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ISMP
An ECRI Affiliate

Acute Care ISMP Medication Safety Alert!®

Educating the Healthcare Community About Safe Medication Practices

Implement strategies to prevent persistent medication errors and hazards

Reflecting on events of 2022, we have identified the top medication errors and hazards that were themes in the ***ISMP Medication Safety Alert!*** which can also be found in ***ECRI's Top 10 Patient Safety Concerns for 2023*** (www.ismp.org/ext/1128). Our selected top concerns are not solely based on the most frequently reported problems or those that have led to the most serious consequences for patients, although these factors were considered. Rather, we focused on errors and hazards that continue to occur but can be avoided or minimized with system and/or practice changes. If you have not already taken action to mitigate these risks, we believe these issues are important enough to warrant attention and priority in the coming year. Links to additional related content in our newsletters and guidelines are provided along with the descriptions below (some links require you to sign into the ISMP website for access). We hope that awareness about these important errors and hazards informs priorities in your 2023 medication safety improvement plan!

Overreliance on Holding Practitioners Accountable for the Five Rights

"The Five Rights" are broadly stated expectations set forth with the desire to achieve safe medication practices. The belief is that the five rights will ensure the **right** patient is given the **right** medication, at the **right** dose, at the **right** time, and via the **right** route. However, the five rights must be recognized for what they are, merely desired outcomes for safe medication practices. In an attempt to reach the desired outcome, some organizations require more than five rights, which still do not address system problems. Unfortunately, they are continually exploited to perpetuate the

continued on page 2 — Medication errors and hazards >

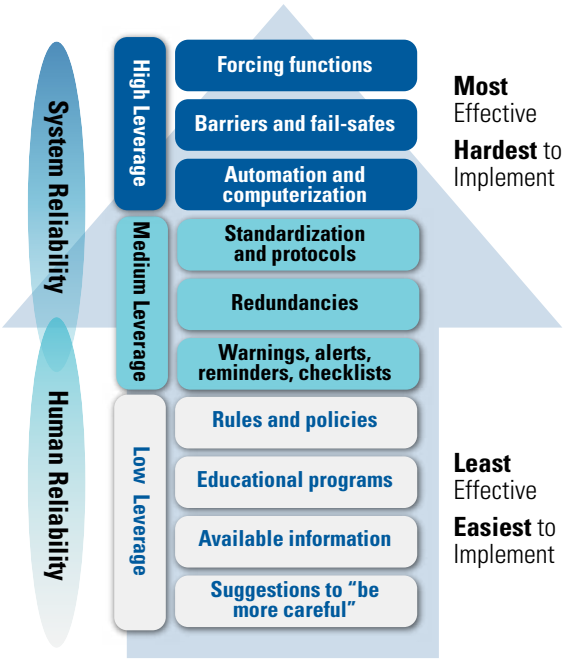

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Figure 1. *ISMP's Hierarchy of Effectiveness of Risk-Reduction Strategies.* Usually, multiple strategies are needed to build a safe system. High-leverage strategies are most effective because they can eliminate the risk of errors and associated harm by 'designing out' hazards; however, they often require complex implementation plans and resources. Medium-leverage strategies, which are easier to implement, help to reduce the likelihood of errors or minimize harm; however, they may need periodic updating and reinforcement and alone will not protect the patient 100% of the time. Low-leverage strategies, which aim to improve human performance, are easy and quick to implement; however, they are the least effective strategies for error prevention although frequently relied upon.

SAFETY briefs

BD Alaris Pump shut off and did not infuse vasopressors. ISMP and ECRI have updated an alert warning about damaged BD Alaris Inter-Unit Interface (IUI) connectors on the Alaris Pump modules that can result in medication infusions suddenly stopping (www.ismp.org/ext/1133). As we previously published in a 2017 ***Safety* brief** (www.ismp.org/node/165), damage to the IUI connectors, which attach the modules of the Alaris System together, may result in an interrupted electrical communication between a module and the PC unit (PCU) or the pump "brain." As a result, the pump modules may display a "communication error" and/or shut down with a channel disconnect alarm on the PCU. When this occurs, the infusion may stop without warning until the module(s) are restarted or replaced. Over the past few years, ECRI and ISMP have continued to receive reports involving IUI connector problems, some of which have resulted in patient harm.

A patient was receiving several intravenous (IV) infusions including norepinephrine and vasopressin through a BD Alaris infusion pump. A nurse noticed a significant decrease in the patient's blood pressure and went to adjust the norepinephrine infusion rate. When the nurse touched the channel that the norepinephrine was running through, it turned off, and so did the channel delivering the vasopressin. The patient continued to decompensate and required cardiopulmonary resuscitation (CPR). The medical team acquired new channels and restarted the norepinephrine and vasopressin infusions, but the patient expired.

