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ISMP
An ECRI Affiliate

Nurse AdviseERR®
Educating the Healthcare Community About Safe Medication Practices

Recent look-alike errors with Myxredlin put patients at risk

Over the past few months, ISMP has received multiple error reports that involved mix-ups with **MYXREDLIN** (insulin human) 100 units/100 mL infusion bags and two other intravenous (IV) medication bags, **ZOSYN** (piperacillin and tazobactam) 4.5 g/100 mL and **CARDENE IV** (ni**CAR**dipine) 40 mg/200 mL. These errors were due to several contributing factors, including similar packaging. All three products are manufactured by Baxter. In the cases where the mix-up reached the patient, the errors were identified, actions were taken, and fortunately, the patients recovered. However, we are worried that if an error occurs and it is not caught in time, serious harm, even death, may result.

A description of the recent events follows, along with recommendations for organizations to implement to help prevent this type of error from happening where you work.

Myxredlin and Zosyn Mix-Up

A prescriber ordered Zosyn 4.5 g/100 mL IV every 8 hours for a patient. The pharmacy inadvertently dispensed a Myxredlin 100 units/100 mL bag. Both products have the same red, white, and black colors; and are packaged in 100 mL bags (**Figure 1**). The pharmacy had a dispensing system with barcode scanning technology which alerted the pharmacy technician upon scanning that it was the incorrect medication. The technician saw the warning and scanned the correct product (Zosyn), but did not remove the Myxredlin bag from the preparation area, and placed the Zosyn label on the Myxredlin bag. This was not caught during the pharmacist check. The nurse scanned the pharmacy-generated barcode on the Zosyn label, rather than the manufacturer barcode, and unknowingly infused Myxredlin for approximately 4 hours. The patient was found unresponsive and was transferred to the intensive care unit. After reviewing the infusion bags, the nurse found that the Zosyn label had been placed on the Myxredlin bag. A hypoglycemic protocol was initiated, and the patient recovered shortly after. The organization has reached out to its electronic health record (EHR) vendor to suggest a software change that would prevent nurses from being able to scan the pharmacy-generated barcode, to facilitate scanning the manufacturer barcode.

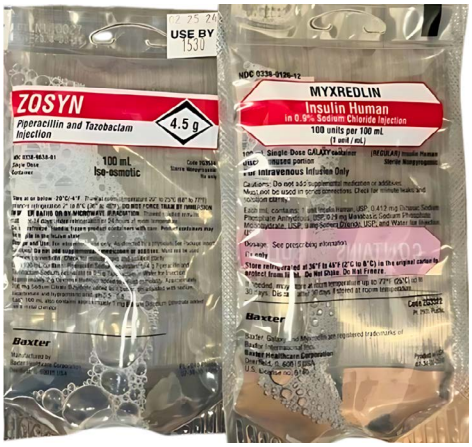

Figure 1. Similar-looking infusion bags of Zosyn (left), and Myxredlin (right), made by Baxter.

In another hospital, a pharmacy technician had just gone through organizational medication safety training which included assessing new products for safety concerns. The technician was evaluating a new product, Myxredlin, which had recently been purchased. He noted that the Myxredlin bag looks very similar to Zosyn bags and escalated this concern to pharmacy leadership. The hospital has decided to store the Myxredlin bags in a separate and secure location, flagged with auxiliary warning labels, and only plans to dispense them to defined areas where staff have received education. This was a great example of completing a safety analysis to proactively consider product characteristics that might lead to medication errors and devise a mitigation plan to proactively prevent errors from occurring.

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SAFETY wires

Sharing a good catch prevented a future error. A nurse reported a close call (i.e., good catch) after attempting to remove a vial of furosemide 20 mg/2 mL (Hospira) from an automated dispensing cabinet (ADC), and finding a vial of ketorolac 30 mg/mL (SOLA) had been placed in the wrong pocket during the ADC refilling process. Both products come in similar-sized brown, light-protected vials, with the drug names displayed in white font on orange banners near the top of the label (**Figure 1**). Due to a shortage, the pharmacy had recently

Figure 1. Similar-looking vials of furosemide (top three vials) and ketorolac (bottom vial) were found mixed together.

purchased ketorolac from SOLA. At an interdisciplinary safety huddle, the good catch was shared with staff to alert them to the similar-looking vials. A few days later,

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Share your safety stories with us

Nurses play an important role in medication safety. They are often the last line of defense in preventing medication errors from reaching the patient. So, we want to hear from you! Share your medication safety stories and error reports in confidence via our website (www.ismp.org/report-medication-error) or via email (ispinfo@ismp.org). Reporter identity and location remain confidential and are never published.

