October 6, 2022 ▪ Volume 27 Issue 20

ISMP
An ECRI Affiliate

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

Survey results from pharmacists provide support to enhance the organizational response to codes

ISMP extends our sincere appreciation to the 410 pharmacists who completed our ***ISMP Survey on the Pharmacists' Role and Medication Safety During a Code*** this past June and July. Although most pharmacists completing our survey reported years of experience with responding to codes and various levels of training and responsibility, a surprising number of respondents felt they were ill-prepared to respond to codes. Respondents also shared numerous medication safety concerns related to code situations. Details about the survey follow.

Respondent Profile

Most survey respondents (82%) were pharmacists who currently respond to codes. Fourteen percent were pharmacists who do not respond to codes, and 4% described their pharmacy position as "Other" (e.g., pharmacy director, manager, administrator). Pharmacists reported their position as staff (63%); manager, director, or supervisor (26%); a specialized position (9%), such as a clinical pharmacist, medication safety pharmacist, or emergency department (ED) pharmacist; or an administrator/executive (2%). The patient population served by the respondents' organizations included a combination of adult and pediatric settings (66%), adults only (29%), and pediatrics only (5%). Most pharmacists participating in our survey (60%) had more than 5 years of experience responding to codes; 12% had 4-5 years of experience; 19% had 1-3 years of experience; 4% reported less than 1 year of experience; and 5% said they have never responded to a code.

Code Participation

In 94% of respondents' organizations, pharmacists respond to codes. Most frequently, pharmacists always attend codes when the pharmacy is open (69%), or they attend as much as possible (15%). In 10% of the respondents' organizations, pharmacists attend codes only at certain locations or for some patient populations (e.g., ED, intensive care unit, only pediatric patients). Most often, pharmacy technicians do not accompany pharmacists to codes (79% never, 7% rarely, 6% occasionally).

Pharmacists' Role

Most of the surveyed pharmacists who respond to codes prepare medications (98%), retrieve medications and/or equipment from code carts and other locations (94%), and advise code team leaders about medications and doses (81%). Less often, pharmacists assist with basic life support including chest compressions and/or ventilation (20%), function as a scribe (11%), defibrillate/assist with defibrillation (6%), and assist with intubation (3%). Some pharmacists reported bringing needed medications/supplies that are not in the cart, and obtaining and reviewing the patient's medication list. Of the 10% of pharmacists who administer medications during codes, the administration routes include intravenous (100%), intraosseous (65%), endotracheal (16%), and intramuscular/subcutaneous (3%).

Code Debriefing

Seventy-five percent of respondents' organizations debrief staff after a code. Only 9% reported that their organization always debriefs staff after a code. More often, debriefings occur sometimes (66%) or they do not occur at all (25%).

continued on page 2 — Survey results >

Your *Reports* at *Work*

Elimination of orange-capped TB syringes. We published a ***SAFETY*** brief in our February 24, 2022 newsletter (www.ismp.org/node/29915), encouraging pharmacy staff to work with their wholesalers to avoid purchasing orange-capped Monoject 1 mL tuberculin (TB) syringes with a ⅝ inch 25-gauge needle from Cardinal Health. The orange-capped TB syringes look very similar to orange-capped insulin syringes with permanently attached needles (**Figure 1**). ECRI, our affiliate and safety partner, also recently published an ***ECRI Hazard Report*** about this topic, which can be found here: www.ismp.org/ext/987.

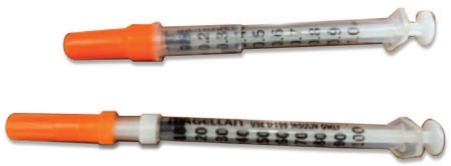

Figure 1. Orange-capped Cardinal Health tuberculin syringes (top) look similar to U-100 insulin syringes (bottom).

Since learning about your reports on this issue, Cardinal Health has told us that the company plans to change the color of its orange-capped TB syringes back to the original red/brown cap color. This will help distinguish the tuberculin syringe from similar-looking orange-capped insulin syringes. This will also help avoid potential tenfold insulin overdoses that have occurred due to confusion between unit and mL markings.

