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ISMP Institute for Safe Medication Practices
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Educating the Healthcare Community About Safe Medication Practices

Saline infusions and flush syringes may not be as "harmless" as you think – scanning will help

Compared to the high-alert medications that practitioners frequently administer, one might argue that "normal saline" or 0.9% sodium chloride injection, is benign. Even in hospitals that are committed to barcode medication administration (BCMA) scanning, we find that staff are not consistently scanning normal saline products, including intravenous (IV) infusion bags and 0.9% sodium chloride flush syringes. The greatest danger is not that the practitioner might administer saline to the wrong patient but rather having the notion that the saline product is "harmless," causing the practitioner to skip scanning, then inadvertently administering an unordered IV medication instead of saline.

There are other reasons why practitioners may not scan barcodes on saline products. By design, in some organizations, prescribers do not enter orders for these products so there is not a prompt on the medication administration record (MAR) to scan. In addition, saline and medication flush syringes are often stored in areas like perioperative, radiology, or emergency departments that may not use BCMA, and are used in situations when barcode scanning may not be practical (e.g., when a patient is coding). Depending on the workflow, a nurse may not bring a computer on wheels and/or scanner to the patient's room if they are planning to simply flush an infusion line with saline. A non-pharmacy department, like central supply or materials management, may purchase sodium chloride infusions and flushes, so they may not be stored in the automated dispensing cabinet (ADC) or medication rooms. Therefore, nurses might not associate these as products that they should scan prior to administration.

Figure 1. Instead of a 0.9% sodium chloride flush (right, BD), a nurse nearly administered phenylephrine 1,000 mcg/10 mL (left, STAQ Pharma), packaged in a similar-looking syringe that was kept at the bedside prior to a procedure.

Scan Saline Flushes

ISMP has written several times about the importance of scanning sodium chloride flushes. In our October 2022 article, Scan Before You Flush, we shared that due to drug shortages, organizations have often purchased products in short supply from different manufacturers. This can result in the product looking different than what practitioners are used to seeing. In one hospital, a pharmacy technician placed heparin flush syringes in a bin intended for saline syringes, which looked similar. Fortunately, a nurse caught this mix-up prior to administration by using barcode scanning.

In a report we received, a nurse removed what she thought was a 10 mL 0.9% sodium chloride flush from a tray in the patient's room, then almost gave it during a bedside procedure. Before administration, the nurse read the label and identified that the syringe contained phenylephrine 1,000 mcg/10 mL instead of saline. The prescriber ordered the phenylephrine to be stored at the bedside in case the patient experienced hypotension during the procedure. The hospital had purchased the phenylephrine syringe from STAQ Pharma, a 503B outsourcing facility. The hospital reported that the phenylephrine syringe which previously had a red cap, now has a white cap, similar to the sodium chloride flush syringes (BD) (**Figure 1**). STAQ Pharma told the hospital that they changed the phenylephrine cap color from

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SAFETY wires

Cresemba unit-dose blisters contain a desiccant. Astellas Pharma manufactures **CRESEMBA** (isavuconazonium sulfate) in blister packs containing 74.5 mg or 186 mg capsules. It is an antifungal agent indicated for the treatment of invasive aspergillosis and mucormycosis in adults and pediatric patients 6 years of age and older who weigh at least 16 kg. The 74.5 mg strength is packaged in a carton of 7 blister packs. Each blister pack contains five capsules per sheet; each capsule is packaged with a corresponding desiccant. The 186 mg strength is packaged in a carton of 2 blister packs. Each sheet contains seven capsules, and again, each capsule is packaged with a corresponding desiccant (**Figure 1**).

Figure 1. Individual blister containing one desiccant (rectangular well on left) and one Cresemba 186 mg capsule (oval well on right).

Each desiccant blister is labeled with "Contains desiccant to protect from moisture. Do not open. Do not eat." However, this warning may be missed as it is only printed on one side of the blister and is in a small font size. The warning "DO NOT EAT" is also included on the desiccant itself but it may also be difficult to read and be missed. Because a desiccant-containing blister could be easily mistaken for a medication-containing blister (**Figure 2**), there is a

Figure 2. Both the desiccant (left) and Cresemba capsule (right) may be accessed and ingested if the backing is completely removed from the blister.

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red to white due to reported look-alike packaging concerns with their succinylcholine syringe.

In another case, a hospital recently procured atropine sulfate injection 1 mg/10 mL syringes manufactured by Amneal. A nurse contacted the pharmacy to report that the atropine syringes were nearly indistinguishable from the 0.9% sodium chloride flush syringes made by BD (**Figure 2**). The nurse noted that these atropine syringes do not come with an overwrap like their previously purchased atropine product, and the labels and printing on the syringe were incredibly small, making it difficult to identify the contents.

In yet another case, a hospital reported that once a practitioner removes the overwrap, sodium chloride 0.9% flush syringes (Excelsior Medical) look very similar to calcium chloride 1,000 mg/10 mL syringes (Medefil) (**Figure 3**). This led to a close call in an operating room where barcode scanning has not been implemented.