During the event investigation, other nurses in the organization stated that there have been prior occasions when they received a "communication error" warning on a pump, but they had not reported the problem. In this most recent event, the pump was sequestered and sent to BD for evaluation. The company

continued on page 2 — SAFETY briefs >

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> Medication errors and hazards — continued from page 1

mistaken belief that healthcare professionals, particularly frontline nurses, can be held individually accountable for achieving those standards within the flawed healthcare delivery systems they often practice. Weaknesses associated with this erroneous guidance include the following:

- The five (six, seven, eight, nine, ten, etc.) rights (aka "rules") do not provide procedural guidance on how to achieve the desired outcome.
- Instructing a healthcare practitioner to follow the five rights is a low-leverage strategy in ***ISMP's Hierarchy of Effectiveness of Risk-Reduction Strategies*** (**Figure 1**, page 1), one that relies solely on the performance of an inherently fallible human being at the sharp end of the medication-use process.
- Many errors, including lethal errors, have occurred in situations where practitioners believed they had verified the five rights.
- The responsibility for accurate medication administration does not lie with a single individual. Rather, it lies with multiple individuals, including organizational leaders, who are responsible for the design, implementation, and maintenance of reliable systems to support safe medication use for all practitioners.
- A medication-use system that is inadequate or poorly designed to support practitioners will lead to errors.
- Human factors play a significant role in the occurrence of errors, a fact that the focus on the five rights ignores.
- Emphasizing the five rights during the review of medication errors may blind the reviewer to latent failures that exist within the system that should be the focus of the investigation.

Recommendations: The healthcare industry needs to stop perpetuating the belief and expectation that practitioners can and should be held individually accountable for the performance of medication-use systems by achieving "compliance" with the five rights. Ultimately, prevention of medication errors relies on the integrity of several complex, interrelated systems designed with high-leverage safety practices and strategies to reduce risks and limit harm, coupled with clearly defined processes and behavioral expectations. An interdisciplinary team of healthcare professionals and organizational leaders must work collaboratively to implement these systems and to coach safe behaviors in support of safe systems. These systems should also be actively managed and continually monitored, not only to measure their effectiveness, but more importantly to make changes and improvements as necessary.

Medication Errors Resulting from Inaccurate Patient Medication Lists

Lack of, or miscommunication about, prescribed and discontinued medications occurs commonly during vulnerable transition points in the continuum of care (e.g., hospital admission, transfers between care settings, discharge). If a patient's medication list is not accurate, it can result in the patient receiving an incorrect medication or dose, receiving a medication too soon or too late if the time of their last dose is inaccurate, receiving inappropriate or duplicate therapies, or the omission of a critical medication. According to the Institute for Healthcare Improvement (IHI), experience from several organizations has shown that poor communication of medical information at transition points is responsible for as many as 50% of all medication errors and up to 20% of adverse drug events in hospitals (www.ismp.org/ext/1080). This is precisely why The Joint Commission (TJC) has focused attention on reducing the risk of errors during transitions of care through the use of the medication reconciliation process (NPSG.03.06.01; www.ismp.org/ext/1081).

continued on page 3 — Medication errors and hazards >

>SAFETY briefs

cont'd from page 1

determined that the cause of the malfunction was corrosion and blue or green deposits possibly from cleaning residue left on the pins in the IUI connector.

BD recommends inspecting IUI connectors (**Figure 1**) on each device before every use and if any surface contaminants or cracks are visible, the device should be sent to clinical/biomedical engineering to replace the IUI connector. It is also important to review resources provided by BD to facilitate appropriate cleaning (www.ismp.org/ext/1121, www.ismp.org/ext/1122, www.ismp.org/ext/1123, www.ismp.org/ext/1124).

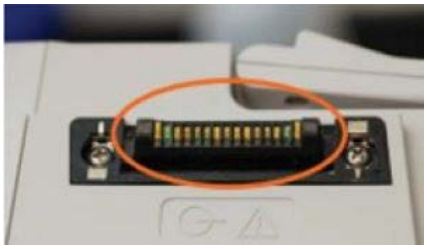

Figure 1. Inspect the IUI connectors on BD Alaris PCU and modules for contaminants, blue or green deposits, or cracks.

If your organization uses BD Alaris infusion pumps, consider the following additional recommendations:

- Share this information with practitioners (e.g., nurses, anesthesia providers, critical care staff, pharmacy, transport/emergency medical services [EMS]), clinical/biomedical engineering, and central supply staff or those who clean the pump modules.
- When connecting a pump module, ensure that it is firmly connected.
- If a PCU displays a "communication error" warning, report per the organizational policy and sequester the PCU, incident module, and all other modules attached at the time of the incident from service and notify clinical/biomedical engineering. Do not detach the modules.
- Educate central supply and those who clean pump modules to only use approved cleaning methods and chemicals as outlined by BD.

continued on page 3 — SAFETY briefs >

ECRI Institute for Safe Medication Practices PSO
Learn how ECRI and the ISMP Patient Safety Organization can assist with your patient safety efforts at: www.ecri.org/pso.