Until Cardinal Health resolves this issue, and the red/brown-capped tuberculin syringes become available, continue to purchase TB syringes without orange caps. Also, confirm that the syringe selected for insulin preparation has unit markings and not mL markings.

> Survey results — continued from page 1

Code Training

Pharmacists who completed our survey and respond to codes told us their organization often requires them to have current basic life support (BLS) certification (72% in hospitals that serve adults and pediatrics; 75% in hospitals for adults only; 68% in pediatric-only hospitals), followed by current advanced cardiovascular life support (ACLS) certification (62% in hospitals that serve adults and pediatrics; 67% in hospitals for adults only; 16% in pediatric-only hospitals), and current pediatric advanced life support (PALS) certification (31% in hospitals that serve adults and pediatrics; 9% in hospitals for adults only; 53% in pediatric-only hospitals). More than half of pharmacists received training on the indications (56%), preparation (61%), and adult doses (58%) of medications typically used during a code. Only 44% of pharmacists who work in hospitals that serve adults and pediatrics received training about typical pediatric doses; whereas 68% of pharmacists who work in pediatric-only hospitals received training about pediatric doses. Approximately two-thirds (63%) of all responding pharmacists have been trained regarding where to find medications in the code cart, and approximately three out of four (73%) have had an opportunity to open a code cart to practice selecting and/or preparing medications. Surprisingly, only 8% of training requirements include shadowing during codes or attending mock codes and simulations, and 7% of all respondents reported no required training. Less than half (41%) of the pharmacists who responded to our survey complete annual competencies for knowledge and skills related to responding to codes. More than one-third (36%) of pharmacists do not feel that they have been adequately prepared to participate in codes.

Medication Safety Concerns

We asked respondents to list three conditions and/or medications that worry them the most when thinking about medication errors during codes. More than half of the respondents (54%) told us that making an error with a high-alert medication was their most common fear. Amiodarone, **EPINEPH**rine, alteplase, magnesium sulfate, and neuromuscular blocking agents were frequently listed as concerns. Approximately one-third (32%) shared concerns regarding dispensing and/or administering an incorrect medication or dose during a pediatric code.This includes making an error when calculating weight-based dosing and preparing an incorrect volume or concentration of the pediatric medication.This was more commonly reported in hospitals that serve adults and pediatrics (81%), compared to those who work in pediatric-only hospitals (8%), and in hospitals that typically only serve adults (11%). More than one out of five (23%) pharmacists worry they might compound or calculate a medication dose or infusion inaccurately, especially when commercially available infusion bags are not available and while calculating doses under pressure. One out of five respondents (20%) said that the wrong medication, dose, or rate was more likely to occur during codes due to the lack of a double check, inability to use barcode scanning, or having to administer medications without the use of an electronic health record (EHR) with clinical decision support.

Additional concerns associated with medication safety included the following:

- Due to shortages, unfamiliarity with alternative products purchased (17%)
- Errors during a rushed, crowded, loud environment, often lacking leadership (15%)
- Lack of clear communication, including incomplete verbal orders (12%)
- Inexperience and/or lack of staff training (8%)
- Unlabeled or mislabeled syringes (6%)
- Delays in medication administration due to pharmacists' response time, inability to locate medications in the code cart, and/or having to find medications not stocked in the code cart (5%)
- Lack of patient information (4%)
- Medication storage issues due to multiple formulations of the same medication, or picking an incorrect medication from the cart (4%)

continued on page 3 — Survey results >

SAFETY briefs

No expiration date on COVID-19 vaccine label. A hospital reported that practitioners had administered expired Moderna coronavirus disease 2019 (COVID-19) vaccines to 120 patients, who then needed to be revaccinated. A pharmacist working in a vaccine clinic identified the problem after he scanned the quick response (QR) code on a Moderna COVID-19 vaccine and found that it had expired. He called the pharmacy buyer to check on additional supplies and discovered that the entire hospital vaccine supply had expired. The buyer did not know that she needed to scan the QR code to identify the expiration date. Instead, she assumed the vaccines had longer expiration dates and labeled the vaccines with a 30-day expiration date after removing them from the pharmacy freezer before dispensing them to clinics for refrigeration. While staff should discard the vaccine vials once leaving refrigeration after 24 hours or 12 hours after the first puncture, the actual manufacturer's expiration date, which was never identified on the label, always takes precedence. The clinic staff used the 30-day expiration date after removal from the freezer and did not check the QR code for the actual product expiration date prior to administration.

