NCPS
Nebraska Coalition for Patient Safety

NCPS Reporting Committee Summary
Quarter 1 – 2024

Could this happen in your organization?

Patient Safety Event – Medication Administration Error Due to Incorrect Stocking of Automated Dispensing Cabinet (ADC)

A patient presented to the ER with lethargy and dyspnea and required an emergent intubation. The Provider ordered 30mg of etomidate for sedation. The nurse went to the ADC to retrieve the etomidate and pulled the medication from the assigned pocket of the Pyxis.

As the nurse prepared to administer the medication, she requested the Provider double check her math calculation to verify the correct dosage. She recognized the medication gotten from the Pyxis was labeled esmolol hydrochloride 100mg and thought it must be the generic name for etomidate and so she asked the Provider if it was. The nurse went ahead and administered the esmolol. The desired results were not obtained and she administered a second dose of the esmolol. The patient was intubated shortly prior to being transferred to a hospital able to provide a higher level of care.

During a routine chart review by CRNA and Quality Coordinator, it was discovered that esmolol hydrochloride 100mg/ml – 3ml IVP had been given to the patient pre-intubation instead of the ordered etomidate 30mg IVP. An increase in the patient's BP from a systolic in the 140's pre-medication administration to 174 post administration was noted.

Additional Information Found During Event Investigation

- A Pyxis report run after the error was discovered showed that 8 weeks prior to the event a pharmacy tech had pulled two expiring etomidate vials from the Pyxis and replaced them with two vials of esmolol 100 mg/10mL (instead of the etomidate 20 mg/10mL). The most likely explanation being that when the new meds were being placed into the Pyxis the expiring etomidate vials were scanned instead of the new ones that were the replacements.
- The Nurse asked the Provider for verification of dosage and generic vs name brand of the medication at the same time the Provider was preparing for the Rapid Sequence Intubation (RSI). The Provider did not pay close attention to what was being asked regarding the medication names and has said yes they were the same med.
- Staff was in an emergency situation and did not use the RSI order sheet affixed to the airway box.
- The RSI order sheet only listed the generic names of the RSI medications.
- Nurse administering medication was inexperienced and though had received training on the RSI process and drug administration had not performed one in a "live" situation.

Contributing factors:

- Code situation
- Emergency situation
- Staff, inexperienced
- New airway process

Known immediate or proximal cause(s) of the event:

- Documentation: Only brand name of medication printed on order sheet
- Management Systems: Procedure/protocol not followed
- Medication: Wrong drug in Pyxis pocket
- Human Performance: Knowledge deficit/training insufficient
- Supplies: Similar sounding medication
- Environment: Code/Emergency situation

Categories of causal statements discovered in RCA:

- Human Factors/Training
- Rules/Policies/Procedures

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Actions to avoid future errors:

- Communication process improved
- Education/training provided
- Staffing practice/policy modified

Corrective actions included in action plan:

- Pharmacy tech educated by pharmacist about looking for differences in vial appearances
- New Pyxis stocking process which proceeds in this order:
  1. Pharmacy tech removes expiring meds from Pyxis and brings them back to Pharmacy
  2. Pharmacist reviews Pyxis replacement supply
  3. Pharmacy tech takes replacement meds to Pyxis for restocking
  4. All vials are scanned before placement in the Pyxis
- RSI order sheets revised to include both brand and generic medication names
- Nursing staff educated on use of Lexicomp emergency drug calculator
- Education plan developed for nursing and providers to attend and participate in hands on training drills on RSI and administration of RSI medications
- Education for nurse involved in this incident RE: process to utilize if unsure about giving a medication and who to contact for additional resources.
- Resource boards in Emergency Room updated with new chart on RSI medications. Chart lists brand/generic names, effect of medications on vitals, contraindications, and uses for medication.

NCPS Reporting Committee Feedback

- **What went well:**
  1. Recognition of the med error during chart review.
  2. Corrective response by pharmacy to restructure their Pyxis med restocking procedure to only allow tech to remove expired meds and the transfer of responsibility to pharmacist to restock/reload Pyxis.
  3. Follow up with education to those persons in those job titles involved in the med error (pharm tech, RN, Provider)

- **What could be better:**
  1. Time out when there is a critical question on med administration where lead provider and entire team hears and responds to a concern.
  2. Empower all members of the healthcare team to ask for help if uncomfortable with an order (TeamSTEPPS).
  3. Empower medical team to re-evaluate why an expected outcome was not achieved after med given (TeamSTEPPS).
  4. Create list of RSI meds for reference in ED or intubation cart.
  5. Verbalization of med ordered, dose to be given, then get confirmation before given, then voice when giving.

