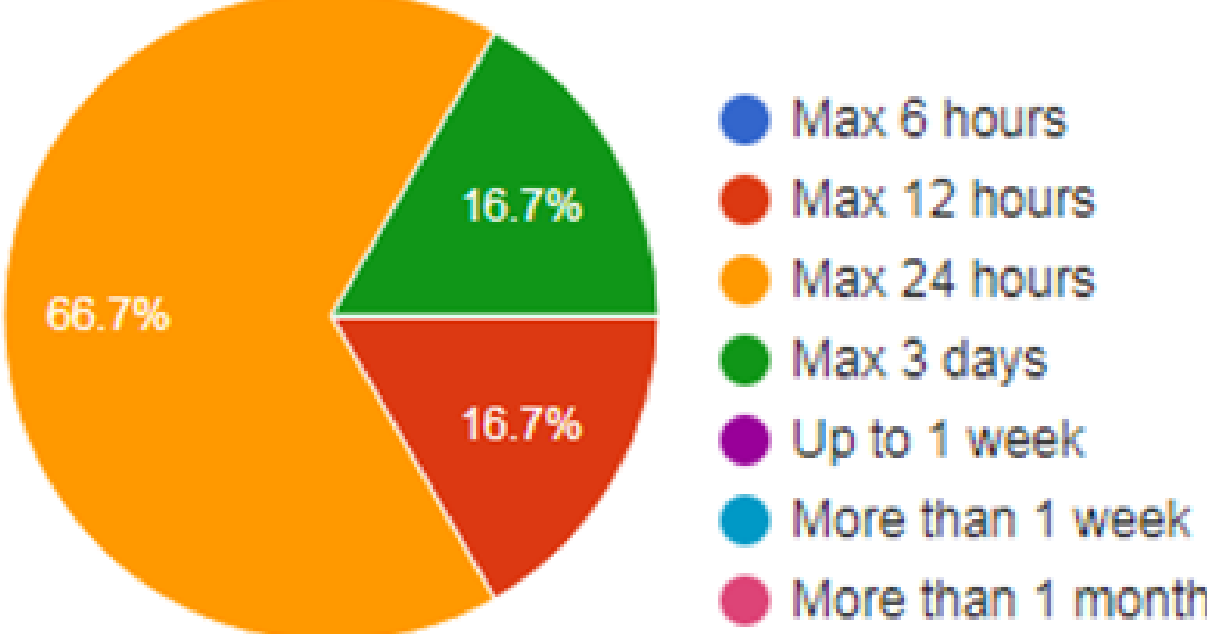
- A. Approximately 50% use opioids, propofol and rocuronium are used more commonly than thiopentone and suxamethonium.
- B. Less than 25% of respondents pre-draw GA drugs, the majority opting to draw GA drugs only when category 1 Caesarian section is anticipated or called.

Storage of oxytocin and phenylephrine

A. Phenylephrine



B. Oxytocin

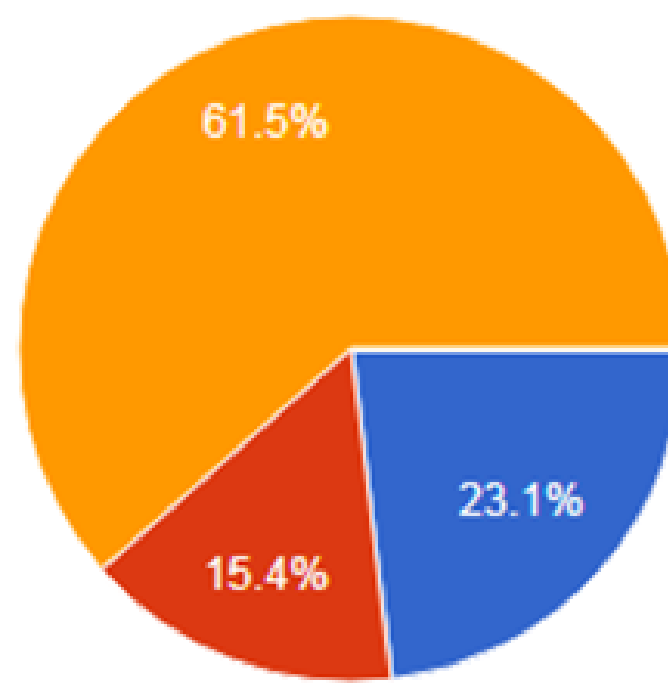


Departmental storage of phenylephrine (A) and oxytocin (B) showing most anaesthetists store each drug for a maximum of 24 hours. No respondent stores either drug for more than 3 days.

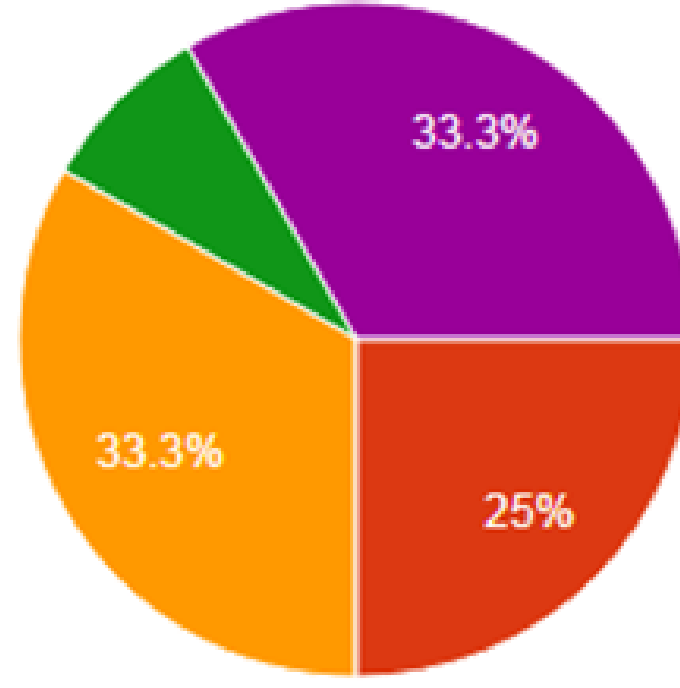
Age was the most common reason for wasting these drugs.