We reached out to the US Food and Drug Administration (FDA) regarding this issue. Once FDA approved the vaccines for emergency use authorization (EUA), manufacturers made them available for the national stockpile before it was possible to complete the extensive testing necessary to determine the long-term expiration date. To expedite availability, some companies listed the date of manufacture on the label and asked practitioners to visit their website for the expiration date; others asked practitioners to use the QR code to view the actual expiration date based on the latest testing results, which companies could quickly change as they collected more data. When EUA COVID-19 vaccines are sent to the pharmacy or clinic, staff should scan the QR code and label the vaccines to reflect the current actual expiration date. During distribution, when the vaccine storage location changes

continued on page 3 — SAFETY briefs >

> Survey results — continued from page 2

Recommendations

Consider implementing the following recommendations to improve the code team members' preparation and confidence when responding to codes:

Preparing for a Code

Require pharmacy participation in codes. Whenever possible, make the participation of pharmacists in codes a standard of practice within the organization when the pharmacy is open. If possible, consider sending a second pharmacist or a trained pharmacy technician to attend codes with a pharmacist to provide a double check for medications, infusions, and doses prepared by the pharmacist, or to stand by in case they are needed.

Outline responsibilities. Clearly define the roles and responsibilities for all code team members (as well as any alternates when certain code team members are unable to respond).

Maximize ready-to-use products and provide labels. When possible, provide commercially available, ready-to-use syringes and premixed medication infusions in a standard concentration(s). When choosing standard concentrations, reference the American Society of Health-System Pharmacists (ASHP) *Standardize 4 Safety* initiative (www.ismp.org/ext/923). In the code cart, provide prepopulated label templates that specify the medication name, strength, and volume to assist in labeling practitioner-prepared medications and infusions in a standard concentration.

Provide drug information. Ensure that all pediatric code carts include emergency medication resources specific to pediatric weight ranges. Stock the most recent version of the Broselow Pediatric Emergency Tape on code carts and use it as a tool for determining the correct medication dose, based on the child's length, especially when the patient's weight is unknown. Consider using a well-vetted, commercially available software system or phone app; alternatively, develop organization-specific emergency medication tables that are immediately available in binders on all code carts. Each table should specify the dose and volume of code medications (by patient weight for weight-based medications and for pediatric patients) based on the organization's standard concentration(s) (**Table 1**, on page 4). Include pertinent information specific to each medication, such as any compounding instructions, the rate of infusion, frequency of repeat doses, and the maximum dose. For example, consider a one-page table for each weight, with 0.2 kg increments for weights less than 3 kg, 0.5 kg increments for weights between 3 kg and 10 kg, 1 kg increments for weights between 10 kg and 50 kg, and 5 kg increments for weights between 51 kg and 100 kg. Number, date, and account for each binder, and update the contents as needed. During a drug shortage or after a formulary change that requires an alternative concentration, update the concentration and corresponding dose and volume in the emergency medication tables/binder and on the prepopulated label templates. Review and approve these drug resources through the Pharmacy and Therapeutics (P&T) or code committee. If possible, incorporate the tables into your EHR.

Code reference for pediatrics. For organizations that use patient-specific tables for pediatric patients, designate a timeframe for how often a nurse should print the patient-specific table using the patient's measured metric weight, and determine where this will be stored (e.g., secured to the pediatric patient's bed) for reference during a code.

