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ACE Action Plan to Prevent Medication Errors

Medication safety in the perioperative environment is uniquely complex. Anesthesia providers operate under intense time pressure, often drawing up, labeling, administering, and documenting medications independently and in real time. While most practices are safe and reliable, the potential for medication errors—including wrong drug, dose, route, or patient—is ever-present.

This action plan, developed by our Anesthesiology department with Pharmacy input, outlines targeted, feasible strategies to improve medication safety without disrupting clinical workflow. It incorporates staff input, error trends, regulatory best practices, and human factors principles.

Purpose

The purpose of this action plan is to:

- Reduce the frequency and severity of perioperative medication errors.
- Enhance communication and collaboration between pharmacy and anesthesia services.
- Improve medication labeling, documentation, and standardization.
- Promote a culture of safety through non-punitive reporting and continuous learning.

This document provides a framework for realistic, implementable improvements tailored to high-risk medications and common perioperative workflows.

Common Root Causes of Medication Errors in the Perioperative Setting

- Look-alike labeling: Medications with similar vial or label appearance (e.g., midazolam and rocuronium) may be confused even when labeled correctly.
- Time pressure and multitasking: Anesthesia providers often manage multiple cognitive and procedural tasks under time constraints, increasing error risk.
- Lack of double checks: Unlike most clinical areas, the OR rarely mandates second-person verification, making errors less likely to be intercepted.
- Non-standard dilution practices: Variable or undocumented drug dilutions create dosing inconsistencies and potential patient harm.
- Ineffective communication: Gaps between pharmacy, anesthesia, and IT may delay or misalign safety initiatives or labeling updates.
- Underreporting of near misses: Without a trusted, anonymous system, valuable learning opportunities may be lost.

Each intervention in this action plan targets one or more of these contributing factors, with a focus on solutions that enhance safety without introducing workflow burdens.

Action Plan

1. ACE Actions
    a. Education
        i. ACE has recently started a monthly **Grands Rounds / Quality Improvement Conference**. We plan to incorporate medication errors as the primary topic **bi-annually** (every other year).
        ii. For those not present, the lecture will be available online and will be mandatory viewing.
        iii. This lecture will incorporate:
            1. Results of self-reporting (see below),
            2. Any updates from the literature regarding medication error prevention, and
            3. Results of surveys of our anesthesiologists and nurse anesthetists which includes:
                a. Questions about frequency of performed or witnessed medication errors and
                b. Suggestions for improvement.
            4. Surveys will be distributed **at least annually**.
    b. Self-reporting
        i. We plan to make available a site for anonymously self-reporting of medication errors.
            1. This will only be for near misses (e.g., identifying a rocuronium syringe attached to the luer hub but noticed prior to administration) or inconsequential errors (e.g., administering ondansetron instead of dexamethasone, however, ondansetron was also planned to be given).
            2. Any medication errors resulting in actual patient harm will still be reported via the eSafe process.
            3. Submitted reports will be reviewed and the data reported at the annual Quality Improvement Conference.
            4. This incident reporting will be modeled after the reporting system used by the Institute for Safe Medication Practices (ISMP).
    c. Medication Identification
        i. To reduce look-alike label errors:
            1. New labels will be adopted for **midazolam** to improve visible differentiation quickly.
                a. Midazolam will remain orange but with a **noticeably different shade** from paralytics.
            2. High-risk medications (e.g., **neuromuscular blocking agents**) will be **double-labeled**:
                a. One **circumferential** label around the barrel
                b. One **longitudinal** label along the back
                c. This enhances visibility in emergencies.
    d. Medication Preparation
        i. Our new policy for Medication Preparation includes:

1. Do **not** draw up medication intended for use **outside the OR** until ready for immediate administration (e.g., midazolam for pre-op anxiolysis).
2. Do **not** draw up **neuromuscular blocking agents** until:
    a. The patient is physically in the OR, and
    b. Appropriate **airway management equipment** is readily available.

2. Hospital Actions
    a. Medication Identification
        i. **Prefilled Syringes**
            1. **Prefilled medications** eliminate the possibility of syringe mislabeling at the point of care.
            2. These are especially important in **emergency or trauma cases**, where speed and accuracy are essential.
            3. Even in less urgent situations, this will facilitate implementation of the policy to leave certain high risk medications in the drawer until needed.
        ii. **Medication Label Printer**
            1. Where prefilled syringes are unavailable, a **label printer** integrated with Omnicell is the next best option:
                a. Scanning a medication automatically prints a label with required information (drug name, dose, date, initials, etc.).
                b. This can decrease mislabeling errors and also be used at time of administration to scan the medication as a built-in double check.
        iii. **Premixed Infusions**
            1. Nurse anesthetists commonly prepare vasoactive infusions.
            2. **Pharmacy-prepared premixed infusions** (e.g., norepinephrine 4 mg/250 mL = 16 mcg/mL) reduce risk of dilution error.
            3. To minimize waste, a limited supply will be stocked.
        iv. **Preprinted labels** for these commonly used dilutions should be available in all anesthesia areas, including:
            1. Drug name
            2. Total drug amount
            3. Diluent volume
            4. Final concentration
            5. Examples: Levophed (norepinephrine) 4 mg in 250 mL normal saline = 16 mcg / mL.
    b. Automatic Medication Dispensing Systems (Omnicell)
        i. To enhance safety and standardization:
            1. Medication drawer layouts will be **standardized** across all Erlanger locations used by ACE personnel.

2. Medication storage locations will be jointly reviewed by **Pharmacy and ACE** to ensure **look-alike drugs**—particularly high-risk agents—are stored:
    a. In **distinct areas within drawers**, or
3. In **separate drawers altogether**, if necessary.
4. **Allergy alerts** to be implemented when dispensing a medication (or class) that matches a documented patient allergy.

c. Two-person Identification and Confirmation
    i. For **especially high-risk medications** (e.g., **IV insulin, potassium chloride infusion**), a **two-person verification** should be implemented—similar to existing practices for blood product administration.
    ii. In the OR, the circulating RN would typically perform this second verification.

d. Time Pressure
    i. While Erlanger administration has expressed support in eliminating unsafe time pressure on anesthesia providers, we acknowledge that:
        1. **Perceived pressure**—whether real or cultural—remains a barrier to safe practice.
            a. We will report any incidents of a "pressure to hurry" to Erlanger for resolution.

e. Surgery / Procedure Location
    i. Inappropriate OR assignment — such as pediatric patients being treated in the **Adult OR** — may delay case preparation.
    ii. Staff familiar with **Children's OR** equipment and layout are essential for rapid, safe setup.
    iii. Cross-location cases increase the burden on anesthesia staff to locate supplies, reducing time for medication preparation and verification.

f. Pharmacy Huddles
    i. Monthly **Pharmacy–Anesthesia Huddles** will be held to:
        1. Discuss recent issues or medication errors
        2. Communicate upcoming **drug shortages**, concentration changes, or product substitutions
        3. Align on messaging and logistics for medication stocking and labeling.