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ISMP 25 YEARS ADVANCING MEDICATION SAFETY

Acute Care ISMP Medication Safety Alert!®

Educating the Healthcare Community About Safe Medication Practices

Too close for comfort: Fatal zinc overdose narrowly avoided

Problem: We recently learned about a frightening close call that almost led to the administration of a 1,000-fold overdose of intravenous (IV) zinc to a 2-year-old child via parenteral nutrition (PN). This incident is eerily similar to another event we described more than a decade ago in our September 6, 2007, newsletter (www.ismp.org/node/883) about a preterm infant who received a fatal 1,000-fold overdose of zinc via PN. In both cases, the dose of zinc was accidentally entered in **mg** dosing units instead of the intended **mcg** dosing units. And in both cases, a critical dose warning did **not** fire for the prescriber entering the order and/or the pharmacists transcribing or verifying the PN orders. The details of these events are provided below to encourage hospitals across the nation to apply the lessons learned and take steps to prevent similar errors, and to encourage drug information database vendors to create much needed critical dose warnings for IV zinc and other trace elements.

Recent Close Call

A physician prescribed PN for a 2-year-old child using the hospital's standard, electronic pediatric (1-12 years) PN template. To include the zinc (a trace element), the prescriber had to specifically choose this additive from a preference list in the order template. Once the additive was selected, the template provided no default dose or directions to guide the prescribing of a zinc dose within a safe range. Additionally, the dosing unit of measure defaulted to **mg**, as it did in the adult PN template, not mcg. Because the dosing units defaulted to mg, the physician inadvertently prescribed 700 mg instead of the intended 700 mcg of zinc per day. Incidentally, the prescriber would have been unable to change the dosing units from mg to mcg had he noticed the error since the mg dosing unit was hard coded in the pediatric PN template. He would have had to enter 0.7 mg as the dose.

The order entry system (Epic) did not warn the physician that he had prescribed a massive 1,000-fold overdose of zinc. Nor did the system warn the two pharmacists who independently verified the PN order. They, too, overlooked the dosing unit error. When transmitting the PN order to an outsourcing admixture pharmacy for preparation, one of the pharmacists conducted an additional verification in the outsourcing pharmacy order entry system but overrode several critical warnings about the excessive dose of zinc sulfate, the salt that would be used. The critical warnings from the outsourcing pharmacy system noted that the prescribed dose of zinc was higher than the recommended dose per body weight and per day for acute dosing with zinc. However, the warnings were displayed on an ordinary-looking screen and embedded within many other alerts, many of which had, in the past, been clinically insignificant; thus, the warnings failed to capture the pharmacist's attention, and alert fatigue likely played a role in overriding the alerts.

Fortunately, before compounding the PN, the pharmacist at the outsourcing pharmacy noticed the large dose of zinc prescribed, and the corresponding large volume of the zinc sulfate additive (700 mL, 1 mg/mL) that would be needed to prepare the PN. The pharmacist at the outsourcing pharmacy contacted the hospital pharmacist to

continued on page 2—Zinc overdose >

SAFETY briefs

Better oral syringe needed. A pharmacist reported that, when his hospital purchased prepackaged acetaminophen oral syringes from Precision Dose, the oral syringes supplied had markings in both mL and teaspoons. He was concerned because the **ISMP Targeted Medication Safety Best Practices for Hospitals** (number 5, www.ismp.org/ext/237) states that oral liquid dosing devices (oral syringes/cups/droppers) that only display the metric scale should be purchased and used. The hospital has been compliant with this best practice when it comes to the oral syringes they purchase, but it's difficult to control the ready-to-administer products purchased from outside vendors.

Also, note the orientation of the numbers on the dosage scale (**Figure 1**). Compared to other oral syringes (image to the right), the purchased acetaminophen syringe (image to the left) presents the number markings upside down when the syringe is held upright, which may be difficult to read. We contacted the company, which indicated it will investigate these situations.

