

# **Medication Errors: Issues of Concern to Anesthesia Providers**

Mary Katherine Riggs, BSN

Department of Nurse Anesthesia, Moffett & Sanders School of Nursing, Samford University

## **Structured Abstract**

### **Background**

Medication errors have been cited to occur in one of every twenty anesthetics. This can be attributed to the fact that anesthesia providers are tasked with the rapid-paced, critical decision-making surrounding the preparation and administration of multiple medications. Issues of similar labeling of medication vials, ampules, and syringes cause misreading of labels to account for over half of the medication errors made.

A 62-year-old female presented for a robotic sacroploexy. The patient had a history of hypertension. A general anesthetic with a transversus abdominis plane block was planned. On arrival to the operating room (OR), pre-induction vital signs were blood pressure of 173/96, heart rate of 65 bpm, oxygen saturation of 99% on room air, and respirations at 14/min. In addition to induction medications, succinylcholine 20 mg/mL and glycopyrrolate 0.2 mg/mL were drawn up and immediately available. The patient was induced with fentanyl 100mcg IV, lidocaine 60 mg IV, propofol 180mg IV, and rocuronium 35 mg IV, followed by atraumatic endotracheal intubation. Post induction vital signs were a blood pressure of 78/42 and a heart rate of 61 bpm. Management of the initial hypotension was indicated and initiated by the student registered nurse anesthetist (SRNA). Ephedrine 5 mg IV was administered. However, upon returning the "ephedrine" syringe to the anesthesia workstation, the SRNA identified that the medication actually administered was phenylephrine 1000 mcg IV.

### **Clinical Question**

Can medication errors in anesthesia be reduced with changes in preparation, labeling, and organization of medications used in the anesthesia work environment?

### **Evidence-Based Discussion**

Anesthesia providers are responsible for the selection, preparation, administration, and follow-up monitoring of more "high-alert" medications than any other health care providers. These multiple steps, involved in the medication administration process, provide many opportunities for human error. Although, few randomized controlled trials (RCTs) have been completed, systematic reviews and prospective observational studies have demonstrated that the process of preparation, labeling, and organization of medications have the highest impact on the incidence of medication errors.

Evidence has revealed that a reduction in multiple preparation steps for the anesthesia provider can decrease errors. This can be accomplished with the use of greater numbers and variety of

prefilled syringe medications in the anesthesia work environment. This is critically important with the frequent administration of high-risk medications by anesthesia providers.

Labeling is a vital component in reducing errors. The root causes of mislabeling of medications is multifaceted. Issues of similar labeling of vials, ampules, and syringes account for over half of the medication errors identified in evidence-based studies. Name similarities and label colors are components that lead to medication errors. Color-coded labels can assist in differentiating classifications of medications but cannot be solely relied upon. There is also a risk for error when handwritten labels are used due to inappropriate abbreviations or unclear dosage documentation.

Evidence has shown that organization and location of medications, when standardized across platforms and providers, reduces errors by 2%. Organization and standardization of drugs in the drawer and on the anesthesia workstation, to include separating look-a-like vials or syringes, will reduce errors by anesthesia providers.

### **Translation to Practice**

Translation of this evidence into practice will require the formation of a multidisciplinary team including anesthesia providers, pharmacists, and perioperative nurses. The team will identify the components of the proposed study and develop a study protocol. When finalized and approved, all staff involved in the medication administration process would be educated on protocol implementation prior to study initiation. Systematic reviews show that a multimodal approach is the most effective strategy to reduce medication errors in anesthesia.

This evidence-based observational pilot study will focus on patient outcomes in reducing medication errors. The protocol would include guidelines for patient selection, the medication preparation process, use of prefilled syringes, adequate and precise labeling of vials and syringes, and standardization of anesthesia workstation to include placement of syringes on top of the workstation and medications in the drug storage compartments. Outcomes for measurement would include reduction in medications errors at each point in the protocol, anesthesia providers' perception of safety and self-awareness, and workload capacity for pharmacists and anesthesia providers as a result of changes in the process. Future randomized controlled trials (RCTs), examining the self-reporting of errors by anesthesia providers are needed to determine the actual incidence of medication errors in anesthesia and the types of errors which will improve clinical practice and patient safety in anesthesia. However, the most important factor to reduce human errors continues to be extreme vigilance by the anesthesia provider.

### **References**

1. Prakash S, Mullick P, Kumar A, Pawar M. Safe labeling practices to minimize medication errors in anesthesia: 5 Case Reports and Review of the Literature. *A&A Pract.* 2018;10(10):261-264. doi:10.1213/xa.0000000000000680
2. Elliott EM, McClung H, Kurth CD. Medication errors and medication safety: preventable events in the operating room. *Curr Rev Nurs Anesth.* 2018;41(16):193-204.

3. Brown LB. Medication administration in the operating room: new standards and recommendations. *AANA J*. 2014; 82(6):465-469
4. Nanji KC, Patel A, Shaikh S, Seger DL, Bates DW. Evaluation of perioperative medication errors and adverse drug events. *Anesthesiol*. 2016;124(1):25-34. doi:10.1097/aln.0000000000000904
5. Estock JL, Murray AW, Mizah MT, et al. Label design affects medication safety in an operating room crisis: a controlled simulation study. *J of Patient Safety*. 2018;14(2):101-106. doi:10.1097/pts.0000000000000176
6. Grigg EB, Martin LD, Ross FJ, et al. Assessing the impact of the anesthesia medication template on medication errors during anesthesia. *Anesth & Analg*. 2017;124(5):1617-1625. doi:10.1213/ane.0000000000001823
7. Wahr JA, Abernathy JH, Lazarra EH, et al. Medication safety in the operating room: literature and expert-based recommendations. *Br J of Anaesth*. 2017;118(1):32-43. doi:10.1093/bja/aew379
8. Grigg EB, Roesler A. Anesthesia medication handling needs a new vision. *Anesth & Analg*. 2018;126(1):346-350. doi:10.1213/ane.0000000000002521
9. Wong C, Nicolai A, Iskander A. A solution to medication error related to the similar appearance of prefilled syringes. *APSF Newsletter*. July 2020.
10. Maximous R, Wong J, Chung F, Abrishami A. Interventions to reduce medication errors in anesthesia: a systematic review. *Can J of Anesth*. 2021;68(6):880-893. doi:10.1007/s12630-021-01959-7
11. Keers RN, Williams SD, Cooke J, Walsh T, Ashcroft DM. Impact of interventions designed to reduce medication administration errors in hospitals: a systematic review. *Drug Safety*. 2014;37(5):317-332. doi:10.1007/s40264-014-0152-0
12. O'Mathuna DP, Fineout-Overholt E. Critically appraising quantitative evidence for clinical decision making. In: Melnyk MD, Fineout-Overhold E, eds. *Evidence-Based Practice in Nursing & Healthcare: A Guide to Best Practice*. 3<sup>rd</sup> ed. Wolters Kluwer; 2015: 92-9

*Keywords:* anesthesia, medication errors, medication labeling, medication organization

Team Leader: Nancy Westbrook, DNP, CRNA, FNP-BC, COL (Ret) USAF

Team Member: Lisa Herbinger, DNP, CRNA