> Medication errors and hazards — continued from page 2

Recommendations: Educate staff and dedicate resources to facilitate accurate medication reconciliation. Multidisciplinary medication reconciliation teams should review current processes, identify gaps and opportunities for improvement, and lead process design and redesign within the organization by implementing the following recommendations:

Admission

- Have practitioners approach admission medication reconciliation as a three-step process:
  - ☐ **Verify.** Obtain the most accurate medication list possible (See ***ISMP Canada's Best Possible Medication History [BPMH]***; www.ismp.org/ext/1119) upon admission to the organization before the first dose of medication is administered (except in emergency or urgent situations). Incorporate prompts in the electronic health record (EHR) for staff to ask about allergies, prescription and over-the-counter medications (including herbals and dietary supplements) and non-enteral medications (e.g., patches, eye and ear drops, topical and inhaled medications, injectables and infusions). List the drug name, dose, route, frequency (including time of administration), indication, and time of the last dose. Sources of information may include visual inspection of the medications brought into the facility by the patient or family, previous medical records, the patient's pharmacy and prescriber's office, or online prescription data. Verify this information with the patient or their family/caregiver to validate an accurate list of current medications as well as the patient's compliance with their medication regimen.
  - ☐ **Clarify.** After documenting the patient's medication list in the EHR, ensure the medication and doses collected and subsequently ordered are the correct therapy for that patient, given that patient's current state of health, or seek clarification.
  - ☐ **Reconcile.** Designate a provider to compare the prescribed admission medications to those on the medication history list and resolve any discrepancies. Document any modifications made to the current therapy upon admission, with each change in the level of care, and at discharge to promote a continuum of safe medication use.

Transfer

- Each time a patient transfers from one level of care or setting to another (e.g., critical care to medical/surgical, operating room to medical/surgical), review previous medication orders alongside new and discontinued orders and the plan of care and resolve any discrepancies.

Discharge

- Prior to discharge, designate a provider to reconcile the patient's list of admission medications against the discharge orders along with the most recent medication administration record (MAR). Any differences must be resolved before discharge.
- Provide the patient with an updated medication list and communicate which medications they are to continue taking, those they should stop taking, and any new medications for them to start taking. Educate patients on each medication's indication, how they should take it, and common side effects.
- Send a complete list of the patient's medications to the next service provider when discharging the patient or transferring the patient to another level of care within the organization to another care setting outside the facility. Even if the patient is going home, send the list directly to the patient's primary care provider (PCP), if possible.

continued on page 4 — Medication errors and hazards >

>SAFETY briefs

cont'd from page 2

- Do not connect the pump modules when the device is wet (e.g., from cleaning solutions).
- Store modules individually (e.g., not connected to each other or the PCU) when not in use.
- Develop a process for clinical/biomedical engineering to inspect IUI connectors for damage (e.g., cracks or deposits) during preventive maintenance and when a problem is reported. If damage is visible in an IUI connector, biomedical engineering should replace the connector.
- Establish a replacement schedule for IUI connectors based on failure history. If the failure rate of the IUI connectors is high or increasing, contact your BD representative to discuss appropriate cleaning practices and IUI replacement.
- While IUI damage is a common reason to receive this warning, there may be additional failure modes that can cause a "communication error" to occur (e.g., inappropriate module latching, stuck latch assembly) that should be considered.

Be aware of error-prone abbreviations. Unfortunately, some US Food and Drug Administration (FDA) drug databases (www.ismp.org/ext/981) may list unsafe abbreviations and dosage units that are on the ***ISMP List of Error-Prone Abbreviations, Symbols, and Dose Designations*** (www.ismp.org/node/8) and The Joint Commission Official "Do Not Use" List (www.ismp.org/ext/983). This includes "ug" for micrograms of digoxin rather than mcg, "U" and "IU" for some insulin listings rather than spelling out units, and listing the strength without a leading zero, such as ".4 mg" of atropine rather than 0.4 mg. FDA should remove and eliminate the use of error-prone abbreviations in their drug databases since healthcare professionals use it as a drug information resource. Sadly, although rare, ISMP has received reports of serious harm and even fatalities, including in children, which resulted from misinterpretation of dangerous medical abbreviations such as these.