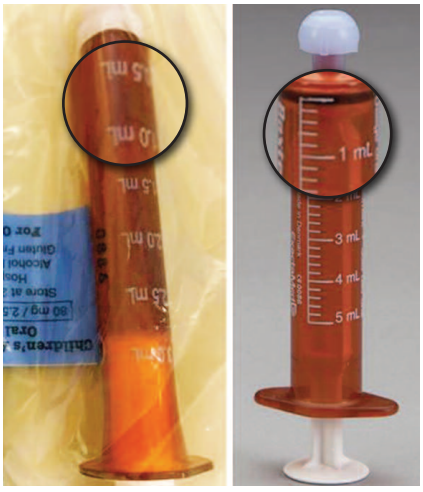

Figure 1. Oral syringe on the left from Precision Dose has an upside-down dosage scale that is difficult to read compared to the oral syringe from another company on the right.

continued on page 2—SAFETY briefs >

> Zinc overdose—continued from page 1

question the order. The error was identified, and the prescriber was contacted. The order was changed to 300 mcg of zinc per day when the prescriber realized he had also made a weight-based dose calculation error in the initial order.

During investigation of this event, the hospital was surprised to learn that a warning for a 1,000-fold dosing error with IV zinc did not fire in their order entry system. When the hospital's drug information database vendor, First Databank, was contacted, the company confirmed that dose checking was not available for this medication. In fact, a dose warning report for "zinc sulfate, 700 mg, intravenous, continuous PN at 50 mL/hr" notes "there is no dose checking available for this medication." This warning was filtered by the hospital's system settings because it was categorized as a dose warning "excluded by policy due to low risk/low potential for harm."

Prior Fatal Event

In 2006, a physician prescribed PN for a preterm infant using a pediatric PN order template. Zinc was not included as a possible additive in the order template, so the physician provided a free-text order for zinc 330 mcg/100 mL. The automated compounder used to prepare the PN required the zinc additive to be entered as a mcg/kg dose. A pharmacist correctly converted the dose but then mistakenly selected "mg" instead of "mcg" on a dropdown list when entering the dose in the automated compounder. This resulted in a final concentration of 330 **mg**/100 mL. As in the most recent case, the order entry system (and the automated compounder software, in this case) failed to warn the pharmacist of the 1,000-fold zinc overdose. Prior to PN preparation, another pharmacist compared the product labels and work labels to the original PN order but did not notice that the zinc dose was expressed in mg, not mcg.

During the evening, an inexperienced pharmacy technician prepared the PN using a 500 mL bag instead of the usual 250 mL pediatric bag since the needed volume of zinc sulfate was 481.8 mL. She had to replenish the zinc sulfate compounder syringe 11 times, which required dozens of vials. Although she found this unusual, she was uncertain whether it signaled an error and was not comfortable questioning the evening pharmacist. Several other PN additives had to be added to the bag manually, which the technician prepared and brought to a different pharmacist to check before adding them to the admixture. The pharmacist verified the patient information at the top of the label, then skipped to the bottom of the label to identify the additives that had to be added manually, thus failing to read the middle of the label which noted that 481.8 mL of zinc sulfate had been added to a bag that would contain 560 mL in total. The pharmacist verified the vials and syringes of the manual additives but never noticed the zinc sulfate error. The final PN bag was then dispensed to the neonatal intensive care unit (NICU).

In the NICU, two nurses conducted a double check of the PN but failed to notice the error. One nurse read the "numbers" associated with the dose for each ingredient from the PN label, but not the dosing units, to another nurse who was reading the original order. While the "numbers" matched, the accidental entry of mg instead of mcg was, again, not noticed. Sadly, many clues that pointed to the error were overlooked during the verification processes, including the fact that the PN bag was unusually large–bigger than the infant herself.

The next morning, the technician who prepared the PN told the oncoming lead technician about the unusual preparation of PN that required numerous replenishments of a zinc sulfate syringe. The oncoming technician checked the order, discovered the error, and alerted a pharmacist, who immediately called the NICU to stop the infusion. The infant received edetate calcium disodium, but the chelation therapy was unsuccessful, and the infant died. The coroner listed cardiac failure caused by zinc intoxication as the cause of death.

continued on page 3—Zinc overdose >

> SAFETY briefs

cont'd from page 1

It's disappointing that many oral syringes sold in the US still have household measurements in addition to mL. That can only mean that healthcare providers are still buying them, despite the risk of errors due to confusion between teaspoons and mL.

