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ISMP An ECRI Affiliate

Acute Care
ISMP Medication Safety Alert!®
Educating the Healthcare Community About Safe Medication Practices

Start the year off right by preventing these *Top 10 Medication Errors and Hazards* from 2020

The end of 2020 marked an important milestone for ISMP as we celebrated 25 years of publishing this newsletter, the *ISMP Medication Safety Alert!* Acute Care, every 2 weeks. Your willingness to voluntarily report medication errors and hazards to ISMP, and to proactively use the information we publish in the newsletter to prevent similar errors and hazards, motivates and inspires us as, together, we continue to learn about the causes of medication errors and how to prevent them.

Reflecting on our most recent year of newsletter publication, ISMP has identified the ***Top 10 Medication Errors and Hazards*** (**Table 1**) that appeared in the *ISMP Medication Safety Alert!* during *2020*. The list is not based only on the most frequently reported problems or those that have caused the most serious consequences to patients, although these factors were considered. Instead, we identified errors and hazards that have been persistent and can be avoided or minimized with system and practice changes. We know it has been an extremely challenging year for healthcare providers given the current coronavirus disease 2019 (COVID-19) pandemic. Two of the ***Top 10 Medication Errors and Hazards*** are closely associated with the pandemic—errors with the COVID-19 vaccines and hazards associated with positioning infusion pumps outside of COVID-19 patients' rooms. In addition to the two pandemic-related hazards, we believe the other eight issues warrant attention and priority in the coming year.

1 Prescribing, dispensing, and administering extended-release (ER) opioids to opioid-naïve patients

Inappropriate prescribing of ER opioids to opioid-naïve patients has resulted in serious harm and death. ISMP, as well as the US Food and Drug Administration (FDA), have warned practitioners about this well known problem for decades. However, inappropriate opioid prescribing continues to occur, often due to a knowledge deficit about the dangers

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Table 1. ***Top 10 Medication Errors and Hazards*** **from 2020**

1	Prescribing, dispensing, and administering extended-release (ER) opioids to opioid-naïve patients
2	Not using smart infusion pumps with dose error-reduction systems (DERS) in perioperative settings
3	Errors with oxytocin
4	Hazards associated with positioning infusion pumps outside of COVID-19 patients' rooms
5	Errors with the COVID-19 vaccines
6	Use of the retrospective, proxy "syringe pull-back" method of verification during pharmacy sterile compounding
7	Combining or manipulating commercially available sterile products outside the pharmacy
8	Medication loss in the tubing when administering small-volume infusions via a primary administration set
9	Wrong route (intraspinal injection) errors with tranexamic acid
10	Use of error-prone abbreviations, symbols, or dose designations

SAFETY briefs

Assuring proper mixing of mycophenolate suspension. A hospital pharmacy reported a couple of recent events in which mycophenolate mofetil oral suspension (**CELLCEPT**) had not been properly reconstituted and/or shaken prior to withdrawing doses. Mycophenolate is an immunosuppressant that is used with other immunosuppressants for patients who have had solid organ transplants. After reconstitution, it is a thick white suspension, which is supplied by the manufacturer in an opaque white bottle, making it difficult to know if the suspension has been mixed properly.

In one case, staff did not shake the manufacturer's bottle well after reconstitution, as evidenced by granular powder found at the bottom of the bottle when the final few doses were drawn into ENFit-compatible syringes. In a second case, sludge appeared at the bottom of the bottle, indicating that the bottle was *perhaps* reconstituted correctly but then sat for a few days and settled. Once the pharmacy staff were ready to use that bottle, they did not shake

Figure 1. Amber bottle prepared by pharmacy with reconstitution instructions, which will later hold mycophenolate mofetil oral suspension.

it well enough before withdrawing doses. Failure to properly shake the suspension could result in an underdose from the first doses withdrawn from the bottle, or an

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associated with prescribing ER opioids to opioid-naïve patients and/or not understanding the difference between opioid-naïve and opioid-tolerant. For example, in 2020, ISMP published several new reports related to prescribing fenta**NYL** patches to opioid-naïve, elderly patients, sometimes to treat acute pain or due to a codeine "allergy" that was a minor drug intolerance (www.ismp.org/node/18707). Fenta**NYL** patches should only be prescribed to opioid-tolerant patients for the management of pain severe enough to require daily, around-the-clock, long-term opioid treatment. This is so critical to safety that, in 2018, ISMP called for the elimination of prescribing fenta**NYL** patches to opioid-naïve patients and/or patients with acute pain in our ***Targeted Medication Safety Best Practices for Hospitals*** (www.ismp.org/node/160). In 2020, this Best Practice was incorporated into a new Best Practice to verify and document the patient's opioid status (naïve vs. tolerant) and type of pain (acute vs. chronic) before prescribing and dispensing ER opioids.

