

# Wrong drug administration errors amongst anaesthetists in a South African teaching hospital

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**Abstract:** A confidential, self-reporting survey was sent out to all 65 anaesthetists (25 specialists and 40 registrars) in the Department of Anaesthesia at the University of Cape Town with the aim of determining the incidence and possible causes of "wrong drug" administrations. The response rate was 95%. 93.5 % of respondents admitted to having administered the wrong drug at some stage of their anaesthetic career. 19/62 (30.6%) have injected the wrong drug or the correct drug into the wrong site on at least three occasions. 56.9 % of incidents involved muscle relaxants with suxamethonium chloride administered instead of fentanyl accounting for nearly a third of cases. 17.6 % of reported incidents were classified as being dangerous, with the potential to cause either severe haemodynamic instability and / or neurological damage or seizures.

**Key words:** Anesthesiology; Safety; Standards; Drug labeling; Medication errors

## Introduction

Studies from New Zealand, Australia and Canada suggest that the majority of anaesthetists will administer the wrong drug at some stage during their career.<sup>1,2,3</sup> Although the majority of wrong drug administrations does not result in harm to patients, a significant minority of incidents results in morbidity or death.<sup>2</sup> This study set out to investigate the incidence, nature and possible causes of wrong drug administration amongst anaesthetists at the University of Cape Town.

## Methods

A confidential self-reporting survey was sent out to all members in the department in which details were sought of incidents of wrong drug administrations. See Addendum.

## Results

62/65 anaesthetists completed the questionnaire (40 Registrars and 22 Specialists). 93.5% of respondents admitted to having administered a wrong drug or the right drug into the wrong site at some stage during their anaesthetic career. 17/65 anaesthetists have done so on at least three occasions. Altogether 103 wrong drug administrations were made. The drugs most commonly administered erroneously are shown in Figure 1. The syringe swap of suxamethonium chloride for fentanyl was the single commonest error, occurring in 30%

### Addendum: AUDIT ON INCIDENCE OF WRONG DRUG ADMINISTRATION BY ANAESTHETISTS IN UCT DEPARTMENT OF ANAESTHESIA

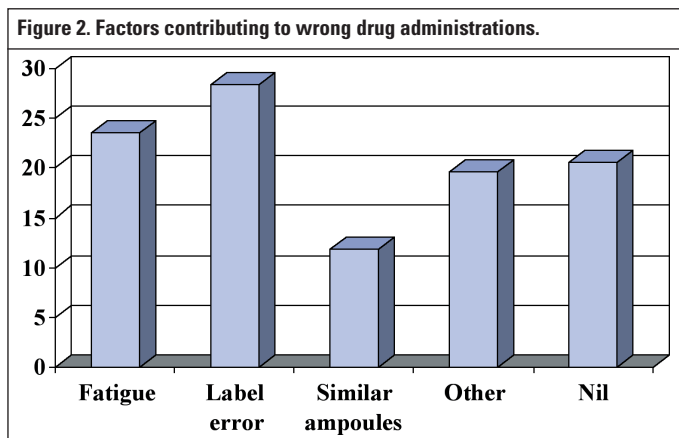
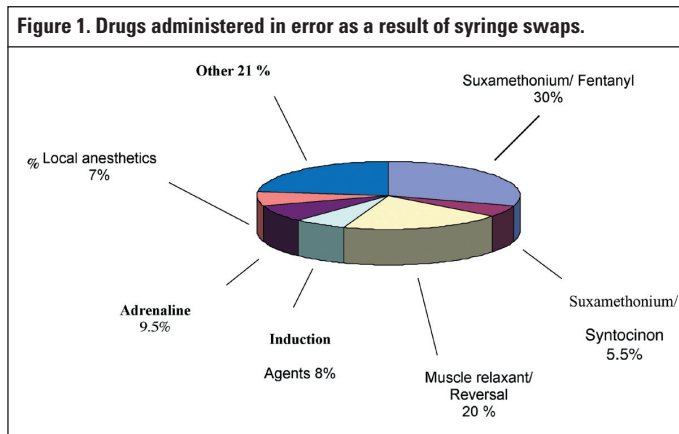
1. Have you ever administered the wrong drug during an anaesthetic?
2. Please state your current position in the department.
3. How many years have you been administering anaesthesia?
4. On how many occasions have you administered a wrong drug in theatre?
5. Please list the drugs you have administered erroneously
  - a) Name of drug administered in error?
  - b) Name of drug that should have been administered?
  - c) Did the patient suffer any long-term sequelae as a result?
  - d) Details of sequelae?
  - e) Did the incident prolong the duration of the anaesthetic and if so by how long?
  - f) At the time of the incident were you a medical officer, registrar or anaesthesiologist?
  - g) What factors contributed to the incident?
6. Do you regularly re-use syringes for more than one drug for a single patient?
7. Do you think coloured labels should be used to identify drug classes in theatre?
8. As far as you are aware is there an International Standard for syringe labelling in theatre?
9. As far as you are aware is there a National Standard for syringe labelling in theatre?
10. Do you think the absence of colour-coded labels in theatre is an important risk factor for administration of the wrong drug in theatre?