RifAMPin–rifAXIMin mix-ups. Recently we learned about a mix-up between rif**AMP**in and rif**AXIM**in (**XIFAXAN**). An emergency department (ED) physician called an infectious disease (ID) physician about a patient with hepatic encephalopathy. The ED physician then prescribed 550 mg of rif**AMP**in intravenously (IV), which was the drug and dose he heard the ID physician prescribe. A vial of rif**AMP**in contains 600 mg, and a typical adult dose is 600 mg. Due to the unusual 550 mg dose, a pharmacist called the ED physician, who insisted this was the ID physician's recommendation. Not wanting to delay therapy further, the pharmacist verified the order for rif**AMP**in without inquiring about its intended use. The following day, the pharmacist again questioned the order. He discovered that the patient had hepatic encephalopathy and that the ID physician had recommended oral rif**AXIM**in, which is available in a 550 mg tablet. The patient was switched to rif**AXIM**in, and lactulose was added to the regimen to treat hepatic encephalopathy.

Most often, rif**AMP**in is used orally but is sometimes administered IV. Rif**AXIM**in is only administered orally and is poorly absorbed systemically through the gut, leading to high concentrations in the gastrointestinal tract. As a 2-week treatment, it is used for irritable bowel syndrome with diarrhea. However, rif**AXIM**in is also of value in treating hepatic encephalopathy, as it reduces ammonia production by eliminating ammonia-producing colonic bacteria.

This is not the first time a mix-up has been reported between these two rifamycin antibiotics. We alerted the healthcare community about possible confusion between this name pair as early as June 2005. However, these are not the only drugs in the rifamycin class of drugs that can be confused due to name similarity. Mix-ups between these five rifamycin antibiotics are possible: rif**AMP**in, rif**AXIM**in, rifabutin, rifamycin, and rifapentine. There may also

continued on page 3—SAFETY briefs >

> Zinc overdose—continued from page 2

Safe Practice Recommendations: The hospital where the most recent close call occurred has made several system changes that should be implemented by all hospitals:

Build, test, and heed maximum dose alerts. The hospital built and tested a customized maximum dose warning for all forms of IV zinc (PN additive of zinc sulfate or zinc chloride; other forms of IV zinc that have been imported during US product shortages [e.g., zinc gluconate]). The warning for zinc doses above 250 mcg/kg fires upstream to prescribers during order entry, as well as downstream to pharmacists during order verification. With this warning, a provider making a catastrophic 1,000-fold dosing error with IV zinc caused by transposing mcg and mg dosing units would receive a critical dose warning with a hard stop (impossible to override).

Meanwhile, ISMP has contacted First Databank to further inquire about the lack of critical dose warnings for IV zinc (and other trace elements). The company noted that, historically, it has not included products exclusively used to compound PN solutions in its dose checking module because each component is dependent on patient-specific parameters (e.g., nutritional status, lab values). However, based on this close call, the vendor will be adding IV zinc to the dose range checking module and will revise its current policy to include additives with referenced dosing specific to PN use if they do not have additional dependencies. Additionally, the company will instruct users that PN component dose screening requires screening of each individual PN component and that it cannot address the total dose for an electrolyte derived from different salts.

Other drug information database vendors may include critical dose warnings for zinc. For example, for PN dosing, Medi-Span issues a warning if a daily pediatric (1-17 years) dose of zinc exceeds 125 mcg/kg for continuous infusions of PN. However, please check your system to determine if a critical dose warning would appear if a zinc overdose was entered, and if not, build and test a dose warning for this product.

Default to mcg dosing units. The hospital changed all standard pediatric PN templates to default to **mcg** dosing units for zinc. Prescribers cannot change the dosing units from mcg to mg. As a general principle, the dosing units should always default to the appropriate units for prescribing.