To do this, ISMP first recommends establishing definitions for opioid-naïve and opioid-tolerant patients (for example, following the fenta**NYL** package insert definitions), and then developing and implementing a standard process for gathering and documenting each patient's opioid status and type of pain (if pain is present). Order entry systems should default to the lowest initial starting dose and frequency when initiating orders for ER opioids, and interactive alerts should be built to confirm opioid tolerance when prescribing and dispensing ER opioids. Distinguish between true allergies and drug intolerances when collecting allergy information. Eliminate the storage of fenta**NYL** patches in automated dispensing cabinets (ADCs) or as unit stock in clinical locations where primarily acute pain is treated (e.g., in the emergency department [ED], operating room, post-anesthesia care unit, procedural areas). Our 2020 survey showed low compliance with many of these recommendations (www.ismp.org/node/19371).

2 Not using smart infusion pumps with dose error-reduction systems (DERS) in perioperative settings

Our updated (2020) ***Guidelines for Optimizing Safe Implementation and Use of Smart Infusion Pumps*** (www.ismp.org/node/972) recommend the use of smart pumps with DERS throughout the organization, including in perioperative settings, for all infusions (including hydrating solutions) and bolus/loading doses. However, use of smart pumps with DERS by anesthesia providers in perioperative settings is limited due to barriers and unique challenges (www.ismp.org/node/14839, www.ismp.org/node/17650). One common barrier to optimal use of smart pumps with DERS in perioperative settings is that there may not be a clear expectation from leadership for anesthesia providers to use smart pumps with DERS. Many anesthesia providers do not understand the capabilities of smart pumps, including loading/bolus dose capabilities. Anesthesia providers may also feel that the soft and hard dose/infusion limits set in the pump are unacceptable, often because they have not been included when building the anesthesia/perioperative drug library. In many organizations, smart pumps are used in the operating room using an "anesthesia mode" setting. However, the organization may fail to understand that, in some pumps, "anesthesia mode" settings reduce all hard stops to soft stops, thereby allowing easy overrides of dosing/concentration limits that should never be bypassed.

Leadership must clearly establish that the use of smart pumps with an engaged DERS is expected in perioperative settings for all infusions and loading/bolus doses (except when the hydrating solution rate is greater than the pump allows). Involve anesthesia providers when building the smart pump library. When possible, implement upper and lower hard limits for medication doses, concentrations, infusion rates, and loading/bolus doses, and restrict the use of pumps in "anesthesia mode" if it affects individualization of infusion limits. Require anesthesia providers to use the bolus feature (if available) with hard limits for catastrophic doses, and do not allow the delivery of bolus doses by increasing the rate of the infusion. Hands-on education about how to use smart pumps with DERS, including the bolus dose feature, along with competency assessments should be implemented for

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overdose from the last doses withdrawn from the bottle. Also, it appears that there may not be enough residual air inside the bottle to disperse it well once the suspension has settled.

The pharmacy where these events occurred standardized its mycophenolate reconstitution process to ensure the product is properly dispensed. The drug name, instructions for reconstitution, and the final concentration (200 mg/mL) are printed on a label and placed on an empty amber 240 mL bottle that will accommodate the volume of the reconstituted product (175 mL) (**Figure 1**, page 1). The 240 mL bottle allows more room for shaking the contents. The empty bottle is kept in a ziplock bag marked, "Caution: Hazardous Drug." After reconstituting the powder in the manufacturer's bottle per the instructions on the amber bottle label, the contents are then transferred to the amber bottle. This allows the suspension to be better visualized, and staff can inspect the bottom of the manufacturer's bottle to make sure no powder clumps have formed. Finally, the amber bottle containing the reconstituted suspension is labeled with the date prepared, the expiration date, and the initials of the person preparing and checking the final product. A "shake well" label is also added. The bottle is then used to prepare unit doses in ENFit-compatible syringes. Mycophenolate meets the National Institute for Occupational Safety and Health (NIOSH) criteria as a hazardous drug and is known to cause teratogenic effects in humans. Therefore, appropriate personal protective equipment and engineering controls are needed when handling this product.

More on preparation errors with Pfizer-BioNTech COVID-19 vaccine. The ISMP National Vaccine Errors Reporting Program (VERP) continues to receive reports of errors occurring during preparation of the Pfizer-BioNTech coronavirus disease 2019 (COVID-19) vaccine. Unlike the Moderna vaccine, the Pfizer-BioNTech vaccine must be diluted prior to use. After thawing, the multiple-dose vial contains 0.45 mL of concentrated vaccine that requires further dilution using 1.8 mL of preservative-free 0.9% sodium chloride injection. After dilution, each vial contains 6 (or even 7) doses when using low dead-volume syringes/needles

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Urgent: Extremely hazardous packaging error involving certain cisatracurium products from Meitheal Pharmaceuticals!
For details, visit: https://ismp.org/alerts/hazardous-packaging-error.

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all anesthesia providers. Organizations are encouraged to analyze pump data to understand any barriers to the effective use of smart pumps with DERS in the perioperative setting.