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Myxredlin and Cardene IV Mix-Up

A physician admitted a patient on a Cardene IV 40 mg/200 mL infusion to an inpatient unit from the emergency department (ED). While getting the patient settled, the nurse was notified that she urgently needed to assist another patient. In anticipation that the newly admitted patient's Cardene infusion was going to run out, the nurse went to an automated dispensing cabinet (ADC) and removed what she thought was a carton containing a Cardene bag. Then, before leaving to care for the other patient, the nurse removed the Cardene bag that was already hanging at the bedside and replaced it with the bag obtained from the ADC, never having scanned the barcode. An hour later, she returned to the patient's room and scanned the barcode on the newly infusing medication to document administration in the medication administration record (MAR). At this time, she identified that the medication infusing was actually Myxredlin 100 units/100 mL, which looked very similar to a premixed Cardene infusion bag (**Figure 2**). The cartons, used for light protection, also looked similar (**Figure 3**). The patient received approximately 40 mL of Myxredlin, was given dextrose as a precautionary measure, and fortunately, was not harmed.

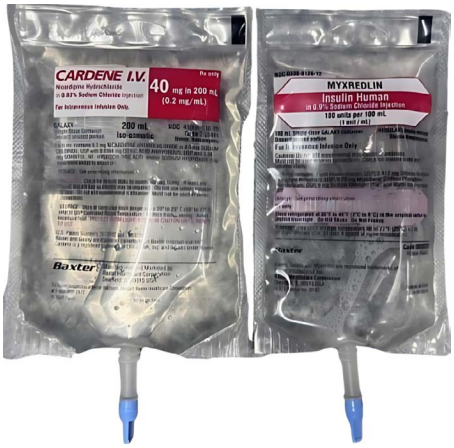

Figure 2. Similar-looking infusion bags of Cardene (left) and Myxredlin (right), made by Baxter.

Figure 3. Cartons containing an infusion bag of Myxredlin (top) and Cardene (bottom).

Upon investigation, the hospital found that during the ADC stocking process, a pharmacy technician scanned the barcode on only one of the Cardene cartons to access and refill the Cardene bin (following their pharmacy's process to only scan one product); then, placed a Myxredlin carton, that was mixed in with the Cardene cartons, in the Cardene bin in error.

Barcode Medication Administration (BCMA) Utilization

In March 2024, our affiliate ECRI, released ***ECRI's Top 10 Patient Safety Concerns for 2024***, which included three medication safety concerns. One of the medication safety concerns is the use of workarounds with BCMA system failures. BCMA systems are valuable tools that reduce medication administration errors, but only when used correctly. Staff must know how to properly use the system, otherwise, practitioners may employ workarounds or unsafe practices such as scanning a medication barcode after administration. BCMA workarounds may indicate that staff have received insufficient education related to appropriate BCMA use, or they lack knowledge about the risks involved when employing a workaround. The medication safety committee should review practices that lead to BCMA workarounds and address system issues to support safe clinical workflow. Regularly review BCMA data to identify medications commonly administered without scanning and address product issues. Observe the BCMA process to help identify potential workflow issues (e.g., administering the drug prior to scanning).

Distractions and Interruptions During Medication Administration

In our May 2024 newsletter, we discussed how distractions and interruptions threaten human performance during critical tasks putting patient safety at risk. A distraction occurs when an

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when checking medications to be filled in an ADC, a pharmacist found a ketorolac vial mixed with furosemide vials. Since the nurse's good catch had been shared with the pharmacy staff, she was aware of the risk, which helped her identify the error.

This serves as an example of how reporting and sharing close calls/good catches supports the development of a learning culture, in which individuals see value in sharing safety issues to prevent errors from reaching a patient. In addition, when the pharmacy receives a new product or a product from a different manufacturer (e.g., new product added to formulary, drug shortage), they will now conduct a review to identify potential risks with the product's design including look-alike labeling and packaging concerns with other products in use (www.ismp.org/node/71460). When problems are recognized, consider purchasing the product (or one product of a problematic pair) from a different manufacturer. Use barcode scanning technology in the pharmacy to confirm that medications chosen for distribution to the ADC match the medications listed on the ADC fill report, before refilling the ADC. If your ADC has the functionality for practitioners to scan individual products (e.g., each vial) when refilling the ADC, consider requiring barcode scanning of each medication before placing it in the ADC. Communicate look-alike labeling and packaging concerns to staff, including any additional actions needed (e.g., use of auxiliary warning labels).