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> **Medication errors and hazards** — continued from page 3

- Educate patients on the importance of maintaining and carrying a complete and up-to-date medication list (www.ismp.org/ext/1118). Encourage patients to share the list during all healthcare encounters (e.g., prescriber's office, pharmacies, hospitalizations).

Accidental Administration of Neuromuscular Blocking Agents

Neuromuscular blocking agents paralyze skeletal muscles and are considered high-alert medications as they are known to cause catastrophic injuries or death when used in error. Over the last 25 years, ISMP has received more than 100 reports concerning accidental neuromuscular blocking agent administration. Inadequate labeling or unsafe storage has been a root cause of most of these errors. Since 2016, our ***Targeted Medication Safety Best Practices for Hospitals***, *Best Practice #7* (www.ismp.org/node/160), has called for organizations to segregate, sequester, and differentiate all neuromuscular blocking agents from other medications, wherever they are stored in the organization. Despite the well known risk of mix-ups, errors involving neuromuscular blocking agents continue to occur throughout the medication-use process.

Recommendations: In alignment with *Best Practice #7*, restricting access, segregating storage areas, and the use of proper warning labels can be used together as effective means of preventing mix-ups with neuromuscular blocking agents. Start by reviewing our previous publications (*Paralyzed by Mistakes - Reassess the Safety of Neuromuscular Blockers in Your Facility* [www.ismp.org/node/247], *Safety Enhancements Every Hospital Must Consider in Wake of Another Tragic Neuromuscular Blocker Event* [www.ismp.org/node/1326], and *Criminalization of Human Error and a Guilty Verdict: A Travesty of Justice that Threatens Patient Safety* [www.ismp.org/node/30908]) to reassess risk in your organization and implement the following safeguards:

- Eliminate the storage of neuromuscular blocking agents in areas of your organization where they are not routinely needed.
- Segregate neuromuscular blocking agents from all other medications in the pharmacy by placing them in separate lidded containers in the refrigerator or other secure, isolated storage areas.
- Limit availability in automated dispensing cabinets (ADCs) to areas where they are needed such as perioperative, labor and delivery, critical care, and emergency department (ED) settings; in these areas, store them in a rapid sequence intubation (RSI) kit, or locked-lidded ADC pockets/drawers.
- Place auxiliary labels on all storage bins (both refrigerated and non-refrigerated) and/or ADC pockets and drawers that contain neuromuscular blocking agents. Also, label all final medication containers (e.g., syringes, intravenous [IV] bags) that state: "**WARNING: CAUSES RESPIRATORY ARREST – PATIENT MUST BE VENTILATED**" or "**WARNING: PARALYZING AGENT – CAUSES RESPIRATORY ARREST**" or "**WARNING: CAUSES RESPIRATORY PARALYSIS – PATIENT MUST BE VENTILATED**" to clearly communicate that respiratory paralysis will occur and ventilation support is required.
- Configure interactive ADC alerts that require users to enter or select clinically relevant information (e.g., the purpose for removing the drug [a code situation], whether the patient is ventilated) prior to removal.
- Implement pharmacy IV workflow management systems and require barcode scanning of each ingredient for positive identification before it is introduced in the compounding process. These systems should not only be used for high-alert medications (e.g., neuromuscular blocking agent infusions) but for all medications, as sometimes high-alert medications are inadvertently selected instead of a non-high-alert medication during the compounding process.

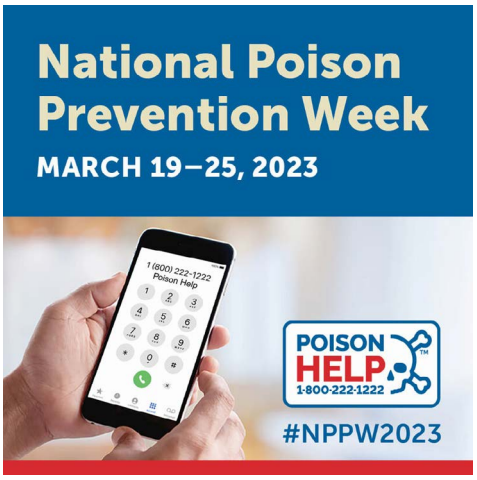
Special Announcements

Become an ISMP Fellow

Time is running out! Applications for our unique fellowship program will be accepted until **March 31, 2023**. The program will begin in the summer. For a brief description about the Fellowship and directions for submitting an application, please visit: www.ismp.org/node/871.

Virtual MSI workshops

Register for our unique 2-day, virtual ***ISMP Medication Safety Intensive (MSI)*** workshop scheduled for **April 13-14, 2023**. More dates are scheduled throughout the year. For details about the program and additional dates in 2023, please visit: www.ismp.org/node/127. Spaces fill up quickly, so reserve your seat today!



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