



ACCURACY OF SYRINGES PREPARED IN ANAESTHESIOLOGY

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BACKGROUND AND OBJECTIVE

The use of intravenous drugs in anaesthesiology is associated with critical risks including wrong drug and wrong dosage. Many intravenous therapies are prepared in the operating theatre, to manage the anaesthesia during the patient operation. The objective of the study was to assess the accuracy of intravenous drugs prepared in anaesthesiology, by analysing the content of syringes.

METHODS

Four test drugs representative of different preparation techniques were selected :

- Fentanyl (10, 20, 25, 50 µg/mL) and atracurium (1, 2.5, 5 mg/mL) were diluted from ampoules
- Thiopental (5, 25, 50 mg/mL) was diluted after reconstitution from vials (powder)
- Lidocaine (10mg/mL) was simply drawn up from the ampoule into the syringe

Syringes were collected at the end of operations in different theatres and the drug content was quantified using 4 validated UV-vis methods.

RESULTS

Five-hundred syringes were analysed: 150 fentanyl, 150 atracurium, 150 lidocaine and 50 thiopental (Fig. 1).

- 34% of the preparations were out of $\pm 10\%$ of the targeted concentration,
- 18% were out of $\pm 20\%$,
- 8% were out of $\pm 50\%$.

Fentanyl showed the higher rate of discrepancy (mean concentration \pm SD: $146.4 \pm 104.5\%$) followed by thiopental (109.1 ± 70.4) and atracurium (97.6 ± 13.5). For lidocaine (101.8 ± 10.2), only one case of double concentration was detected (Fig. 2).

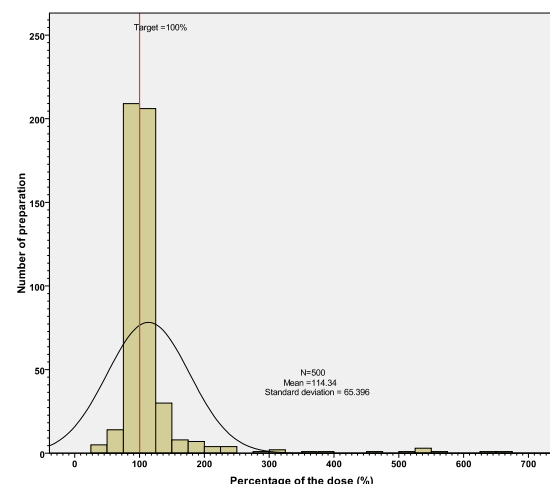


Fig 1. Global frequency histogram of measured concentrations from the collected syringes (all drugs combined)

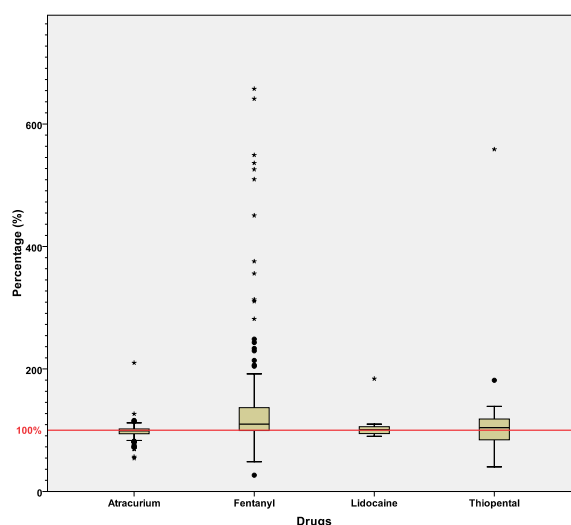


Fig 2. Box plot of the distribution of the different dosages measured for each of the four drugs, N= 500 (150 fentanyl, 150 atracurium, 50 thiopental, 150 lidocaine), in comparison with the targeted concentration

CONCLUSIONS

Only two-third of syringes prepared in an operating theatre have concentrations corresponding to the European pharmacopoeia requirements. In 8% of cases, the dosage is far away from the expected concentration, suggesting not only an imprecision, but an error during drug preparation. These results strongly support the need for strict preparation procedures (i.e. preparation protocols) and the production of ready-to-use syringes in GMP conditions at the pharmacy (Fig. 3).



Fig 3. Ready-to-use syringes