3 Errors with oxytocin

In 2020, ISMP conducted an analysis of oxytocin errors (www.ismp.org/node/14240), many of which caused hyperstimulation of the uterus, which can result in fetal distress, uterine rupture, or an emergency cesarean section. Sadly, a few maternal, fetal, and neonatal deaths have been reported. More than one-third of the reported errors were associated with look-alike vials and label confusion. For example, generic oxytocin and brand **PITOCIN** vials look similar to ondansetron vials from various manufacturers, which all have green caps. Several recent 10-fold dosing errors were caused by label confusion with 1, 10, and 30 mL oxytocin vials (Fresenius Kabi). The labels prominently display "10 USP units/mL," with the total volume in the vial at the bottom of the label, causing staff to think there were only 10 units total in each vial. A few prescribing errors were caused by selection of the wrong drug on order entry screens when searching using only the first few letters of a drug name (e.g., "OXY10" for oxytocin vs. oxy**CODONE**; "PIT" for Pitocin vs. **PITRESSIN** [discontinued brand of vasopressin]). Occasionally, verbal orders for "Pitressin" were misheard as Pitocin and dispensed, or vice versa. Administration errors were often related to incomplete or omitted labels on nurse-prepared oxytocin solutions, which often led to infusion bag swaps. Numerous errors were reported in which an oxytocin bag was mixed up with either a hydrating fluid or magnesium infusion.

To prevent oxytocin errors, require prescribers to use at least five letters of a drug name when searching electronic systems. Avoid nurse-prepared oxytocin infusions and instead have pharmacy dispense oxytocin in ready-to-administer, labeled bags in standardized concentrations. Ensure oxytocin vial (and premixed infusion) labels are clear regarding the amount of drug per total volume. Employ barcode scanning technology when stocking ADCs and when preparing and administering infusions. Infuse all oxytocin solutions through a smart infusion pump with an engaged DERS. Immediately discard discontinued oxytocin infusion bags.

4 Hazards associated with positioning infusion pumps outside of COVID-19 patients' rooms

During the COVID-19 pandemic, some hospitals have positioned infusion pumps outside of COVID-19 patients' rooms to conserve personal protective equipment (PPE), reduce staff exposure, and enhance the ability to hear and respond to pump alarms in a timely manner (www.ismp.org/node/15327). This has been accomplished through the use of extension sets. The length and inner diameter of the long extension tubing can impact the volume of fluid needed for priming, flow rates, and the time medications and solutions take to reach a patient. Inadvertent bolus doses of medication remaining in the extension set might be administered to a patient when flushing the long tubing. Occlusion alarms may be delayed at low flow rates or become excessive at high flow rates. The long extension tubing (and electrical cords) may pose a tripping hazard and become tangled and disconnected. Barcode scanning of the patient and drug may be more challenging, and certain components of an independent double check may become difficult or impossible in some situations.

While recognizing that this is not ideal, hospitals must weigh the risk vs. benefit of positioning infusion pumps outside of COVID-19 patients' rooms. If a decision has been made to locate pumps outside of rooms, planning and periodic reassessment of the process is a must. A special report from ECRI (www.ismp.org/ext/400) can help guide the selection and use of long extension sets for this purpose and includes other factors (e.g., fluid viscosity) that should be considered. Conduct periodic infusion pump rounds in the hallway to verify the accuracy of the fluids and medications infusing as well as the

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to extract the 0.3 mL (30 mcg) dose. In our January 14, 2021 issue (www.ismp.org/node/22009), we described instances where the Pfizer-BioNTech COVID-19 vaccine had been improperly diluted with too little diluent, or no diluent at all. More recently, though, reports have reached us where air has been used accidentally as the "diluent" for the Pfizer-BioNTech COVID-19 vaccine.

These errors have happened in mass vaccination clinics where more than one person is often involved with the vaccine preparation and administration process. In these clinics, practitioners sometimes open the syringe packages and draw the syringe plunger back to the appropriate amount of diluent (1.8 mL) or vaccine (0.3 mL) that will need to be withdrawn from the vial, leaving only air in the syringe. Injecting air into the vial in the same amount as the volume being removed from the vial equalizes the pressure and allows the desired amount of diluent or vaccine to be withdrawn.

In one case, pharmacy staff were diluting the Pfizer-BioNTech vaccine vials, and nurses were drawing up the doses. In the process of labeling what was thought to be vaccine, it was noticed that several of the syringes contained only air and no vaccine. It was discovered that one of the nurses was unpackaging 1 mL syringes, pulling back 0.3 mL of air as described above, then putting the syringes back down with the caps on. She was later going to draw up vaccine doses with these syringes that she previously filled with air. However, others nearby thought these syringes were already filled with 0.3 mL doses of the vaccine, so they moved them to the labeling section of the table. Fortunately, the pharmacist noticed empty syringes where the vaccine was supposed to be and corrected the problem. This was experienced twice at the same facility on separate days.

At another public health immunization clinic, a healthcare worker drew up 1.8 mL of "diluent" to inject into a Pfizer-BioNTech vaccine vial. The vaccine was "mixed," and the first dose of 0.3 mL was drawn into a syringe and given. However, when the second dose was withdrawn from the vial, there was not enough vaccine remaining

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pump settings. Also, check that the tubing is not disconnected or a tripping hazard. Develop a temporary process that allows some components of barcode scanning and/or independent double checks to occur prior to medication administration. For example, because nurses cannot scan the barcode on the patient's identification band, some hospitals affix the patient's name, birthdate, and a barcode to the pump or intravenous (IV) pole located outside the room. At the end of the pandemic or when pumps are no longer located in hallways, please discontinue temporary identification measures and have staff return to the verification processes in place prior to the pandemic.