Separate pediatric and adult medications and supplies. Ideally, provide separate and clearly identified adult and pediatric code carts. If a universal code cart must be used, separate and identify the trays and drawers with supplies, medications, and equipment for adult versus pediatric patients.

continued on page 4 — Survey results >

> SAFETY briefs cont'd from page 2

(e.g., freezer, refrigerator, room temperature), plan how to express the expiration date by incorporating the manufacturer's recommended beyond-use date based on the storage location as well as the current expiration date provided by the QR code. In addition, we are concerned that using a QR code to check expiration dates can adversely affect underserved populations, where smart devices or internet and cellular access may not be available to confirm the integrity of the vaccine. Teach practitioners about how companies generate expiration dates and that they must scan the QR code again prior to preparation. It should be noted that FDA-approved COVID-19 vaccines, such as **COMIRNATY** (Pfizer-BioNTech) and **SPIKEVAX** (Moderna), have been fully tested and do have the expiration date on the label.

STS abbreviation results in a close call. A surgeon entered an order in the electronic health record (EHR) for sodium tetradecyl sulfate, a sclerosing agent used to treat varicose veins. A nurse then called the operating room (OR) pharmacy and requested "STS," using an abbreviation for sodium tetradecyl sulfate. The pharmacist did not clarify the abbreviation "STS" and dispensed a vial of sodium thiosulfate injection for the surgeon to administer during the procedure. Sodium thiosulfate is used to lessen the side effects or for extravasation management of **CIS**platin. It is also used in combination with sodium nitrite to treat cyanide poisoning. Based on previous experience with sodium tetradecyl sulfate, the surgeon expected the medication to foam when drawn into the syringe. Prior to injection, he visually inspected the liquid in the syringe, which did not foam, and questioned if it was the correct medication. After reviewing the medication label, the error was identified and the medication was not administered.

For clarity and safety, never abbreviate the names of medications or other substances used for treatment. The ***ISMP National Medication Errors Reporting Program*** (ISMP MERP) database contains a number of error reports in which drug name abbreviations were a contributing factor. If a colleague refers to a medication

continued on page 4 — SAFETY briefs >

> Survey results — continued from page 3

Manage code cart medication contents. Store medications in each code cart in a standard configuration, with labels facing up and separating look-alike products. Routinely review medications ordered during codes to ensure the drugs and doses are evidence-based and readily accessible in the code cart. Remove medications not needed during a code, as access to unnecessary medications is a known source of error. Communicate with staff when a drug is removed or a new product is available in the code cart due to a drug shortage, and review the packaging, storage location, and other pertinent information.

Emergency Medication Table

Weight:	10 kg						
Medication	**Route**	**Concentration**	**Initial Dose**	**Volume**	**Dose Range**	**Maximum Adult Dose Range**	**General Information**
Adenosine	IV push	3 mg/mL	1 mg	**0.3 mL**	0.1*-0.2 mg/kg	6*-12 mg	Rapid IV push at a peripheral site closest to the patient's heart; follow each bolus with saline flush
EPINEPHrine	IV push	0.1 mg/mL	0.1 mg	**1 mL**	0.01 mg/kg	1 mg	May repeat dose every 3 to 5 minutes
Lidocaine	IV push	20 mg/mL	10 mg	**0.5 mL**	0.5-1* mg/kg	1.5 mg/kg	3 mg/kg maximum cumulative dose

*Usual starting dose

Table 1. An example of how code medications can be organized in a weight-based emergency medication table for a 10 kg patient. The volume for the pharmacist to prepare is calculated based on the organization's standard concentration. The table also provides information on the dose range, maximum adult dose range, and other pertinent information.

Mandate education. Require formal training and certification for all code team members. Consider requiring BLS and ACLS certification, as well as PALS certification for key code team members (e.g., prescribers, pharmacists, nurses) working in organizations with pediatric patients. Develop organization-specific competency assessments for code team members, including pharmacists, to complete during orientation and annually. For pharmacists, include each emergency medication's indication, calculation, and preparation of adult doses (and pediatric doses, if applicable), and the location of medications in the code cart. If feasible, consider a code team member orientation checklist and expect key team members to observe a designated number of codes, and participate in a designated number of codes with the help of a seasoned practitioner, prior to allowing the team member to independently attend the code.

