Learning From Others:

# A Case Report From the Anesthesia Incident Reporting System

Anesthesia Quality Institute
ANESTHESIA INCIDENT REPORTING SYSTEM (AIRS)

Review of unusual patient care experiences is a cornerstone of medical education. Each month, the AQI-AIRS Steering Committee abstracts a patient history submitted to the Anesthesia Incident Reporting System (AIRS) and authors a discussion of the safety and human factors challenges involved. Real-life case histories often include multiple clinical decisions, only some of which can be discussed in the space available. Absence of commentary should not be construed as agreement with the clinical decisions described. Feedback regarding this article can be sent by email to **airs@asahq.org**. Report incidents or download the AIRS mobile app at **www.aqiairs.org**.

## Case 2018-03: "Everything is not what it seems"

*Healthy 7-year-old child having a lower-extremity procedure. Anesthesia plan included general anesthesia with a femoral nerve block. Site was appropriately marked by the surgeon. A block time out was performed. Cephalosporin and ropivacaine were both ordered from the pharmacy and delivered in a brown bag. Block performed under ultrasound but without nerve stimulation. Anesthesia resident realized that the cephalosporin was injected instead of the local anesthetic when he was about to inject ropivacaine for SSI prophylaxis. Decided not to perform the block due to concerns about neurotoxicity from the antibiotic. Proceeded with the case with I.V. opioids. Ultimately no harm to the patient.*

This incident report highlights two different issues. The first is a syringe swap between a local anesthetic and an antibiotic and the second is a process issue regarding the block time out. The combination of the two errors resulted in this patient receiving a cephalosporin instead of the intended local anesthetic.

Medication errors continue to plague anesthetic practice for a number of reasons. A recent article highlights the results of a Failure Mode and Effects Analysis in pediatric perioperative medication administration at a tertiary care children's hospital. As a result of this analysis, the study authors targeted five specific bundled countermeasures and were able to significantly decrease the frequency of medication errors. Nanji et al. reviewed 277 operative procedures in adults with a total of 3,671 medication administrations. One hundred ninety-three (5.3 percent) administrations were classified as a medication error and/or an adverse drug event. One hundred fifty-three (80 percent) of these events were considered preventable, and of these 153 events, 64.7 percent were serious, 33.3 percent were significant and 2 percent were considered life-threatening.

A more recent publication studied medication errors as reported in the Wake Up Safe database. Wake Up Safe is the quality improvement and patient safety project of the Society for Pediatric Anesthesia. Their analysis found 276 reported medication errors during 2,316,635 anesthetics from 2010 to September of 2016. This incidence is certainly confounded by under-reporting. Opioids and sedative/hypnotic drugs were the mostly commonly involved. Nearly two-thirds of errors occurred at the time of administration, with over 80 percent of these errors reaching the patient. Of significance, 5 percent required life-sustaining interventions, and 97 percent of the errors were considered preventable in nature.

While all clinicians should read the label on every syringe, ASTM developed an internationally accepted anesthesia color coding system (ASTM Active Standard ASTM D4774) that has been in place for decades and is a powerful visual cue to quickly identify the class of the drug. Its premise is that the color coding system would help prevent drug errors between classes of drugs, which would be particularly relevant in our case. The second premise is that it is far safer in the O.R. to incorrectly administer a drug within a class of drugs than between two classes of drugs. ASA has a Statement on Creating Labels of Pharmaceuticals for Use in Anesthesiology, which identifies nine classes of commonly used drugs and a standard background color.

Unfortunately, the computer-generated labels used by many hospital pharmacies were designed to comply not with this standard, universally recognized by anesthesiologists, but rather with the standards promulgated by The Joint Commission, which are geared primarily toward ward nurses. This creates a critical safety gap by ignoring the dramatic differences in how drugs are administered in the O.R.