5 Errors with the COVID-19 vaccines

Findings from the analysis of recent influenza (flu) vaccine errors can be used to prevent errors during the COVID-19 vaccine campaigns that started in December 2020 (www.ismp.org/node/21356). Common contributing factors associated with flu vaccine errors that could also be a risk factor for COVID-19 vaccinations include: look-alike vaccine names, labels, and packaging; unsegregated refrigerator/freezer storage; mixing/dilution errors; communication barriers with patients; not checking/documenting administration in the immunization information system (IIS); temperature excursions; and the inability to use technologies such as barcode scanning during mass immunizations.

We also reviewed early COVID-19 vaccine errors voluntarily reported to ISMP since mid-December 2020 (www.ismp.org/node/22009). Numerous dilution errors with the Pfizer-BioNTech vaccine have led to overdoses when too little diluent was used, often 1 mL instead of 1.8 mL. In one case, patients received the entire vial contents without dilution. In a clinic, patients received intramuscular (IM) injections of Regeneron's casirivimab (monoclonal antibody) instead of the Moderna vaccine due to vague labeling of the monoclonal antibody, which included a product code name, not the established name. Wasted vaccines from inefficient scheduling or "no shows" were reported, as was administration of the vaccine to patients younger than indicated. A few allergic reactions were reported. (Also see the ***SAFETY*** **brief** [starting on page 2] on COVID-19 vaccine errors.)

When planning COVID-19 vaccine campaigns, be sure vaccination sites have enough space to assess patients before vaccination, observe them after vaccination, and treat patients who experience a reaction, all while maintaining social distancing and other pandemic measures. Provide vaccinators with a *Fact Sheet* for the vaccine(s) being used, and verify their competency regarding vaccine storage and preparation, patient assessment, identification of the proper vaccine injection site (www.ismp.org/node/21977), administration, and emergency treatment of anaphylaxis. Ensure the vaccine scheduling process includes a reliable system to confirm appointments. Also establish a standard process for dealing with leftover doses at the end of the day. If feasible within the timeframe for vaccine stability, have the pharmacy verify the number of vaccines needed each day and dispense predrawn, labeled syringes of the vaccine. Use low dead-volume syringes/needles to withdraw as many doses as possible from the vaccine vials. At all vaccination sites, be prepared to immediately treat an allergic reaction.

6 Use of the retrospective, proxy "syringe pull-back" method of verification during pharmacy sterile compounding

In our 2020 survey on pharmacy sterile compounding systems and practices, only half of the respondents reported it is always easy to identify with certainty which drugs, diluents, and volumes were used when verifying the preparation of compounded sterile preparations (CSPs) (www.ismp.org/node/21042). Respondents with the lowest confidence in the verification process cited weaknesses in the outdated, post-production proxy "syringe pull-back" method of verification. Using this method, an ingredient is injected from the syringe into the final container, and then the plunger is pulled back to the amount on the syringe that was injected. It is this "pulled-back" syringe that is checked to determine the accuracy of the amount injected. Errors may not be detected if the syringe does not

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in the vial to prepare a 0.3 mL dose. It was determined that 1.8 mL of air had been injected into the vial, but no actual diluent. The patient who received the first dose from the vial received undiluted vaccine. Investigation of the event revealed that unpackaged syringes drawn up with air for use with the diluent vials had been used as if they contained the diluent.

Whenever possible, a pharmacy should prepare and label vaccine doses for mass vaccination programs ahead of time after verification of the number of confirmed appointments or anticipated patients. Do not pre-open syringe packages to draw up air in advance. This risky practice is error-prone and may contribute to possible contamination of the vaccine. Instead, be sure practitioners completely prepare one vial at a time.

USP COVID-19 vaccine toolkit. USP has published a free ***COVID-19 Vaccine Handling Toolkit*** (www.ismp.org/ext/634). The organization recently convened national experts, stakeholders, members of various USP expert committees, and representatives of the US Food and Drug Administration (FDA) and the Centers for Disease Control and Prevention (CDC), to identify and address operational efficiency gaps to help increase COVID-19 vaccinations. ISMP was also a participating organization. The toolkit will be updated as new information and new vaccines become available. The toolkit will eventually include operational strategies in three key areas: preparation and labeling; storage, handling, and transport; and waste and disposal.

Additional COVID-19 resources. As previously announced, ISMP maintains a public service webpage that provides **FREE** access to our published articles on coronavirus disease 2019 (COVID-19) topics, including articles on reported safety issues with COVID-19 vaccines as well as other important resources. A link to the material can be found on our homepage or by going to: www.ismp.org/node/15295. In addition, our ECRI affiliate also has extensive **FREE** COVID-19 resources available on its website at: www.ismp.org/ext/633. ISMP and ECRI hope your healthcare team finds this information useful.

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reflect the actual amount added or if the syringe is not partnered with the correct container. ISMP has received multiple reports of harmful or fatal errors, mostly preparing the wrong concentration/strength or using the wrong product/diluent, that were specifically related to a failed verification system using the "syringe pull-back" method.