Practice simulations. Require annual code simulations focusing on selecting and preparing commonly used and high-alert medications. Allow all code team members, including pharmacists, to open a mock code cart to familiarize themselves with medication packages, storage locations, and other available equipment. Confirm that code team members have access to the emergency drug binders on each code cart as well as the EHR and additional online drug information resources. Allow code team members who participate in double checking medications to practice this process and understand the expectations around the elements that must be checked (e.g., correct dose based on weight, comparison of source container to label).

During a Code

Position the code team. Identify the physician team leader during a code and establish the location of other team members so that they have a clear line of sight and can hear the directions/orders from the leader.

Gather patient information. Upon entering the room, listen to the description of the patient, noting their age, weight, diagnoses, allergies, recently administered medications,

continued on page 5 — Survey results >

> SAFETY briefs cont'd from page 3

using an abbreviation, ask for the full name of the medication, and coach them to avoid using abbreviations as they are too often misinterpreted. In this case, the nurse should not have used the abbreviation "STS" to communicate the drug name when calling the pharmacist, and the OR pharmacist should have verified the meaning of the "STS" abbreviation with the nurse as well as verified the order the surgeon had entered in the EHR. In addition, the prescriber could have provided the indication with the medication order, which would have helped prevent this close call.

Expanded access to adult vaccines.

Starting in 2023, the Advisory Committee on Immunization Practices (ACIP) and the Inflation Reduction Law (www.ismp.org/ext/969) specifies that the following vaccines will be available for free (without copays or out-of-pocket expenses) for Medicaid and Medicare Part D beneficiaries:

- anthrax
- bacille Calmette-Guérin (BCG)
- cholera
- coronavirus disease 2019 (COVID-19)
- dengue
- diphtheria and tetanus toxoids and acellular pertussis (DTaP/Tdap/Td)
- Ebola
- hepatitis A
- hepatitis B
- *Haemophilus influenzae* type B (Hib)
- diphtheria and tetanus toxoids and acellular pertussis vaccine, inactivated poliovirus vaccine, *Haemophilus influenzae* type b, hepatitis B (DTaP-IPV-Hib-HepB)
- human papillomavirus (HPV)
- influenza
- Japanese encephalitis
- measles, mumps, rubella, and varicella (MMR/MMRV)
- meningococcal
- pneumococcal
- polio
- rabies
- rotavirus
- smallpox (vaccinia)
- typhoid
- varicella (chickenpox)
- yellow fever
- zoster (shingles)

Please share this information with patients to promote immunization.

> Survey results — continued from page 4

and take note of those that may still be infusing. If possible, review the patient's medication administration record (MAR) to screen for potential adverse drug events that may have contributed to the code. Check the status of the patient's vascular access.

Communicate doses safely. Never use drug name abbreviations during a code, or any other time. The pharmacist should repeat back each verbal order, stating the ***exact dose*** they will prepare. Pronounce each numerical digit in the dose (e.g., "sixteen, one six," to avoid confusion with "sixty"). Ensure the prescribed medication and dose make sense in the context of the patient's condition. Encourage staff to clarify any medication-related concerns, especially when a prescriber requests a medication not typically used during codes. Ensure the route of administration is always a part of the order and is never assumed.

Label practitioner-prepared doses. Select ready-to-use, prefilled emergency medication infusions and syringes whenever possible. Label all practitioner-prepared infusions and syringes using the prepopulated label templates supplied in the code cart.

Double check doses. When possible, have a second code team member independently double check the dose and volume with the label prior to administration. If the dose or infusion is practitioner-prepared, also share the vial so the original label and dose can be confirmed during the double check.

After a Code

Debrief staff. Shortly after a code, provide a safe learning environment for attendees to regroup and discuss what occurred during the code. Allow code team members to ask questions, share concerns, and review what went well and what could be improved. If a medication-related scenario caused difficulty for the pharmacist or another code team member, consider conducting a failure mode and effects analysis (FMEA) to determine how to better approach code-related medication processes in the future.

Secure and replenish supplies. Remove opened medications/infusions, any patient-specific emergency medication table, and any other used supplies and equipment after codes. Do not return items to the code cart that were removed during the code. Ensure a process is in place to immediately secure the remaining medications and replace/exchange the drugs and supplies that were used, including the drug information resources. Consider using radiofrequency identification (RFID) inventory systems for code cart contents and replacements. Confirm all required contents are present and ready for the next code.