Provide dosing guidance. The hospital is adding dosing buttons for additives, including zinc, in PN templates to help guide prescribers to doses within safe limits. The dosing buttons offer a few acceptable dose options (i.e., 50 mcg/kg, 125 mcg/kg, 250 mcg/kg) for the prescriber, although free-text orders are still allowed.

Additional recommendations to help prevent PN dosing errors follow:

Standardize prescribing methods. Ensure that the dosing in PN templates in the electronic health record (EHR) corresponds to the way orders are entered in an automated compounder if used, so dose recalculation is not necessary.

Heighten suspicion of an error. Create a learning culture that encourages all staff, despite their level of experience or education, to speak up about unusual conditions.

Pharmacy technicians who compound PN and other products should feel comfortable stopping the process if they suspect any abnormality and should be required to do so if they need to add a drug, electrolyte, mineral, or trace element in a large dose or in a large volume in order to complete a single preparation. They should also stop the process if they need to prepare the admixture in a larger bag or bottle than usual. If the compounding process is stopped, pharmacists should suspect an error

continued on page 4—Zinc overdose >

> SAFETY briefs cont'd from page 2

be confusion with the brand names **RIFATER** (rif**AMP**in/isoniazid/pyrazinamide, tablets), **RIFADIN** (rif**AMP**in, capsules and injectable), and **RIFAMATE** (rif**AMP**in and isoniazid, capsules). We urge pharmacists and prescribers to familiarize themselves with various dosing parameters and indications for all rifamycins. We also urge pharmacists to persist in clarifying any orders for patients in which the prescribed drug does not seem to match the usual indications or doses.

Close call with abbreviation, ILK. A dermatology consultation for a patient with a history of pyoderma gangrenosum resulted in the following treatment options: "ILK; increase the dose of **IMURAN** (aza**THIO**prine); start cyclo**SPORINE**; apply topical dapsone; or conservative care (continuing therapy as is)." The patient was also evaluated by a plastic surgeon and was scheduled to undergo debridement and skin grafting of her right lower extremity. The plastic surgeon called the pharmacy the night before the procedure to ask about the availability of interleukin to inject intraoperatively. He stated that this was a recommendation made in the dermatology consultation note. After researching the treatment for this indication (there are some studies in rats showing skin growth with an interleukin), the pharmacist ordered the only interleukin listed in the wholesaler catalog, **PROLEUKIN** (aldesleukin). The drug was expected to be delivered the following morning.

After further clarification of the order with plastic surgery residents, a surgery service pharmacist learned that interleukin was not needed for the procedure. Both the residents and the attending plastic surgeon realized that the "ILK" abbreviation in the dermatology consult note was intended to be an abbreviation for "intralesional **KENALOG**" (triamcinolone), not interleukin. Although no error reached the patient, the unapproved abbreviation caused considerable confusion.

In addition to having a list of error-prone abbreviations that should never be used, practitioners should have easy access to online databases of medical abbreviations to assess their meaning in context. Better yet, drug name abbreviations should not be used; if they are, prescribers should be called for clarification.

> Zinc overdose—continued from page 3

(e.g., transposed mcg and mg dosing; decimal point errors) and verify every step of the compounding process before proceeding.

Nurses who work in pediatric and neonatal units should be taught to (and never hesitate to) question products that are dispensed in larger (or smaller) volumes than typically supplied for children or neonates.

Conduct effective verification processes in the pharmacy. A pharmacist should be required to verify the initial PN order entry. If a compounder is used for preparation, and transcription of the order into the compounder is required, comparison between the original order and the transcribed order by a second pharmacist must occur. As appropriate, double check any dose calculations. Scan the barcodes of compounding products for verification, and conduct quality control checks and verification of replacement solutions on the compounder, if used. Visually verify the vials and syringes that contain all manually prepared additives **before** they are injected into the PN admixture. All source containers used should be presented to the pharmacist for verification, not just a representative vial when multiple vials are used. Additionally, using gravimetric analysis of the PN admixture ingredients for verification can help detect errors before reaching the patient. Review the final compounded PN prior to dispensing.