In 2016, our ***Targeted Medication Safety Best Practices for Hospitals*** (www.ismp.org/node/160) introduced a recommendation to perform an independent verification to ensure that the proper ingredients and volumes have been prepared prior to their addition to the final container. Specifically, the Best Practice calls for the elimination of proxy methods of verifying the CSP ingredients, including the "syringe pull-back" method. Instead, the Best Practice recommends the use of technology to assist in the verification process (e.g., barcode scanning, gravimetric verification, robotics, IV workflow software) to prevent errors that would not be detected with the "syringe pull-back" method. In 2020, ISMP broadened the scope of this Best Practice to all CSPs by removing a minimum requirement to perform a prior independent verification for high-alert medications and CSPs for high-risk patients and high-risk and routes of administration. Today, we urge organizations to eliminate the "syringe pull-back" method of verification and to conduct an independent verification of all CSP ingredients prior to their addition to the final container.

7 Combining or manipulating commercially available sterile products outside the pharmacy

Our recent 2020 survey on admixture outside the pharmacy showed that this error-prone practice happens often during emergency situations, mostly without formal training, and that there are significant procedural deviations and challenges associated with the practice that contribute to risk (www.ismp.org/node/21184). Survey respondents told us that IV push medications, IV intermittent infusions, IM injections, and IV continuous infusions were the most frequent sterile injectables prepared outside of the pharmacy, primarily by nurses, anesthesia providers, and physicians. Nearly half of the respondents told us they have not been formally trained for this complex task. The biggest concerns expressed by respondents were lack of space, rushing through the preparation process, labeling issues, mixing by memory, interruptions and distractions, and concerns about sterility and accuracy. Nearly one-third of the respondents were aware of associated errors in the past year, particularly preparation errors.

Use the results of this survey to prompt internal discussions about the need to limit the preparation of admixtures outside the pharmacy as much as possible and how to increase the use of pharmacy- and manufacturer-prepared, ready-to-use products. If your organization did not participate in this survey, you can download it at www.ismp.org/ext/595, conduct it internally, and review the results to pinpoint your vulnerabilities and establish a plan for improvement. Your goal for 2021 should be to significantly reduce the need and frequency of admixture outside the pharmacy.

8 Medication loss in the tubing when administering small-volume infusions via a primary administration set

When a patient has a vascular access device (e.g., saline lock) without a continuously infusing, compatible primary solution, small-volume intermittent infusions (50 to 100 mL) are often administered using a longer primary administration set (via pump or gravity) connected directly to the patient's vascular access device. This may lead to significant underdosing because the residual volume remaining in the primary administration set may not be administered to the patient. Primary administration sets hold various amounts of residual volume in the tubing (e.g., BD Alaris pump infusion set holds about 25 mL). In one health system, about 360,000 small-volume infusions annually were likely being administered to patients at lower doses than prescribed using primary administration sets (www.ismp.org/node/21598), which could have a clinical impact on patient outcomes.

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Meet our 2020-2021 Fellows

Merissa Andersen, PharmD, MPH

Merissa is the **2020-2021 International Medication Safety Management Fellow**, supported by Baxter International, Inc. She completed her Doctor of Pharmacy and Master of Public Health degrees at the Massachusetts College of Pharmacy and Health Sciences (MCPHS) University in Boston, MA. Merissa completed a PGY-1 pharmacy practice residency at Mount Auburn Hospital, Cambridge, MA, where she developed an interest in medication safety and global health issues.

Damon Birkemeier, PharmD

Damon is the **2020-2021 FDA/ISMP Safe Medication Management Fellow**. He completed his Doctor of Pharmacy degree at the University of Toledo, Toledo, OH, and completed a PGY-1 pharmacy practice residency at Mercy Health St. Rita's Medical Center, Lima, OH. Damon's interest in medication safety emerged during his residency where he served on the local medication safety committee.

Bennet Ninan, PharmD

Bennet is the **2020-2021 ISMP Safe Medication Management Fellow**, supported by Baxter International Inc. He received his Doctor of Pharmacy degree from Temple University, Philadelphia, PA, and most recently practiced as a clinical pharmacist at Rothman Orthopaedic Specialty Hospital in Philadelphia, PA. Bennet developed a passion for medication safety while serving on his hospital's Pharmacy & Therapeutics Committee (P&T).

Jill Paslier, PharmD, CSP

Jill is the **2020-2021 International Medication Safety Management Fellow**, supported by Novartis, Name Creation & Regulatory Strategy. She completed her Doctor of Pharmacy degree at the University of Minnesota College of Pharmacy in Minneapolis, MN. Prior to the Fellowship, Jill spent several years developing clinical services for a new specialty pharmacy with Banner Health near Phoenix, AZ. During this time, she developed an interest and aptitude for patient and medication safety initiatives as she established and chaired a pharmacy Quality Council.

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To reduce the risk of lost medication in the tubing of primary administration sets, administer small-volume intermittent infusions using a shorter secondary set. It is also important to embed an appropriate carrier fluid in order sets so they will be prescribed along with the small-volume intermittent infusions, if needed. A carrier fluid is a small bag (50 to 250 mL) of compatible fluid that is used as a primary infusion to allow administration of the intermittent infusion via a secondary administration set. After the intermittent infusion is complete, the carrier fluid is infused to flush residual drug from the tubing.