- **Reviewer Questions/Concerns:**
  1. Is provider receptive to questions by other members of the healthcare team?
  2. Was the ED team empowered to “Stop the Line” so that thoughtful consideration of the questions about whether the medication being prepared for administration was the correct medication and if the RNs dosage calculation was correct?
  3. It was mentioned that esmolol was not usually stocked in the ED (only in the OR), is it physically included in the RSI box?
  4. Are these two medications included on the look-alike, sound-like listing?
  5. What system processes/steps are in place to bring attention to high alert medications? Is the storage shelf where the med is kept in the Pharmacy stickered to bring attention to it being a high alert med?
  6. What type of systems’ checks are place to verify correct meds within their expiration dates are stocked in Automated Dispensing Cabinets, Crash Carts, or any specific clinical care boxes/kits? (e.g., airway box)

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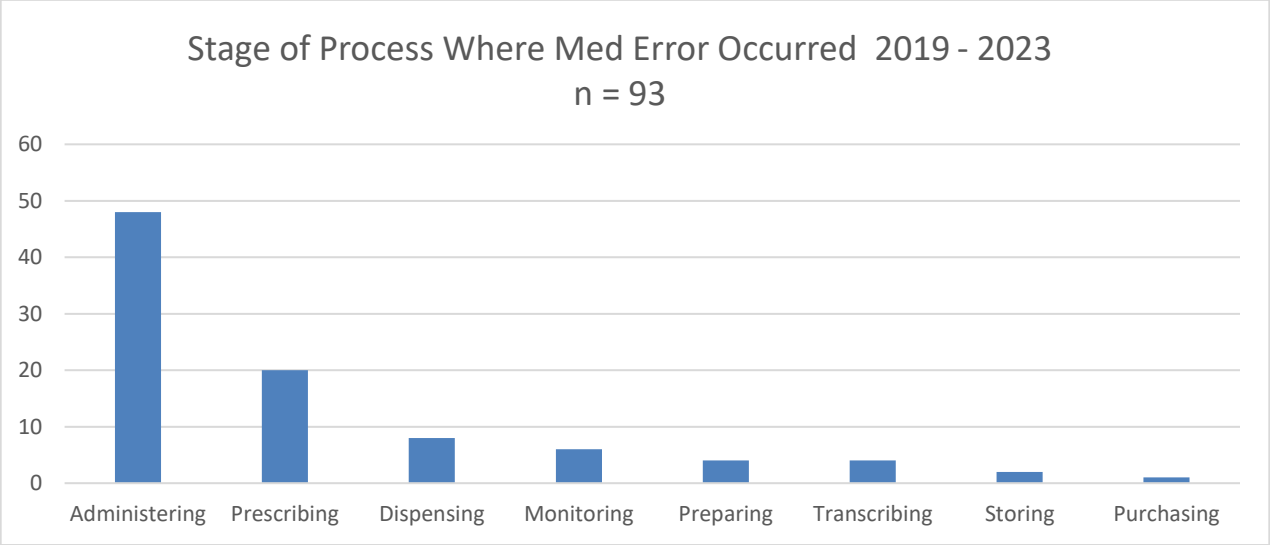
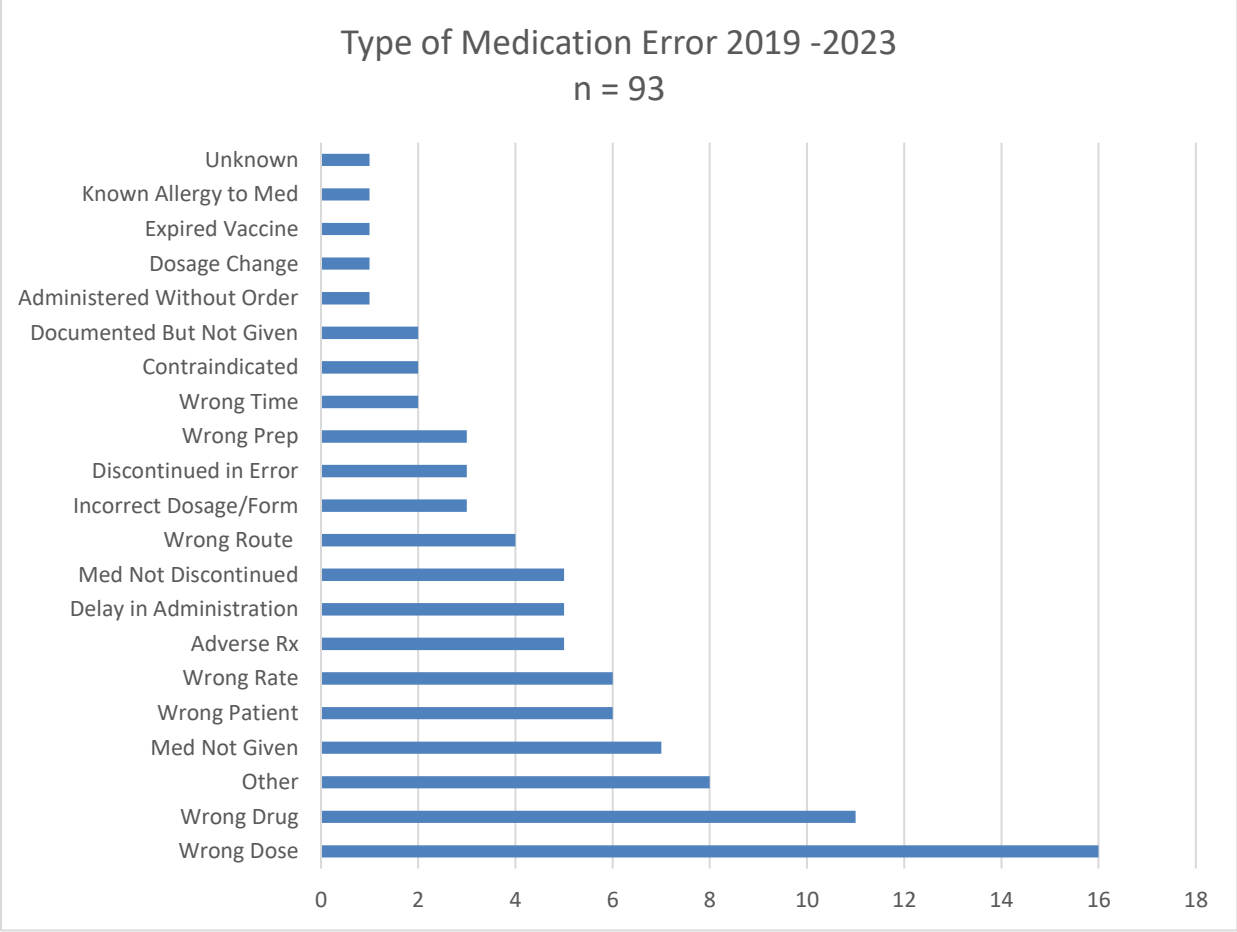
From 2019 – 2023, the greatest number of medication errors reported to NCPS occurred at the administration of the medication.



