

## Original Article

### Standards for labelling and storage of anaesthetic medications — an audit

Muhammad Imran, Fauzia Anis Khan, Shemila Abbasi  
Department of Anaesthesia, Aga Khan University, Stadium Road, Karachi, Pakistan.

#### Abstract

**Objective:** To check compliance of anaesthetist to current policies set for the use of medication within operation room and for induction room floor stock.

**Methods:** The initial audit was conducted from 1st October to 31st November 2006 and reaudit after dissemination and sharing of results within the department repeated in July-August 2007. In each audit four operating rooms were visited twice a week. Syringes were checked for standard drug labelling for narcotic and non narcotic preparations. Drug trolley was checked for any expired drugs and whether the trolley was locked in case of operating room (OR) where list was ended or was on hold. Any unattended drug was noted and Induction room was checked twice weekly for accurate drug inventory and for standard drug storage recommendations.

**Results:** Labels were according to standard in non narcotic drugs on 25% syringes in first audit and 63% in second audit, likewise, narcotics labels were according to standards in 41 % in first and 57% in second audit. Unattended drugs were present once in first and twice in second audit. There was 100% compliance in other drug storage policy parameters in both audits.

**Conclusion:** Poor compliance of drug labelling standards for both narcotic and non narcotic drugs was present. However, second audit revealed improvement in all areas of drug handling. Dissemination of policies and reminders are important for continuing improvement in use of medication within operation room and within induction room floor stock (JPMA 59:825; 2009).

#### Introduction

Anaesthesia involves frequent injection of potent intravenous drugs. These drugs are often prepared and drawn up in syringes some time before they are to be used. The potential of a wrong drug being given because of syringe swap or wrong dilution of drugs is a real possibility. Majority of these drug errors are totally or partially attributed to human error.<sup>1</sup> Reports on drug error in anaesthesia have addressed the issue of colour coding of ampoules and syringe labels. The addition of colour to a label is thought to be an additional visual and psychological cue for choosing the right ampoule or syringe.<sup>1</sup> A previous published report from our department

has documented drug errors to be 21% of total reported critical incidents.<sup>2</sup> In order to reduce these errors standardized drug labelling and storage was introduced in July 2006, which was in line with current international standards.<sup>3</sup>

The objective of this current audit was to check compliance of anaesthetist to current policies set for the use of medication within the operating room and for induction room floor stock.

#### Methods

In each audit four operation rooms were visited twice a week. Syringes were checked for standard drug labelling for

narcotic and non narcotic preparations. Standards that were used as a bench mark were as follows: Drug labels on syringes should clearly state name of drugs with concentration and time of preparation, narcotic syringe should be labelled with patient identity, any drug expired as per manufacturer recommendation should not be present on the drug trolley, drug trolleys should be locked in between cases and no unattended medication should be present on the drug trolley in the absence of anaesthetist in the operating room.

In addition, standards applied to the floor stock kept in the induction room were; floor stock should be same as documented in the file, no expired drugs should be present in the drug storage and temperature of refrigerator used in the induction room should be at 4 degrees centigrade.

The initial audit was conducted between 1st October to 31st November 2006.

Following methodology was used. Our main operating room suite has eleven operating room (ORs). Two sets of operating rooms were selected randomly one in which a surgical case was in progress and another where list was on hold. These operating rooms were visited by one of the investigator between 8am-5 pm. Randomization was achieved by assigning a number on a piece of paper for each OR. Four papers were then picked up by the investigator. Four operating rooms were visited by the principal investigator or co-investigators depending on the availability. The selected days of audit were also randomly selected by picking four pieces of paper. Timing of audit was not standardized and left to investigators convenience. A specially designed form was used.

The following was checked:

1. In each operating room where a case was in progress a check was observed whether drug labels on syringes were written according to department guidelines, narcotics syringes were labelled with patient identity and if any, expired anaesthesia drugs were present. Labels which were found deficient in any component were regarded as incomplete.

2. Checklist in empty operating room included whether drug trolley was locked or unlocked and if any unattended drugs were present.

3. The induction room refrigerator was checked for its temperature (four degree centigrade), whether it was locked or not, presence of inappropriate items like food, blood etc, any unauthorized drug present, any expired drug present or not and for correct number of drugs present as documented.

4. Induction room drug cupboard was checked whether it was locked, total number of documented drugs present, bins of drugs with proper labels present and for presence of any expired drugs.

Any part of missing standard such as name or

concentration was taken as non compliance.

Results of these audits were disseminated in the department at different levels. A re-audit based on the same methodology was conducted between 1st July till 31st August 2007.