of incidents. 17.5% 18 of errors were classified as dangerous with the potential to cause serious haemodynamic or neurological damage. Two patients suffered harm after receiving adrenaline in error. One suffered a myocardial infarction and developed pulmonary oedema, while a second developed ventricular fibrillation requiring defibrillation. Factors blamed for the errors are shown in Figure 2. These included fatigue (23.5%), syringe labelling errors (28.4%), similar looking drug ampoules (11.8%) and other factors (20%). The latter group

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included inattentiveness, pressure from impatient surgeons and anaesthetic consultants, poor lighting and distraction.

70% of respondents were of the opinion that colour coded labels for syringes in theatre helped to minimize drug administration errors. Approximately 70% of respondents were unaware of the existence of either a National or International Standard for syringe labels in theatre.

## Discussion

The incidence of wrong drug administration by anaesthetists in South Africa has not been documented previously. This survey demonstrated that the incidence of such errors by anaesthetists at our institution is similar to that in other first world countries.<sup>1,2</sup> Although the majority of errors did not result in patient harm, the incidence of potentially dangerous errors is concerning. Fatigue featured as an important contributory cause. The causes of fatigue include sleep deprivation, boredom, work overload, physical exhaustion and alterations in circadian rhythm. The relationship between fatigue and pharmacological errors and the increased risk of such errors between midnight and 06h00 has been well documented, supporting the need for fatigue alleviation strategies and the need to limit surgery to emergency cases only after midnight.<sup>4</sup>

In 1985, Prof. Pat Foster from Tygerberg Hospital pioneered the development of both a National and International standard for colour coding of syringe labels.<sup>5,6,7</sup> A new colour coding system has since been adopted by the USA, Australasia, Canada and the United Kingdom.<sup>8</sup> South African anaesthetists travel between many hospitals and frequently obtain locum positions overseas. Standardization of labelling is therefore important and for this reason South Africa should consider adopting the new international standard.

Our study confirms that 'syringe swaps' are a frequent cause of

drug error. In the study by Currie et al, 63 % of syringe swap errors occurred with correctly labeled syringes.<sup>3</sup> Colour coding of syringe labels according to drug class must therefore be regarded as an important secondary cue to correctly identify syringes in theatre. They can never replace careful reading of the label. Anaesthetists need to be aware of the tendency of the human brain to identify words by pattern recognition rather than by reading the letters.

Poor labelling of ampoules was identified as another important cause of drug errors. Strategies described to prevent such errors include improved labelling with clear fonts that emphasize the generic name rather than the proprietary name<sup>8</sup>, using a two-person check when drawing up drugs, and the introduction of bar-coded ampoules with a computer that speaks the name of the drug after it has been scanned before being drawn up.<sup>9</sup> At present there is no colour code to identify ampoules according to drug class. The adoption of the international code for colour coding of syringe labels for labelling ampoules by drug manufacturers, would readily identify the class of drug. It would not eliminate the risk of incorrectly administering drugs of similar class such as phenylephrine for ephedrine. To avoid such errors, hospitals should be persuaded to purchase prefilled syringes of drugs such as ephedrine.

The storage and presentation of drugs in theatres probably influences the likelihood of drug errors. Drug drawers are frequently haphazardly packed with drugs with radically different actions next to each other. Webster et al have suggested that compartments in the drug trolley be colour coded for class of drugs.<sup>10</sup>

## Conclusion

Most anaesthetists will administer a wrong drug at some time. An important minority of such incidents may cause significant patient morbidity or death. Anaesthetists and administrators need to be aware of the problem. Mechanisms for reporting such incidents should be in place to identify possible causes and implement measures to prevent further incidents. Prospective, randomized studies investigating strategies to decrease the incidences of wrong drug administration are needed. The SA Society of Anaesthesiologists should be involved with the pharmaceutical industry to improve and standardize ampoule and syringe labels.

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