Errors, of course, can still occur with color-coded labels. If two drugs of the same class are prepared (e.g., fentanyl and morphine), one could easily administer the incorrect drug by reliance on the color code alone. Another potential fail point involves the placement of the label. If the label is only placed longitudinally along the barrel of the syringe, the label cannot be read if the syringe is placed with the label down. A solution would be to place the label around the barrel of the syringe. This may, however, present other issues with smaller syringes. Individuals who are color blind can also have difficulty with this system.

Some departments have implemented automatic syringe labeling systems that read the bar codes on drug vials. These devices print out appropriately colored labels that also comply

with Joint Commission requirements for identifying the preparer and the date and time that the drug was prepared. However, many hospital pharmacies do not yet use these devices when generating labels or affix bar codes to their labels. Bar-coded labels and readers, if properly and universally utilized in combination with color-coded and well-designed labels, might offer the most specific and comprehensive solution to syringe swap errors.

To combat this system deficiency, some hospitals may need to temporize until better comprehensive solutions are instituted. When all pharmacy-prepared syringe labels appear identical, the hospital pharmacy could affix an additional anesthesia color-coded label prior to dispensing the drug. This process may also be used to identify all standard perioperative infusions. Less ideally, such labels could be added to the syringe by the anesthesiologist in the O.R.

Local anesthetics required for the performance of regional anesthesia, should they be administered systemically by mistake, are among the most potentially lethal drugs prepared for the procedure. Due to this concern, it may be useful to segregate them away from other medications in the same way protamine is routinely segregated during cases requiring cardiopulmonary bypass. In April 2016, the Institute for Safe Medication Practices published an analysis titled "Key Medication Errors in the Surgical Environment." Among its many recommendations was to standardize the anesthesia workspace, especially with regard to medication placement.

Another potential preventative measure would be to distinguish the local anesthetic syringe itself from all other prepared medications. Examples of such devices include syringes with different colored plungers, commonly used by interventional radiologists. If the pharmacy is not preparing the local anesthetic, the anesthesiologist can draw up the drug immediately before its administration. This is slightly more time-consuming and may create other potential medication errors, especially should the clinician wish to combine the local anesthetic with additives such as epinephrine, clonidine or dexamethasone.

A more recent innovation is the use of unique connectors that allow only certain syringes to fit with a unique line/device. These have emerged as a result of recently adopted ISO guidelines. For example, there is now a set of connectors for use for anything administered via the enteral route known an ENFit. A similar set is available for neuraxial and other types of blocks known as NRFit. The syringes in this system have a yellow barrel and the connectors are also yellow to further aid in ensuring the correct connection. Luer lock connections are still recommended for intravenous lines. The Joint Commission published a Sentinel Event Alert in 2014 highlighting the risks of incorrect connections and some strategies on how best to manage transitions to this system.

We do not know if resident supervision contributed to the error. One can easily envision a number of ways an error could have occurred from prescription to preparation (if this was the case), to the administration of the local anesthetic. We do not know whether the attending was present during the block time out and whether there was a missed opportunity to recognize the drug error prior to the block. While there was no permanent harm to the patient, the block was not performed and it is certainly possible that the child would have had a different and potentially less painful postoperative course with the block.

The surgical time out was created to ensure that the correct procedure is being performed on the correct patient at the correct site. In much the same manner, the block time out was created to ensure that the correct block is being performed on the correct patient at the correct site. There is no standard practice, however, to check the local anesthetic syringe as part of this process. It may behoove all of us to incorporate this step after reading this incident report.

Anesthesiology is a highly medication-intense specialty. We are all familiar with the five rights of medication administration: 1) right patient, 2) right drug, 3) right dose, 4) right route and 5) right time. In this particular case, the incorrect drug was administered via the incorrect route. In the perioperative period, the overwhelming majority of medications are administered intravenously, with the notable exception of local anesthetics. It was fortunate the patient did not suffer any permanent harm, but it illustrates the need to read the syringe label prior to administration and to develop more robust processes to ensure that we always adhere to the five rights of medication administration.

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