Provide education and validate competency. Establish a formal training process and validate competency for pharmacy technicians who are permitted to compound PN, and for pharmacists who check the compounded PN admixture. Focus training on dose and dose concentration, not just the volume of PN additives. If compounding services are provided for neonatal and pediatric patients, include age-specific training emphasizing weight-based dosing, and validate the competency of all who may prepare or check pediatric PN.

Reminder: Please take our surveys by July 19!

In December 2017, ISMP launched the **2018-2019 Targeted Medication Safety Best Practices for Hospitals** to identify, inspire, and mobilize widespread adoption of best practices to address harmful and fatal error-related issues. We are now conducting a short survey to get a sense of the current level of implementation of the practices since their release. We would greatly appreciate your participation in this online survey (www.ismp.org/ext/268) regardless of whether you have or have not implemented the best practices.

ISMP is also conducting a 4-question survey on **prefilled flush syringes** (sodium chloride, heparin), which now include a 2D matrix barcode that captures a unique device identifier (UDI). Earlier this year, flush syringe companies started adding the 2D barcode to their products. We have received some early feedback from users but would like to know more about your experiences with these syringes. We would be very grateful if you completed a very brief online survey (www.ismp.org/ext/267) on this topic.

Thank you!

Special Announcements

Action Agenda now in an Excel file!

The ISMP **Action Agenda** included with this newsletter issue provides links to various formats, including a PDF, Microsoft Word document, and now an Excel spreadsheet (www.ismp.org/node/9381). The different formats can assist organizations when addressing the key medication safety items published in the prior quarter in the *ISMP Medication Safety Alert!* The Action Agenda is typically published in the first issue of the newsletter in January, April, July, and October. The July issue begins on **page 5.** Organizations can utilize the Word or Excel formats to expand the columns in the table to help document and track the actions required, staff assignments for the agenda items, and other items your organization would like to document and track. ISMP strongly recommends that organizations use each edition of the Action Agenda to proactively assess risk potential, and to plan and implement the recommended actions to reduce the possibility of medication errors.

ISMP medical director appointed to FDA committee

Ronald Litman, DO, ML (www.chop.edu/doctors/litman-ronald-s), was recently appointed chairperson of the US Food and Drug Administration (FDA) Anesthetic and Analgesic Drug Products Advisory Committee. Dr. Litman, who serves as medical director at ISMP, is an anesthesiologist with the Department of Anesthesiology and Critical Care Medicine at the Children's Hospital of Philadelphia. The FDA Committee is responsible for reviewing and evaluating the safety and effectiveness of drugs used in anesthesiology and surgery. The Committee also reviews abuse-deterrent opioids and other issues related to opioid abuse to provide advice to the Commissioner of Food and Drugs.

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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 **April – June 2019** 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 **PDF** format as well as **Microsoft Word** and **Excel** formats (www.ismp.org/node/9381) that allow expansion of the columns in the table designated for organizational documentation and tracking 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
Spinal administration of tranexamic acid instead of bupivacaine or ropivacaine					
(10) ⚠	Two recent cases of inadvertent spinal tranexamic acid administration were reported, and a recent review article identified 21 additional cases. This error has a mortality rate of 50% or otherwise results in patient harm, including paraplegia. Previously reported cases mostly involved mix-ups between tranexamic acid and bupivacaine or ropivacaine. All three products come in vials with blue caps, which are often stored upright making labels difficult to read, and are typically used in areas where barcode scanning is not utilized (e.g., operating room, labor and delivery).	Purchase these products from various manufacturers to help differentiate vial appearance, and avoid upright storage to ensure labels are always visible. Store tranexamic acid vials separately, and add an auxiliary label to tranexamic acid containers to note the route of administration. Employ barcode scanning prior to dispensing or administering these products. Exela Pharma Sciences manufactures a premixed bag of 1 g/100 mL of tranexamic acid. Although it received approval for a narrow indication, its use can greatly reduce the potential for mix-ups.			
Mix-up between mitoMYcin and mitoXANTRONE					
(9) ⚠	A patient underwent intraperitoneal administration of mito**XANTRONE** after the pharmacy dispensed the product in a brown overwrap, believing it was light-sensitive mito**MY**cin. The overwrap made it hard to see the drug's blue color. The pharmacy workflow system displayed an "invalid route" warning when mito**XANTRONE** (approved for intravenous use) was scanned. The system was bypassed since a "wrong drug" alert did not occur. The error was noticed later due to blue staining of the peritoneal tissues.	A request was made to the manufacturer of the pharmacy workflow system to revise the software so that identification of wrong drug takes priority, although a "wrong route" message is equally important and should be investigated. Address any change in the expected appearance of the drug and any unexpected workflow system error messages since they can be important clues for detecting medication errors. Perform manual quality checks in situations where pharmacy workflow system controls are bypassed.			