9 Wrong route (intraspinal injection) errors with tranexamic acid

ISMP continues to receive reports involving the accidental intraspinal injection of tranexamic acid instead of a local anesthetic intended for epidural or spinal anesthesia. Bupivacaine, ropivacaine, and tranexamic acid are sometimes packaged in vials with the same blue color cap. When the vials are standing upright in storage, practitioners have picked up a vial based on cap color and not noticed it was the wrong vial. Wrong route errors with tranexamic acid is the only error type repeated from our 2019 list of ***Top 10 Medication Errors and Hazards***, and it is the only danger that rose to the level of activating the ***National Alert Network*** during 2020 (www.ismp.org/node/20154). Last month, FDA announced that it will be revising the tranexamic acid labeling to highlight the IV route of administration and strengthen the warnings to include the risk of wrong route errors (www.ismp.org/ext/610). Accidental intraspinal injection of tranexamic acid results in severe patient harm, with a mortality rate of 50%.

We urge practitioners to purchase these products from different manufacturers to help differentiate their appearance and/or consider alternate preparations (e.g., premixed bag, pharmacy-prepared syringes or infusions). Avoid upright storage of the vials so the labels are always visible. Store tranexamic acid vials away from other look-alike vials and add an auxiliary label to vials to highlight the IV route of administration. When possible, employ barcode scanning prior to dispensing and administration. Exela Pharma Sciences manufactures a premixed bag of 1 g/100 mL of tranexamic acid, which should be used when appropriate, or have the pharmacy prepare minibags to reduce the risk of mix-ups. Transition to NRFit syringes and connectors for local anesthetics to prevent misconnections with drugs intended for IV use.

10 Use of error-prone abbreviations, symbols, or dose designations

Abbreviations, symbols, and certain dose designations are a convenience, a time saver, a means of fitting a word, phrase, or dose into a restricted space, and a way to avoid misspellings. However, they are sometimes misunderstood, misread, or misinterpreted, occasionally resulting in patient harm (www.ismp.org/node/14101). ISMP has repeatedly published errors resulting from misinterpretation of error-prone abbreviations, symbols, and dose expressions, particularly those associated with doses/measurement units, routes of administration, drug name abbreviations, and apothecary/household abbreviations.

By the end of next week, we plan to post the 2021 updated ***ISMP List of Error-Prone Abbreviations, Symbols, and Dose Designations*** (www.ismp.org/node/8). Our updated list includes abbreviations, symbols, and dose designations that were reported to ISMP and have been frequently misinterpreted and involved in harmful or potentially harmful errors. They should **NEVER** be used when communicating medical information verbally, electronically, and/or in handwritten applications. In 2021, we encourage organizations to review our updated list and to use it to create or update your organization's "Do Not Use" abbreviation list. Error-prone abbreviations, symbols, and dose designations that are included on The Joint Commission's "Do Not Use" list (Information Management standard IM.02.02.01) are highlighted in the ISMP list, as are the error-prone abbreviations, symbols, and dose designations that are relevant mostly in handwritten communications.

Special Announcements

FREE ISMP webinar

Join us on **February 24, 2021**, for a **FREE** webinar, ***Call to Action: Experience in Adopting the ENFit System to Guard Against Accidental Tubing Misconnections***, which is supported by Avanos. Our presenters will discuss wrong route errors that brought about the re-engineered design standard and development of ENFit devices, the patient safety benefits of transitioning to ENFit, and the lessons learned after successful transition to ENFit. Pharmacy staff can earn 1 hour of continuing education credit. For details and to register, visit: www.ismp.org/node/22062.

Healthcare Safety Challenge

The **Healthcare Safety Challenge**, a project sponsored by the Jewish Healthcare Foundation in Pittsburgh, PA, is looking for innovative ideas to improve outcomes and save time, money, and lives. The project is awarding over $60,000 in cash prizes to the most exciting patient/healthcare safety solutions! Applications are open until **March 7, 2021**. Individuals, including researchers and clinicians, as well as startups, are eligible to apply. Learn more at: www.ismp.org/ext/632.

Become an ISMP Fellow

ISMP is now accepting applications for three unique Fellowship programs that will begin in the summer/fall of 2021. For details and to apply, visit: www.ismp.org/node/871.

To subscribe: www.ismp.org/node/10

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Report medication and vaccine errors to ISMP: Call 1-800-FAIL-SAF(E) or visit our website at: www.ismp.org/report-medication-error. ISMP guarantees the confidentiality of information received and respects the reporters' wishes regarding the level of detail included in publications.

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ISMP Medication Safety Alert!® ActionAgenda

One of the most important ways to prevent medication errors is to learn about problems that have occurred in other organizations and to use that information to prevent similar problems at your practice site. To promote such a process, the following selected items from the October - December 2020 issues of the *ISMP Medication Safety Alert!* have been prepared for leadership to use with an interdisciplinary committee or with frontline staff to stimulate discussion and action to reduce the risk of medication errors. Each item includes a brief description of the medication safety problem, a few recommendations to reduce the risk of errors, and the issue number to locate additional information. Look for our high-alert medication icon under the issue number if the agenda item involves one or more medications on the *ISMP List of High-Alert Medications* (www.ismp.org/node/103). The Action Agenda is also available for download in a Microsoft Word and Excel format (www.ismp.org/node/22307) that allows expansion of the columns in the table designated for organizational documentation of an assessment, actions required, and assignments for each agenda item. Continuing education credit is available for nurses at: www.ismp.org/nursing-ce.