Continuous Improvement

Report errors. Encourage staff to share hazardous conditions, close calls, and actual errors that have occurred during codes. Create action plans and share the steps that the organization has taken to prevent them from happening again.

Seek expertise. Reach out to colleagues, including those who attend codes at other hospitals, to share and discuss code experiences or challenging situations and how to best approach them.

Special Announcements

ISMP program at ANESTHESIOLOGY 2022 annual meeting

If you are attending the ANESTHESIOLOGY 2022 annual meeting in New Orleans, register for a FREE ISMP evening satellite symposium, ***Improving the Safe Use and Storage of Medications in the Perioperative Setting***, which is supported by Omnicell. The symposium will be held on **October 22, 2022**, from 5:30 to 6:30 pm. Program speakers will discuss opportunities to advance medication safety principles and to enhance the detection and management of risk in perioperative and procedural settings. For more information and to register, visit: www.ismp.org/node/41567.

Medication Safety Certificate Program available

Pharmacy professionals, physicians, nurses, and pharmacy technicians can earn a Medication Safety Certificate by completing a self-guided, online course (41 continuing education [CE] hours) developed by ISMP and the American Society of Health-System Pharmacists (ASHP). The program provides participants with the knowledge and skills necessary to minimize medication errors. For information, visit: www.ismp.org/node/770.

Editors: Judy Smetzer, BSN, RN, FISMP; Michael Cohen, RPh, MS, ScD (hon), DPS (hon), FASHP; Shannon Bertagnoli, PharmD, BCPPS; Ann Shastay, MSN, RN, AOCN; Kelley Shultz, MD. ISMP, 5200 Butler Pike, Plymouth Meeting, PA 19462. Email: ismpinfo@ismp.org; Tel: 215-947-7797.

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 **July - September 2022** issues of the ***ISMP Medication Safety Alert! Acute Care*** newsletters 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(s) 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 in Acute Care Settings*** (www.ismp.org/node/103). The *Action Agenda* is also available for download in Microsoft Word and Excel formats (www.ismp.org/node/41559). Continuing education credit is available for nurses at: www.ismp.org/nursing-ce.

Key: ⚠ — ISMP high-alert medication

Issue No.	Problem	Recommendations	Organization Assessment	Action Required/Assignment	Date Completed
Labeling concerns with coronavirus disease 2019 (COVID-19) vaccines for children and bivalent boosters					
14, 19	The labeling of the Pfizer-BioNTech COVID-19 vaccines for children 6 months through 4 years may mislead staff regarding age indications and when to discard. The Pfizer-BioNTech COVID-19 bivalent vaccine looks almost identical to the primary series for those 12 years and older, with similar gray caps and borders. The Moderna COVID-19 primary series vaccine for children 6 through 11 years states "BOOSTER DOSES ONLY," even though it is now only used for primary series doses, and it appears similar to the bivalent vaccine as both have dark blue caps and similar labels that display "BOOSTER DOSES ONLY."	Familiarize yourself with these discrepancies, post clarifying information for staff to review, and see the recommended strategies for preventing mix-ups (www.ismp.org/ext/937, www.ismp.org/ext/995, www.ismp.org/node/39547). Manufacturers need to better differentiate these look-alike vaccines and modify the labels to reflect the approved age range (Pfizer-BioNTech), when to discard after dilution (Pfizer-BioNTech), and the primary series indication for use (Moderna).			
Pfizer and the US Food and Drug Administration (FDA) respond to PAXLOVID (nirmatrelvir and ritonavir) error reports					
16	In response to ongoing Paxlovid error reports, Pfizer and FDA released a letter to healthcare providers discussing the wrong-dose error reports; revisions to the *Fact Sheet for Patients, Parents, and Caregivers*; and recommended actions (www.ismp.org/ext/967). ISMP previously published a special alert about Paxlovid errors (www.ismp.org/node/29033) and an analysis of wrong-dose Paxlovid errors (www.ismp.org/node/32452).	Review the letter from Pfizer and FDA; the updated *Fact Sheet for Patients, Parents, and Caregivers* (www.ismp.org/ext/939); and our analysis of wrong-dose Paxlovid errors. Give patients who are prescribed Paxlovid the updated *Fact Sheet* and counsel them using the teach-back method. Continue to report errors to FDA (mandatory for medications authorized under an Emergency Use Authorization [EUA]) (www.ismp.org/ext/544) and to ISMP (www.ismp.org/MERP).			