Issue No.	Problem	Recommendation	Organization Assessment	Action Required/Assignment	Date Completed
Use independent double checks judiciously and properly					
(11)	Manual independent double checks have long been disputed, discounted, and misused in healthcare. The process is time consuming and often associated with practical problems in implementation. Although studies confirm that, conducted properly, independent double checks can detect up to 95% of errors, failed checking processes can be linked to inconsistent use; variability in how the checks are performed; "cosigning" with little real appraisal; deference to authority that constrains questions; excessive trust in the work of others; distractions and interruptions; and other human factors.	Evaluate whether independent double checks are being used judiciously and properly. Consider what you are trying to verify or catch, the necessary steps to achieve this goal, and if an independent double check is the best strategy and/or if other more effective risk-reduction strategies should be used. Fewer independent double checks strategically placed will be more effective than an overabundance of independent double checks. If an independent double check is needed (ISMP does not recommend an independent double check for all high-alert medications), design and implement the strategy as outlined in the full article (www.ismp.org/node/8884).			
Mix-up between ZEMPLAR (paricalcitol) and ZEMURON (a former brand of rocuronium) due to look-alike names					
(11) ⚠	A nurse received a telephone order for Zemplar from a physician in the hospital. When entering the drug into the order entry system, Zemplar appeared with a non-formulary warning, and Zemuron appeared below it in the drug picklist. The nurse selected Zemuron instead of Zemplar, but the verifying pharmacist caught the potentially fatal error.	Avoid displaying the Zemuron brand name for rocuronium (no longer manufactured using that brand name) in drug picklists, and only display the generic name, rocuronium. Only allow verbal/ telephone orders to be used in an emergency or when the provider is working in a sterile environment.			
Mix-ups between PROLIA (denosumab; Amgen) and UDENYCA (pegfilgrastim-cbqv; Coherus BioSciences) due to similar packaging and storage					
(10)	Eight mix-ups (11 as of today) between Prolia and Udenyca prefilled syringes, mostly stocking errors in outpatient infusion sites, have been reported this year. Both syringes are packaged in similar green and white cartons, with the concentration listed in a green circle in the same location. Also, both products are refrigerated and may be stored near each other.	Store these products away from one another and verify the medication via barcode scanning prior to dispensing and administration. Pharmacy staff may also want to circle the product name on the carton using a permanent marker to draw attention to it.			