## Results

In the initial audit, 58 operating rooms audited were in progress and 8 were on hold. On 16 occasions induction room was inspected. Out of the operating rooms in which a case was in progress, only 15% were compliant with proper drug labelling whereas compliance for the presence of patient identity on narcotic syringes was 24% (Table-1). Unattended

**Table-1: Drug standards compliance inside operational operating rooms during the two audits.**

Standard	Oct-Nov 2006	July-Aug 2007
Drug labels according to department standards	15 (25.8%)	36 (63.1%)
Expired drug present in anaesthesia trolley	No expired drug present	No expired drug present
Narcotics labelled with patient identity	24 (41.3%)	33 (57.8%)

**Table-2: Compliance of drug standards in operating rooms on hold.**

Standard	Oct-Nov 2006	July-Aug 2007
Drug trolley locked	3 (50%)	6 (85.7%)
Unattended drugs present	1 (20%)	2 (28.5%)
Names of unattended drugs	Lignocaine	Phenylepherine, GTN

**Table-3: Compliance of drug standards in Induction room for drugs in refrigerator in both audits.\***

Standard	Compliance
Refrigerator locked	16 (100%)
Temperature of refrigerator is within range	16 (100%)
Inappropriate items like food, blood etc. present or not?	0 (0.0%)
Unauthorized drug present or not?	0 (0.0%)
Expired drug present or not?	0 (0.0%)
Correct number of drugs present as documented	16 (100%)

\*Result was same in both audits.

drug was found only once. In induction room refrigerator was found to be unlocked on only one occasion as drug was taken just before inspection.

In the re-audit, 57 operating rooms were in progress and seven were on hold. There was compliance with proper labelling in 63% drug preparations; compliance with patient ID stickers was 57% on narcotic syringes. Unattended drugs were found on two occasions. In induction room refrigerator was found to be unlocked on 3 occasions (Table-2). There was 100% compliance in other drug storage policies

parameters in both audits (Table-3).

## Discussion

Drug related incidents are a common form of reported medical errors. The importance of drug error has been emphasized in the Harvard Medical Practice Study,<sup>4</sup> the Quality in Australian Healthcare Study<sup>5</sup> and a report from the U.S. Institute of Medicine.<sup>6</sup> In the Australian study, drug errors were the fourth commonest category of adverse events (accounting for 10.8%), resulting in permanent disability in 17% and death in 8%. The reduction of iatrogenic harm has been recognized as a priority in healthcare.<sup>5</sup> It is important to understand that iatrogenic harm is not a homogeneous problem, but is contributed to by deficiencies in the system in which medical professionals work.

Drug administration error in anaesthesia is an important subset of drug error in general. Most of the errors reported in anaesthesia practice are preventable.<sup>2</sup> Serious morbidity and mortality resulted from clearly preventable events.<sup>7</sup> In a survey conducted in New Zealand problems with drug labels were contributing factors with 9% of error reports.<sup>8</sup> In a study of 55,426 anaesthetics in Norway, drug error was reported in 63 or 0.11% of cases over 36 months.<sup>9</sup> In a study of 896 drug errors reported in Australia, 187 (20.8%) involved selecting the wrong ampoule or making an error in drug labelling.<sup>10</sup> Contributing factors included inattention, haste, drug-labelling error, communication failure, and fatigue. Factors minimizing the events included prior experience and training. A survey among obstetric anaesthetist, responders put importance of drug labels on top for preventing drug related incidents.<sup>11</sup> The use of class-specific colour coding for syringe and ampoule labels might not reduce intra-class substitution, but would have considerable potential for reducing inter-class errors.<sup>12,13</sup> In our institution (AKUH) 768 critical incidents were reported, between January 1997 to December 2002, 165 (21%) of which were related to drug errors. Under dosage, side-effect, drug reaction and syringe swap were the most common. A total of 76% were classified as preventable; 56% due to human error and 19% due to system error.<sup>2</sup> Considering a large contribution of drug labels in drug related errors, literature therefore supports the development of improved standards for drug labels and the establishment of a reporting programme for medication errors.<sup>14</sup>

Simple maneuvers like proper drug labeling, handling and storage simply can reduce the risk and improves quality of anaesthetic care. A standardized color code for user-applied syringe labels for anaesthetic drugs exists in the USA, Australia, New Zealand, South Africa, Canada and UK. Considering these facts standardized syringe color labels coding as approved by Association of Anaesthetists of Great Britain and Ireland were introduced in our department in July

2006.<sup>3</sup> The other standards used within the department are in compliance with Joint Commission International Accreditation (JCIA) standards.<sup>15</sup>

There should be a safe and secure storage arrangement for all drugs in the operating rooms. Controlled substances must be stored under lock when not in immediate use. A drug inventory log book documenting use and remaining balance should be in place for controlled drugs. Operating rooms should have a documented policy to check that drugs and supplies have not expired. The key to this drug safe must be kept in a secure place away from the drug storage safe. We found satisfactory compliance of policies in drug inventory and storage.