Kentucky law prevents practitioners from being criminally charged for medical errors. We were pleased to learn that Kentucky Governor Andy Beshear recently signed a bill (House Bill 159: www.ismp.org/ext/1363) into law that protects healthcare practitioners from being criminally charged for medical errors, making Kentucky the first state to do so. Under this bill, practitioners, including nurses, pharmacists, and physicians, "shall be immune from criminal liability for any harm or damages alleged to arise from an act or omission relating to the provision of health services" with exceptions for gross negligence and intentional misconduct.

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individual's attention is drawn away from one task to a different task, or when they are trying to work on multiple tasks at the same time. An interruption occurs when an individual is engaged in a task and stops or performs another task with the intention of returning to the initial task. Nurses may frequently be distracted or interrupted when caring for multiple patients that have complex needs and require care, as noted in the Myxredlin/Cardene error described previously. So, although interruptions may be necessary and appropriate when crucial information must be conveyed, minimizing unnecessary distractions and interruptions is essential.

Recommendations

We contacted the US Food and Drug Administration (FDA) and the manufacturer and recommended altering the infusion bag labels (e.g., using color differentiation) for these products. In the meantime, organizations need to be proactive in preventing these types of errors before they occur. Please share and discuss the recommendations listed below with your organizational leaders.

■ Actions to take in the pharmacy

- ☐ **Review new products to identify risks.** When the pharmacy receives a new product (e.g., new product added to formulary, drug shortage), conduct a review to identify potential risks with the product's design including look-alike labeling and packaging concerns with other products in use within the organization (www.ismp.org/node/71460). When problems are recognized, consider purchasing the product (or one product of a problematic pair) from a different manufacturer.

- ☐ **Utilize barcode scanning during distribution and ADC refill.** As per the ISMP ***Guidelines for the Safe Use of Automated Dispensing Cabinets*** (www.ismp.org/node/1372), use barcode scanning technology in the pharmacy to confirm that medications chosen for distribution to the ADC match the medications listed on the ADC fill report. Scan the products before refilling the ADC. Determine if your ADC has the functionality for practitioners to scan individual products (e.g., each bag or vial) when refilling the ADC, and consider requiring barcode scanning of each individual medication container before placing it in the ADC.

- ☐ **Separate storage.** Store look-alike products separately, and consider the use of signage or other warnings such as auxiliary labels on the infusion bags and in storage locations.

■ Actions for nursing

- ☐ **Utilize BCMA prior to administration.** Educate end-users about the importance of scanning the barcode prior to administration, not after, and make sure this is covered during new employee orientation. Gather feedback to assess contributing factors related to workarounds. Share internal and external published events related to incorrect BCMA utilization to educate staff and further highlight the importance of proper use of BCMA.

- ☐ **Scan the manufacturer's barcode.** When available, practitioners should scan the manufacturer's barcode printed directly on the product. This ensures the right (or wrong as in the Myxredlin/Zosyn case described earlier) container is in hand to prevent the risk of a false positive barcode scan from a pharmacy-applied label.

- ☐ **Limit distractions and interruptions.** Medication administration is a complex process. Nurses need to focus their attention on completing each phase (e.g., preparing medications, programming infusion pumps, accessing IV lines) to ensure the medication is administered correctly. It is important to remind practitioners and ancillary staff not to disturb colleagues who are administering medications unless it is urgent.

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This follows our April 7, 2022 newsletter article, *Criminalization of human error and a guilty verdict: A travesty of justice that threatens patient safety* (www.ismp.org/node/30908), when we shared how RaDonda Vaught had been convicted of criminally negligent homicide and gross neglect of an impaired adult following the 2017 tragic death of Charlene Murphey. RaDonda was found guilty of negligent homicide, lost her nursing license, and was sentenced to three years of supervised probation in Tennessee.

ISMP, along with others, feared the criminal charges and the guilty verdict against RaDonda Vaught set a dangerous precedent with worrisome implications for safety. We were concerned the guilty verdict would prevent practitioners from reporting errors, undermine the creation of a culture of safety, accelerate the exodus of practitioners from clinical practice, exacerbate the shortage of healthcare providers, perpetuate the myth that perfect performance is achievable, and impede system improvements.

We are thankful for the path Kentucky has taken with this new law. We hope similar actions will be taken by other states in the near future. We encourage practitioners to report medication errors to their organization, to ISMP, to state agencies where required, and/or to a patient safety organization (PSO), to facilitate learning about the causes and prevention of medication errors.

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Report medication and vaccine errors to ISMP: Please call 1-800-FAIL-SAF(E), or visit: 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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