Key: ⚠ — ISMP high-alert medication

Issue No.	Problem	Recommendation	Organization Assessment	Action Required/Assignment	Date Completed
Confusion regarding strength listed on Fresenius Kabi oxytocin vials					
(22) ⚠	Ten-fold dosing errors occurred in the pharmacy when oxytocin 10 mL vials were used instead of 1 mL vials. The 10 mL vial label prominently lists the amount per mL (10 units/mL), with the total volume near the bottom of the label, causing staff to think the 10 mL vial only contained 10 units. Barcode scanning did not warn staff about the error.	Fresenius Kabi is updating the labels to express the total amount of drug per total volume as the primary designation. For now, ensure oxytocin vial (and premixed infusion) labels clearly note the amount of drug per total volume. Review an earlier 2020 article (www.ismp.org/node/14240) for additional recommendations when using oxytocin.			
Prevent *shoulder injury related to vaccine administration* (SIRVA) when administering the coronavirus disease 2019 (COVID-19) vaccines					
(25)	SIRVA presents as persistent shoulder pain, weakness, and limited range of motion within hours to days after administration of an intramuscular (IM) vaccine into the shoulder capsule instead of the deltoid muscle. This condition is preventable, given healthcare providers follow proper IM vaccine administration technique.	When administering IM vaccinations in the deltoid muscle, expose the upper arm/shoulder area, measure 2 to 3 finger widths from the acromion process (bony prominence above the deltoid), and locate the armpit as the lower border. Use the thumb and forefinger to make a V outlining the deltoid muscle before injecting the needle at a 90-degree angle.			
Mandatory error reporting for drugs granted Emergency Use Authorization (EUA) from the US Food and Drug Administration (FDA)					
(25)	Drugs and biologics used under an EUA (including COVID-19 vaccines) are not officially approved for use in the US by FDA but instead are temporarily authorized for use during a crisis. Thus, FDA requires mandatory reporting of adverse events, including errors, within a specified time period for all EUA drugs and biologics.	Refer to the *Fact Sheet* to determine the process and timeline for reporting adverse events and/or errors, as requirements may differ depending on the drug or biologic. Also, continue to report errors with these drugs or biologics, including vaccines, to ISMP; however, this does not replace the need for mandatory reporting to FDA.			

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Learn from influenza (flu) vaccine errors to prepare for coronavirus disease 2019 (COVID-19) vaccine campaigns					
(23)	Analysis of recent flu vaccine errors can be used to prepare for COVID-19 vaccine campaigns. Risk factors include look-alike vaccine names, labels, and packaging; unsegregated refrigerator/freezer storage; mixing/dilution errors; communication barriers; not checking/documenting administration in the immunization information system (IIS); inability to use technologies during mass immunizations; and temperature excursions.	When planning vaccine campaigns, consider infection control measures, optimal staffing patterns, anticipated language barriers, and storage for cold chain requirements. Before vaccination, screen patients for contraindications and precautions, verify prior vaccinations, and provide patients with a *Fact Sheet.* Establish best practices for vaccine preparation, administration, and documentation, and treatment of adverse reactions.			
ISMP survey shows safety gaps in pharmacy compounded sterile preparation (CSP) systems and practices					
(21)	Our survey on pharmacy CSPs identified the most common challenges, including lack of direct verification of the CSP process, difficulty meeting USP standards, and insufficient staff training and competency. Only half of respondents found it easy to identify which drugs, diluents, and volumes were used when verifying CSPs, citing limitations in technology and the syringe pull-back method of verification. Nearly three-quarters were aware of at least one pharmacy CSP error in the past year.	Use the results of this survey to prompt internal discussions about improvements that may be needed in sterile compounding practices to reduce the risk of errors in your organization. If your pharmacy did not participate in this survey, you can download it at www.ismp.org/ext/568, distribute it internally, take the survey, and review the results to pinpoint your vulnerabilities and establish a plan for improvement.			
ISMP survey provides insights into preparation and admixture practices OUTSIDE the pharmacy					
(22)	Our survey on admixture practices OUTSIDE the pharmacy identified the most common challenges, including lack of space, lack of independent double checks, and lack of staff training. The biggest concerns were rushing through the preparation process, labeling issues, mixing by memory, interruptions and distractions, and concerns about sterility and accuracy. Nearly one-third of respondents were aware of associated errors in the past year.	Use the results of this survey to prompt internal discussions about limiting the preparation of admixtures outside the pharmacy as much as possible and how to increase the use of pharmacy- and manufacturer-prepared products. If your organization did not participate in this survey, you can download it at www.ismp.org/ext/595, distribute it internally, take the survey, and review the results to pinpoint your vulnerabilities and establish a plan for improvement.			

