Antimicrobial Stewardship & Patient Safety Improvements: Introducing the NIVAS Line Flushing Guidance

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INTRODUCTION

Recent published literature highlights that as much as 35% [1] of medication may remain in the infusion line as residual volume. The line is not commonly flushed outside of paediatric and oncology settings and therefore the total prescribed dose is not administered to patients, and this residual medication is discarded, raising the issue of underdosing. [2]

At Salisbury NHS Foundation Trust, the Medical Device Management Services team is actively working towards improving patient safety and recovery through antimicrobial stewardship and compliance with new NIVAS guidelines [3]. We were keen to understand the implications of current intravenous administration practice at our Trust. We were particularly interested in assessing the prevalence and extent to which patients are underdosed, and the cost implications of discarded medication.

METHODS

An observational audit was undertaken of gravity administration sets on two surgical wards at Salisbury District Hospital over a 60 hour period running from 29th November to 2nd December 2021. At the end of administration, all infusion sets were gathered and their remaining volume measured.

RESULTS

The audit revealed that when all medication had emptied from the drip chamber, the line remained filled with residual volume, resulting in the patient being underdosed (Fig. 1). In most cases, (n=58/71, 81.7%) this residual volume was 12mls. However, in one observation, metronidazole remained in the drip chamber as well as the line, resulting in the patient being underdosed by 27mls. Of the 71 gravity administration sets observed;

- 43 (60.6%) infused antibiotics
- 18 (25.4%) infused paracetamol
- 6 (8.4%) infused maintenance fluids such as sodium chloride (Fig. 2)
- 96% of sets in this audit were used for intermittent infusions

Because most infusions had a residual volume of 12% (mean = 12.42%), after nine infusions, each patient would have lost **more than one full dose**, increasing the risk of antimicrobial resistance and suboptimal effectiveness of the medication. Additionally, purchasing data from NHS Supply Chain revealed that over the past three years, an average of 102,233 gravity administration sets were purchased by our Trust per annum. When accounting for the proportion of intermittent infusions, the cost per dose of each drug observed in the audit, and the **mean residual volume of 12.42%**, we calculated that over the course of a year, **the total value of discarded drug would be £25,517.** The cost of the average waste for each drug is shown in Fig. 3.

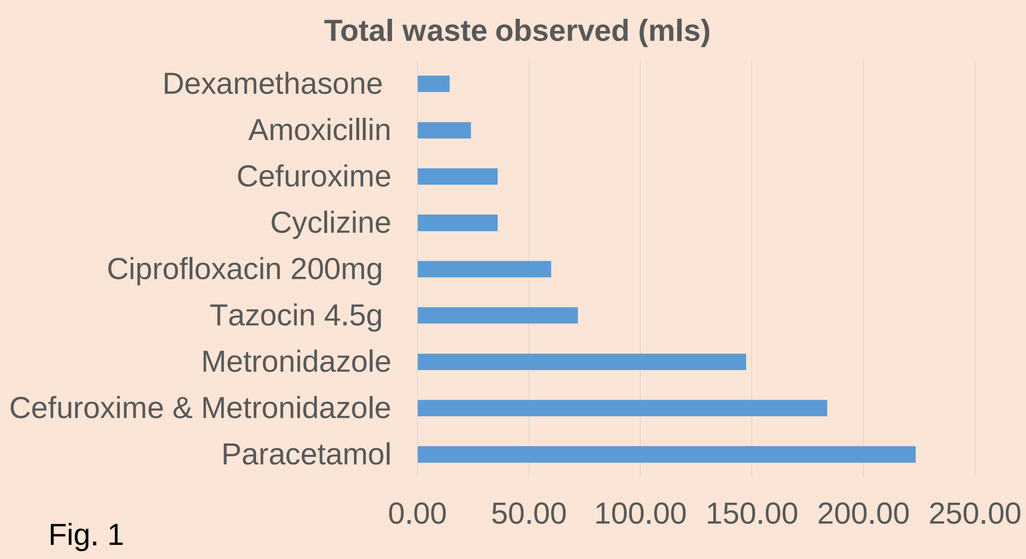


Fig. 1

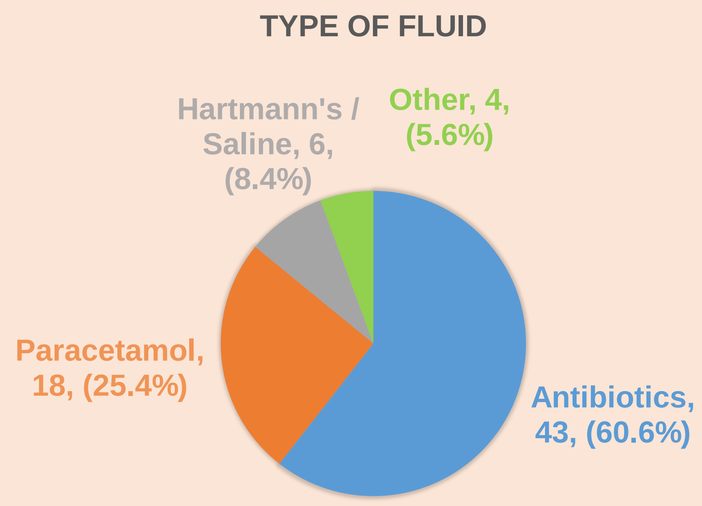
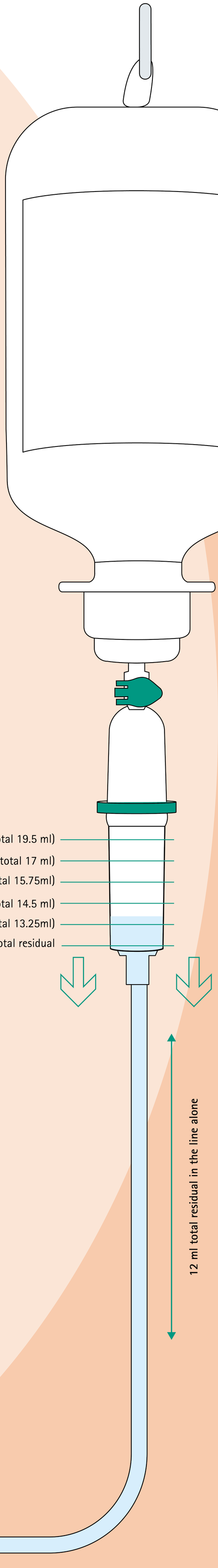


Fig. 2



CONCLUSION & DISCUSSION

As a result of these findings, the Medical Device Management Services Team wanted to improve patient safety and recovery through antimicrobial stewardship and introduce the NIVAS line flushing recommendations [3], which specifically recommend **a post-medication flush to prevent underdosing** and its associated risks.

In order to deliver a post medication flush, we intend to explore the introduction of SafeSet Flush, comprising a needlefree port upstream of the drip chamber serving as a **visual cue** reminding staff to administer a **post infusion flush**. The system also allows line flushing whilst maintaining a closed system, preventing unnecessary antibiotic exposure and ensuring that only the residual volume of medication is displaced, preventing any risks associated with fluid overload.

We expect the introduction of SafeSet Flush to be accepted by the nursing team as a way to ensure they deliver full doses of antibiotics and other intermittent medication to their patients whilst also addressing the financial implications of discarded medication.

REFERENCES

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2. Rout, J., Essack, S., & Brysiewicz, P. (2019). Are nursing infusion practices delivering full-dose antimicrobial treatment?. *Journal of Antimicrobial Chemotherapy*, *74*(12), 3418-3422.
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Fig. 3