Issue No.	Problem	Recommendation	Organization Assessment	Action Required/Assignment	Date Completed
Patient-controlled analgesia (PCA) pump keys available online					
(7) ⚠	Pump keys for CADD-Solis and CareFusion Alaris Medley PCA syringe pumps can still be purchased online, threatening the security of medications in the pumps. Lockboxes for various PCA pumps also can be accessed with common items.	Follow the manufacturer's directions and utilize other security features that may be available with PCA pumps, such as a software code to activate the locking mechanism rather than using just a manual key lock.			
Look-alike vials of bupivacaine and pantoprazole from AuroMedics					
(7) ⚠	Vials of bupivacaine and pantoprazole are the same size with similar light blue labels. If the vials are stored near each other in areas such as the emergency department or perioperative area, mix-ups could result in inadvertent intravenous (IV) administration of bupivacaine, which is cardiotoxic.	Consider purchasing these products from different manufacturers. Barcode scanning should be used prior to drug preparation and administration to detect drug mix-ups. Wherever bupivacaine is stored, lipid emulsion should also be readily available to be used for reversal of inadvertent IV administration.			
Look-alike labeling on various Alvogen product vials					
(8) ⚠	Look-alike labeling can cause mix-ups between Alvogen injectable products (e.g., rocuronium, metoprolol tartrate, deferoxamine mesylate, dexrazoxane, tranexamic acid, midazolam, labetalol, vancomycin, ketorolac). Carton and vial labels have the same mustard yellow background, and a color band highlighting the strength distracts one's eyes away from the drug name.	When possible, purchase these products from different manufacturers so the labels are dissimilar, and separate the storage of all Alvogen products. Barcode scanning should be used prior to drug preparation and administration to detect drug mix-ups.			
Refills prescribed for ELIQUIS (apixaban) starter pack					
(11) ⚠	When prescribing an Eliquis starter pack, a provider modified the default setting of zero refills and sent the prescription to an outpatient pharmacy with refills. Several months of refills were dispensed. Investigation revealed other instances in which the starter pack had been prescribed with refills.	Set the default for refills of all drug starter packs to zero without the ability to modify this field. If prescriptions for both the starter pack and maintenance dose are sent together to the pharmacy, instruct the pharmacist to put the maintenance prescription on hold until the starter pack has been completed. Patient education should also be provided.			

Issue No.	Problem	Recommendation	Organization Assessment	Action Required/Assignment	Date Completed
Distribute FREE NurseAdviceERR to all nurses					
(12)	Frontline nurses need to be aware of significant medication errors that are happening across the nation and ways to avoid them. NurseAdviceERR is a free ISMP newsletter that can help accomplish this goal. However, we are worried that many US hospitals are not distributing this resource to their nurses, thus missing a key opportunity.	Find out if nurses are currently receiving NurseAdviceERR. If not, forward this link to subscribe: www.ismp.org/node/138. ISMP encourages a coordinator from each facility to subscribe and then redistribute the newsletter to other facility nurses. If having difficulty subscribing to the newsletter without a fee, use the code NURSE2019 at checkout.			
Patient education needed for use of disposable standard pen needles					
(12) ⚠	Errors with home-use of standard pen needles continue. In the latest case, a patient failed to remove the inner needle cover on an insulin pen for more than a year. When he realized his mistake, he injected himself correctly but at a dose that had been repeatedly increased during the year, leading to hospitalization due to hypoglycemia.	Contact pen needle manufacturers for demonstration devices to show patients which covers to remove before administration. If a patient's blood glucose level remains elevated after insulin administration, suspect pen or needle misuse before increasing the dose. Ask the patient to demonstrate the administration process if improper use is suspected.			
Dosing levothyroxine in mg continues to cause tenfold overdoses					
(10)	During two hospitalizations, a patient was prescribed oral levothyroxine 0.5 mg instead of 50 mcg. The prescriber modified the selected dose of "25" mcg to "0.5" and changed the dosing unit from "mcg" to "mg." Decimal point confusion has also led to errors between 0.025 mg and 0.25 mg.	Consider adding an order entry warning with a hard stop for doses that exceed 200 mcg. Require all levothyroxine doses to be prescribed in mcg (as expressed on levothyroxine containers). Be sure the dosing unit (mcg) cannot be modified during order entry.			
Mix-up between pralidoxime and pyridoxine due to sound-alike drug names					
(7)	A poison control center recommended a pralidoxime loading dose and infusion to treat organophosphate poisoning. The physician heard "pyridoxine" and repeated it back without recognition of the error. The patient received a bolus dose and part of the pyridoxine infusion before detecting the error.	Spelling the drug name instead of just repeating it back could catch misheard oral communication of sound-alike drug names. Poison control center staff should consider sending an immediate confirmation email/fax of their recommendations to help verify the recommendations.			