Storage of GA drugs

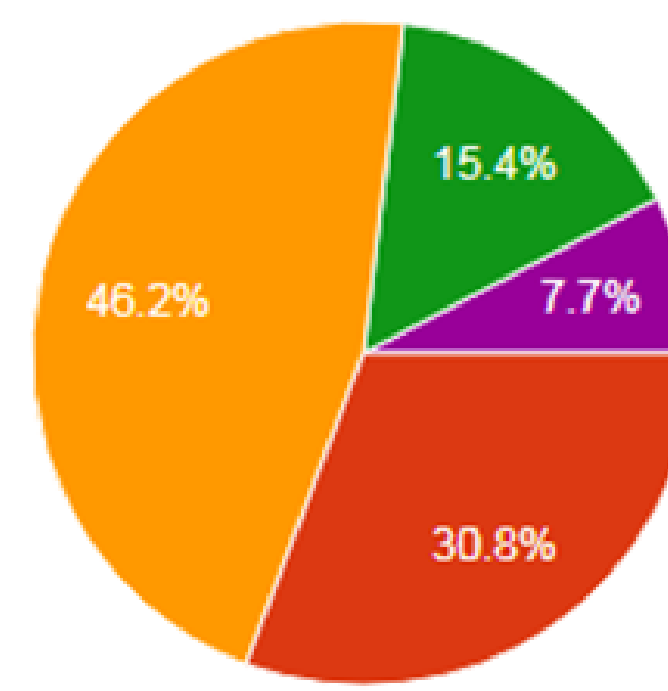
A. Propofol



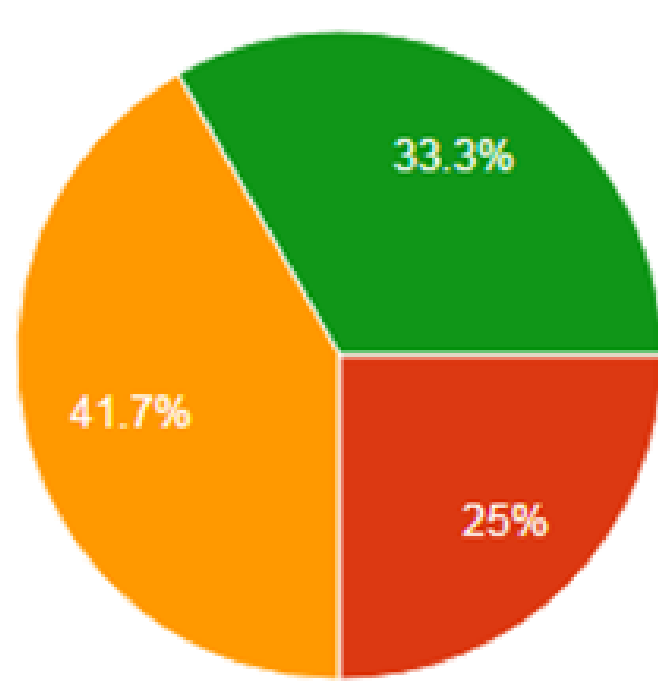
B. Thiopentone



C. Rocuronium



D. Suxamethonium



Legend for storage durations:
Max 6 hours (blue), Max 12 hours (red), Max 24 hours (orange), Max 3 days (green), Up to 1 week (purple), More than 1 week (cyan)

Survey data showing storage durations used for propofol (A), thiopentone (B), rocuronium (C) and suxamethonium (D).

Propofol is stored for the shortest duration but >75% store propofol for longer than the recommended maximum of 6 hours.

Thiopentone is stored by most for 12-24 hours or 1 week.

Rocuronium and suxamethonium are stored by most for < 24 hours, a smaller proportion store them for > 3 days.

Evidence for drug storage in syringe

Drug	Stability	Sterility
Phenylephrine	>95% - 6 weeks	6.4% contamination rate (multi-dose)
Oxytocin - fridge	>90% - 30 days	8 days - 100% of 126 samples
Propofol	>90% - 13 days	6 hours maximum
Thiopentone - fridge	>90% - 13 days	8 days -100% of 126 samples
Rocuronium - fridge	100% - 28 days	Bacteriocidal, no long-term data
Suxamethonium - fridge	>99% - 90 days	8 days - 100% of 126 samples

Summary

- In our obstetric unit we aim to introduce individualised storage of anaesthetic drugs, recommendations are available in department
- Phenylephrine and oxytocin - most frequently wasted due to age of drug in syringe. Wastage is rarely indicated due to their high frequency of use, usually <1-2 days
- GA drugs – with less frequent usage differing storage durations need to be considered, notably propofol storage is limited to 6h in syringe due to contamination.
- Appropriate drawing up, labelling and storage of opened vials in the GA drug box likely improves drug safety
- Commercially available pre-made syringes would reduce wastage