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The US Food and Drug Administration (FDA) provides an updated Emergency Use Authorization (EUA) for VEKLURY (remdesivir)					
(23)	FDA approved Veklury for the treatment of COVID-19 in hospitalized adult and pediatric patients 12 years and older weighing at least 40 kg, and revised the EUA to permit use in patients less than 12 years weighing at least 3.5 kg. FDA continues to receive reports of administering the wrong Veklury dose or formulation (solution vs. lyophilized powder), missed doses, or wasted doses that have been improperly prepared or stored.	Veklury should only be administered in a hospital/acute care setting and used for the FDA-approved and EUA indications. Staff education is required before preparing the different formulations (solution and lyophilized powder), particularly regarding dilution, storage, and indication. Review an earlier 2020 article (www.ismp.org/node/20176), the revised EUA *Fact Sheet*, and the package insert prior to use.			
Using primary administration sets to administer small-volume intravenous (IV) infusions can lead to underdosing					
(24)	Small-volume intermittent IV infusions administered using a primary administration set may lead to underdosing due to the residual volume in the tubing. In one health system, about 360,000 small-volume infusions were being administered annually to patients at lower doses than prescribed.	Increase staff awareness of the residual volume left in the tubing when using primary administration sets for small-volume infusions. Create reminders to administer these with a secondary set. Add an appropriate carrier fluid to order sets to flush residual drug from the tubing.			
Neuromuscular blocking agent (paralyzing agent) vial caps without warnings may circulate through 2022					
(25) ⚠	Due to shortages, temporary manufacturing of vecuronium (Fresenius Kabi) and rocuronium (, Alvogen) without the vial cap warning, "Paralyzing Agent," was allowed. Although these vials are now being manufactured with a cap warning, vials without the warning have expiration dates up to May or June 2022 and may remain in distribution.	Make sure staff are aware of the absence of the warning statement on some paralyzing agents that may still be in stock. Store these products with the labels (not the caps) face up, as the labels still carry a warning statement. Affix auxiliary "Warning: Paralyzing Agent" labels to vial caps of affected products.			
Similarities between B. Braun 500 mL bags of intravenous (IV) heparin and hypertonic sodium chloride 3%					
(21) ⚠	ISMP received multiple reports involving mix-ups between 500 mL bags of IV heparin and IV hypertonic (3%) sodium chloride (B. Braun). The bags look very similar in their overwraps. Mix-ups with these products could prove serious.	Use barcode scanning to help prevent errors and store these products apart in the pharmacy. Consider obtaining one of the products from a different manufacturer. ISMP asked B. Braun to consider labeling changes to prevent mix-ups.			

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More mix-ups between vials of ePHEDrine and EPINEPHrine (ADRENALIN)					
(21) ⚠	Look-alike vials of e**PHED**rine and **EPINEPH**rine have been frequently mixed up due to name and packaging similarities. The latest mix-up occurred between Amneal Pharmaceuticals e**PHED**rine and PAR Pharmaceutical **EPINEPH**rine vials, both of which are similar in size (1 mL) and have purple caps.	Use barcode scanning when stocking, dispensing, and administering these medications. Store them apart in the pharmacy and in locked, lidded drawers in automated dispensing cabinets (ADCs). Use prefilled **EPINEPH**rine syringes from an outsourcer, and/or have pharmacy prepare infusions and bolus doses for these drugs (except in emergencies).			
Topical thrombin (RECOTHROM) given systemically instead of antithrombin III (THROMBATE III)					
(22)	During cardiac surgery, a patient received topical Recothrom systemically instead of Thrombate III. The perfusionist typed "T-H-R-O-M" into the automated dispensing cabinet (ADC) and selected Recothrom in error. Recothrom vials come with a Luer syringe, which was then connected to a cardiopulmonary bypass machine and administered.	Edit electronic health records and ADC product displays to clearly list "topical thrombin" for Recothrom and "antithrombin III" for Thrombate III to decrease the risk of name confusion. If possible, stock topical thrombin in a kit that does NOT contain a Luer syringe (e.g., **THROMBIN-JMI**). Review our 2017 article (www.ismp.org/node/234) for additional recommendations.			
Mix-up between conventional and liposomal DOXOrubicin formulations					
(24) ⚠	A technician accidently used liposomal instead of conventional **DOXO**rubicin to prepare two infusions. The technician did receive an alert when she scanned the wrong medication, but she overrode it. The pharmacist did not catch the error during verification, and the preparations were dispensed and administered.	Vials of liposomal and conventional **DOXO**rubicin should be stored separately. Consider affixing a prominent sticker on the liposomal formulation so it is not confused with the conventional formulation. A pharmacist should review all scanning overrides prior to final verification of the preparation.			
Administer adenosine injection via rapid intravenous (IV) push for cardioversion					
(24) ⚠	Adenosine was administered too slowly during cardiac arrest, resulting in a failure to convert the patient to normal sinus rhythm. Adenosine is often retrieved from an automated dispensing cabinet (ADC) via override (e.g., during a code), so instructions about rapid administration built into orders may not be visible.	Pharmacy staff, especially those stationed in the emergency department or responding to codes, should educate others about the requirement for rapid injection at a site as close to the patient's torso as possible, and that the medication must be rapidly flushed and cleared from any tubing. An auxiliary label may also help.			