Issue No.	Problem	Recommendations	Organization Assessment	Action Required/Assignment	Date Completed
Implement barcode scanning in the perioperative settings					
16, 18	Although ISMP has called for the expansion of barcode scanning beyond inpatient units (*Best Practice* #18: www.ismp.org/node/160), the perioperative area poses unique challenges. These challenges include a lack of barcodes on some perioperative products, difficulty accessing identification (ID) bands under surgical drapes, use of preference cards without order sets, and non-profiled automated dispensing cabinets (ADCs).	Read an interview with a pharmacist from an organization that adopted barcode scanning in perioperative areas to learn how they overcame these barriers (www.ismp.org/node/33905). Create and/or test barcodes for perioperative products; place ID bands on extremities accessible to perioperative staff; develop order sets for common surgeries; support prospective pharmacist review of orders; and use profiled ADCs. Epic users also have a new workflow available to them that can assist with implementation of this *Best Practice* thanks to an anesthesiologist who worked with Epic to modify their perioperative electronic order system to successfully utilize barcode scanning for medications administered during surgery (in newsletter: www.ismp.org/node/37117).			
Observe for leakage with EXACTAMIX 2400 (Baxter) valve sets					
15, 19 ⚠	Baxter received complaints of ExactaMix ports leaking and issued an *Urgent Medical Device Correction* for ports 1 through 4 (www.ismp.org/ext/955). However, we received reports of leaking beyond ports 1 through 4, which may be due to using the device incorrectly. A leaking valve set may result in a patient receiving incorrect additives.	Use BD 50 mL syringes and medication vials that are 10 mL or larger. Observe the pumping process and the ingredient vials to ensure consumption of appropriate amounts and volumes. If a leak is identified, abort the process, discard the final container, replace the valve set, and report the incident to the US Food and Drug Administration, Baxter, ISMP, and ECRI.			
Do not remove or tear the monkeypox and smallpox vaccine (JYNNEOS [US], IMVAMUNE [Canada], IMVANEX [Europe]) vial flange					
19	Injectable monkeypox and smallpox vaccine comes in a pour vial that is often used for oral formulations. If the yellow cap is removed improperly, the entire stopper and flange can come off or the metal flange can tear exposing a sharp edge.	The US manufacturer recommends flipping off the yellow cap at the arrow with your thumb at a 90-degree angle, and leaving the cap attached to the flange or flipping it off all the way while ensuring the stopper and flange stay on the vial. The company did not explain why the vaccine is packaged in a pour vial.			