The most common error was the administration of the wrong dose of medication.



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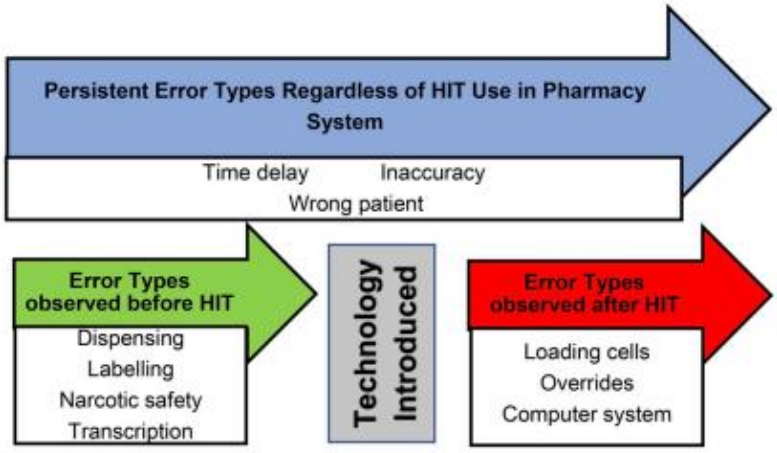
- Medication errors are defined as preventable events that lead to inappropriate medication use or patient harm, which may occur during prescription, dispensing, or administration.[1]
- Each year in the USA 7000 to 9000 people die due to medication errors; more than 7 million people are affected; and the total cost of looking after patients with medication-associated errors exceeds $40 billion. [2]
- ADCs have been shown to reduce the number of prescription errors and in one study the rate decreased from 3.03 errors per 100,000 to 1.75 errors per 100,000.[3]
- The American Society of Health-System Pharmacists' (ASHP) 2020 National Survey of pharmacy practice in hospital settings found that 74.5% of hospitals use automated dispensing cabinets (ADC) as their primary method for drug distribution.[4]
- A study to assess the specific error types before and after implementation of ADCs found that four error types were eliminated, three new error types emerged, and three error types persisted.[5]