Audit is a process of quality control; in medicine it is taken as systemic peer review in a clinical practice with the object of maintaining and improving quality of that practice. Regular audits to determine practice of these guidelines are necessary in order to reduce drug related critical incidents. Our initial audit depicted lapses in compliance of drug policy specially in labelling of drugs. Drug labelling and handling policy was properly communicated at different fora within the department to disseminate awareness. The second audit conducted after six months, a replicate of previous audit was carried out for the same purpose. Looking at results of both audits it is seen that there is general improvement in drug handling. This shows the importance of auditing, feedback and improving the practices.

This audit revealed poor drug standard compliance especially in drug preparation, however there was excellent drug compliance in drug storage standards. In addition this audit also revealed importance of propagation and dissemination of policies in general improvement in all of the areas of drug handling but there is still a lot of room for further improvement. Propagation of information especially among the new staff and constant reminders are important for persistent policy practice and reducing drug errors. In future drug standard policies would be circulated regularly and checked by mini audits. Drug related incidents would be followed as part of our quality improvement measures and their magnitude and importance discussed to guide us to further develop these standards.

## Conclusion

An audit was conducted to observe compliance of departmental drug labeling and storage policies. Marked improvement was observed in the next audit revealing importance of education and information of hospital guidelines.

## References

1. Davies JM, Webb RK. Adverse events in anaesthesia: the wrong drug. *Can J Anaesth* 1994; 41: 83-6.
2. Khan FA, Hoda MQ. Drug related critical incidents. *Anaesthesia* 2005; 60: 48.

3. Simpson PJ, Birks RJ. Syringe labeling in critical care areas. (Online) (Cited 2008 Sep 20). Available from URL: [http://www.rcoa.ac.uk/docs/syringelabels\(june\).pdf](http://www.rcoa.ac.uk/docs/syringelabels(june).pdf).
  4. Leape LL, Brennan TA, Laird NM, Lawthers AG, Localio AR, Barnes BA, et al. The nature of adverse events in hospitalized patients - results of the Harvard medical practice study II. *N Engl J Med* 1991; 324: 377-84.
  5. Wilson RM, Runciman WB, Gibberd RW, Harrison BT, Newby L, Hamilton JD. The quality in Australian healthcare study. *Med J Aust* 1995; 163: 458-71.
  6. Institute of Medicine. *To Err Is Human: Building a Safer Health System*. Washington DC: National Academy Press, 2000.
  7. Orser BA, Chen RJ, Yee DA. Medication errors in anaesthetic practice. A survey of 687 practitioners. *Can J Anaesth* 2001; 48: 139-46.
  8. Webster CS, Merry AF, Larsson L, McGrath KA, Weller J. The frequency and nature of drug administration error during anaesthesia. *Anaesth Intensive Care* 2001; 29: 494-500.
  9. Fasting S, Gisvold SE. Adverse drug errors in anesthesia, and the impact of colored syringe labels. *Can J Anesth* 2000; 47: 1060-7.
  10. Abeysekera A, Bergman IJ, Kluger MT, Short TG. Drug error in anaesthetic practice: a review of 896 reports from the Australian Incident Monitoring Study database. *Anaesthesia* 2005; 60: 220-7.
  11. Yentis SM, Randall K. Drug errors in obstetric anaesthesia: a national survey. *Int J Obstet Anesth* 2003; 12: 246-9.
  12. Webster CS, Merry AF, Larsson L, McGrath K. A complex-systems approach to safer drug administration in anaesthesia. *J Clin Monit* 2000; 16: 150-1.
  13. Webster CS, Merry AF. British syringe label "standards" are an accident waiting to happen. *Anaesthesia* 2000; 55: 618-21.
  14. Gordon PC, Llewellyn RL, James MF. Drug administration errors by South African anaesthetists - a survey. *S Afr Med J* 2006; 96: 630-2.
  15. The Joint Commission International Accreditation. Terrace. (Homepage of JCI). *Hospital Standards*. (Online) (Cited 2008 Sept 18). Available from URL: <http://www.jointcommissioninternational.org/fpdf/international/Standards.pdf>.
-