Issue No.	Problem	Recommendations	Organization Assessment	Action Required/Assignment	Date Completed
Potassium chloride for injection concentrate in 250 mL EXCEL bags (B. Braun) reaching organizations					
14, 15 ⚠	Organizations are now receiving the new pharmacy bulk package of potassium chloride for injection concentrate (2 mEq/mL) in 250 mL EXCEL bags. These bags have blue and red labeling, which look similar to other infusion bags. A mix-up could result in dispensing or administering undiluted potassium chloride for injection concentrate.	Allow only the pharmacy to purchase, store, and use this product. Upon receipt, affix auxiliary warning labels to both sides of the overwrap. Use barcode scanning when preparing compounded sterile preparations. B. Braun has added a black port set cap to help differentiate the product, and additional label changes are forthcoming. Until then, review the ***National Alert Network*** (NAN) on this topic (www.ismp.org/node/31719).			
Confirm tenecteplase (TNKASE) indication and dose before use					
17 ⚠	The top of the TNKase carton specifies use in myocardial infarction, and the inside carton flap contains the approved ST-elevation myocardial infarction (STEMI) dosing regimen. But hospitals are also using TNKase off-label for acute ischemic stroke, which has a different weight-based dose and maximum dose. Patients could receive a two-fold overdose if using STEMI dosing instead of stroke dosing.	If using TNKase for a stroke, affix a stroke dosing card to the carton; discard the carton and place the vial in a stroke kit with dosing instructions; or when possible and timely, have pharmacy staff verify, prepare, and dispense each dose. Create order sets in the electronic health record (EHR) to guide the correct dose based on the indication. Avoid using abbreviations (e.g., t-PA, TPA, TNK) for TNKase or alteplase.			
Risk of error when entering future medication orders in the electronic health record (EHR)					
14	When scheduling a prescribed antibiotic to start the following day, a pharmacist inadvertently selected the next year, leading to omission of the antibiotic. Practitioners can select the wrong date in the EHR if: using a calendar tool with nearby arrows to advance the month and year; entering the shortcut Y+1 instead of T+1 (Y and T keys are close) to advance by 1 year rather than 1 day; or making a keystroke error when manually entering the start date.	Run EHR future order queries and assess which medications are involved, the appropriateness of the future orders, how the orders appear, and whether staff administered the medications correctly. Build EHR alerts for organization-defined future start dates and create a hard stop if ordered a year or more in advance. Restrict the "year" shortcut, and include future orders in your medication reconciliation process and interdisciplinary rounds.			

Issue No.	Problem	Recommendations	Organization Assessment	Action Required/Assignment	Date Completed
2020-2021 non-coronavirus disease 2019 (COVID-19) vaccine analysis: Prevent age-related errors					
19	Age-related vaccine errors result in lower- or higher-than-intended doses based on the patient's age, which can compromise immune protection or lead to adverse effects. Contributing factors include not using barcode scanning in outpatient settings, and similar storage, names, and packaging that do not clearly differentiate adult from pediatric formulations.	Use barcode scanning in outpatient areas (*Best Practice* #18, www.ismp.org/node/160). Purchase age-specific vaccines from different manufacturers and store adult and pediatric vaccines separately. Label syringes and verify patients' identity, age, and requested vaccine before vaccination. Manufacturers should include **PEDIATRIC** or **ADULT** in a different colored, bold font on the cartons, vials, and syringe labels.			
Be prepared for unanticipated electronic health record (EHR) downtime events					
17	Unanticipated EHR downtime is an emergency organizations may face, but many are inadequately prepared to respond. This may delay patient care and heighten the risk of medication errors. ISMP received two error reports demonstrating how healthcare has become reliant on computer-generated alerts, which are lacking during EHR downtime.	Plan the organization's response to unanticipated EHR downtime, educate staff, and conduct simulations to assess response. Select response team(s), identify leaders, and establish a communication triage procedure. Develop an emergency readiness binder containing hard copies of procedures and documents that may be needed, and plan for recovery after the event.			
Prevent uncontrolled, rapid intravenous (IV) infusion rates: Confirm infusions are connected to pumps before opening the clamp					
15 ⚠	Uncontrolled infusions of heparin, propofol, and phenylephrine were accidentally given via gravity at a rapid infusion rate rather than via a smart infusion pump programmed to deliver a defined infusion rate. Contributing factors included line mix-ups, not tracing infusion lines, and not placing the tubing back into the pump.	Ensure enough infusion pumps are available and used for all continuous and intermittent infusions. Engage the dose error-reduction system (DERS) in the pump. Label and trace infusion lines prior to opening the roller clamp. Place the tubing back into the pump after clearing air or priming the line. Report any safety concerns.			
Risks associated with multi-chamber bag parenteral nutrition (MCB-PN)					
15 ⚠	Due to shortages of parenteral nutrition (PN) components, MCB-PN usage has increased. Errors with these products have been due to look-alike packaging and the failure to activate (mix) chambers, leading to the wrong formulation being dispensed or omission of PN components.	Require pharmacy to activate chambers, add any prescribed additives to MCB-PN, and confirm activation prior to dispensing. Apply auxiliary labels to differentiate products with and without electrolytes. Employ barcode technology prior to compounding, dispensing, and administration.			