For Automated
Dispensing Cabinets

- ASHP has a detailed guideline for the Safe Use of Automated Dispensing Cabinets which outlines needed steps in each of the following areas[6,7]:
    - Information technology infrastructure
    - Safe and secure operation (includes access control; medication stocking and dispensing; override function; return and waste of medications; emergency access; ADC placement; alerts)
    - Configuration and inventory selection (includes safe configuration considerations; inventory selection considerations)
    - Monitoring, reporting, and surveillance (includes inventory counts; discrepancy management; diversion surveillance, monitoring, and detection; medication dispense transaction reconciliation)
    - Maintenance and monitoring (includes access monitoring; maintenance and optimization)
    - Education and training
    - Perioperative ADC use (ADC settings and configurations)
    - ADC use outside the hospital
    - Switching ACD systems
    - Regulations
    - Future considerations

- ISMP lists the following items within their Guidelines for the Safe Use of Automated Dispensing Cabinets[8,9]
    - Provide Ideal Environmental Conditions for the Safe Use of ADCs
    - Establish ADC System Security
    - Provide Profiled ADCs and Monitor System Overrides
    - Select and Maintain Appropriate ADC Configuration and Functionality

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- Select and Maintain Optimal ADC Inventory
- Implement Safe ADC Stocking and Return Processes
- Display Important Patient and Drug Information
- Develop Procedures for Accurate ADC Withdrawal and Transfer to the Bedside for Administration
- Provide Staff Education and Competency Validation

- After a widely reported fatal neuromuscular medication event, ISMP renewed their call for the safe use of ADCs and issued the following guidance:

ADC Safety Features to Reduce the Risk of Errors When Removing Medications from Cabinets

▪ **Optimize profiled ADCs**	Optimize the use of profiled ADCs that allows drug selection after pharmacy verification of orders in inpatient and outpatient settings (e.g., emergency department; pre- and post-procedural locations)
▪ **Manage override lists**	Limit the variety of medications that can be removed from an ADC via override for defined urgent/emergent situations
▪ **Block staff from loading Inappropriate meds**	Activate ADC software that prevents clinically inappropriate meds from being loaded into specific cabinets without prior approval
▪ **Utilize warnings during medication removal**	Configure interactive alerts that require users to enter or select clinically relevant information (e.g., purpose for drug removal, whether the patient is ventilated [for neuromuscular blockers] prior to removal
▪ **Witness override medication removal**	Require a second individual to verify the correct patient, medication, strength, route, and indication upon override removal of a select medications or from certain ADCs; document the verification process
▪ **Allow simultaneous searching by brand and Generic name**	Configure ADCs to search simultaneously by brand and generic names. If searches are limited to either brand or generic names, educate staff how to toggle between these two functions.
▪ **Support distraction-free ADC medication removal**	Avoid distractions and talking at the ADC while searching for and removing medications.
▪ **Neuromuscular Blocker Safety Feature: Limit Access**	Strictly limit availability in ADCs to perioperative, labor and delivery, critical care, and ED settings; in these areas, store in a sealed box, rapid sequence intubation (RSI) kit, or locked-lidded ADC packets.
▪ **Neuromuscular Blocker Safety Feature: Affix warnings to ADC pockets**	Place auxiliary labels on ADC pockets/drawers/lids that clearly state, **"WARNING: CAUSES RESPIRATORY ARREST – PATIENT MUST BE VENTILATED**; the warning should be visible when ADC pockets/drawers/lids are open.

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Mitigating Risks Associated with the Use of Automated Dispensing Machines (ADC)	Yes	No	What action is needed?
Have you compared your organization's policies/procedures/practices to current best practice guidelines? When gaps have been identified, have action plans to correct those gaps been developed and then activated? ***See*** *ASHP Guidelines on the Safe Use of Automated Dispensing Cabinets*[6], *ASHP Practice Resource for Automated Dispensing Cabinet Overrides*[7], *ISMP Guidelines for the Safe Use of Automated Dispensing Cabinets*[8], *ISMP Guidelines to Safeguard the Design and Use of Automated Dispensing Cabinets*[9], and *ISMP Safety enhancements every hospital must consider in wake of another tragic neuromuscular blocker event*[10]			
When patient safety policies/procedures are not followed, do actions taken by your organization address both system problems and appropriate response to at-risk behavior in alignment with a just culture?			
Are staff able to see the impact of interventions implemented for improvement? Are success stories shared?			
Do staff readily report events and near misses? Are thorough Root Cause Analyses conducted and system issues addressed?			
Does your organization have effective disclosure policies that are used appropriately so that patients and their families are informed of unanticipated events and outcomes? *See AHRQ's CANDOR toolkit*[11]			

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Additional Resources

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