Figure 2. The 0.9% sodium chloride flush syringe by BD (left) looks similar to the atropine syringe by Amneal (right).

Scan Saline Infusions

Errors and close calls can also occur with premixed saline infusions. In a recent case, a radiology technologist removed a 100 mL bag of what he thought was 0.9% sodium chloride from a bin in the imaging center. When loading the fluid into the computed tomography (CT) contrast power injector, the technologist noticed the label looked different than the one on the bag he typically used. He did not administer the fluid and immediately brought the bag to the pharmacy. The pharmacist identified that it was gentamicin 80 mg/100 mL in 0.9% sodium chloride injection. The pharmacist called the imaging center and asked the nurse to check the bin where the 100 mL saline bags were stored. She found additional bags of gentamicin, which were sequestered. Baxter makes both products, and they come in similar packaging (**Figure 4**).

Figure 3. The 0.9% sodium chloride flush syringe by Excelsior Medical (left) looks like the calcium chloride syringe by Medefil (right), once removed from their overwraps.

In this hospital's imaging center, prescribers were not required to enter orders for 0.9% sodium chloride in the electronic health record (EHR) when these products were used to test for IV line patency. Although radiology technologists administered some medications in the imaging center, this area did not have an ADC or use barcode scanning prior to medication administration.

Purchasing 0.9% sodium chloride for the imaging center was left to central supply. The person ordering the supply typed "NaCl 100 mL" into the ordering software. The first option was for gentamicin sulfate in 0.9% sodium chloride injection, which they selected and ordered in error. The shipment was delivered to the imaging center 3 months prior to the event. The

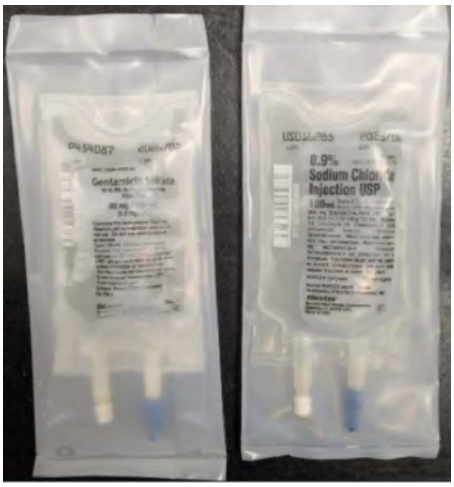

Figure 4. Bags of gentamicin 80 mg/100 mL injection (left) were found mixed in the bin used to store bags of 0.9% sodium chloride 100 mL injection (right).

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risk that a patient may accidentally ingest a desiccant.

That is exactly what happened in one case reported to ISMP. A nurse accidentally handed both the capsule and the desiccant to a patient. The patient then ingested both. The patient later reported throat discomfort, describing it as being scratched by the desiccant.

We have previously written about reports we received in which patients have accidentally ingested desiccant capsules from medication bottles and blister packs. For example, multiple patients ingested the desiccant tablets included in the everolimus packs manufactured by Biocon Pharma.

It is critical that healthcare practitioners and patients know that these blister packs contain desiccants that should not be swallowed or eaten. Pharmacy should consider applying a warning label to alert nurses that the blister contains a desiccant.

EPINEPHrine auto-injector does not have a retractable needle. A pediatric emergency department nurse reported that the **EPINEPH**rine single-dose prefilled auto-injector (Amneal) does not automatically retract and shield the needle post-injection. According to the prescribing information, Amneal's **EPINEPH**rine auto-injector requires the user to manually slide a cover over the needle after administration, increasing the risk of a needlestick injury. The nurse expressed concern that this could lead to a needlestick injury, so they notified the pharmacy, which now purchases an **EPINEPH**rine product from a different manufacturer.

Other brands (e.g., **EPIPEN** [Mylan], generic products [Mylan, Teva]) have safety mechanisms in place that automatically cover the needle after administration or the needle automatically retracts (e.g., **AUVI-Q** [Kaleo]) to help prevent accidental needlestick injuries.

We have notified the manufacturer about this concern and recommended that they

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radiology technologist did not read the label or scan the barcode before restocking the bags, then unknowingly added the gentamicin bags to the 0.9% sodium chloride bin.

Of the 25 gentamicin bags purchased, 17 were located, and it was presumed that 8 patients might have received 30 to 50 mL (24 to 40 mg) of gentamicin in error. The radiology director contacted the physicians of the patients who may have been impacted. A pharmacist reviewed the EHR for all of the potentially impacted patients to assess allergies/reactions, weight (to determine mg/kg gentamicin dose potentially administered), laboratory monitoring (e.g., renal function), and if any readmissions could be correlated. They did not identify any actual patient harm.

When investigating further, they discovered that central supply had access to the entire drug product catalog in the ordering software, including some high-alert medications (e.g., concentrated potassium chloride, heparin). They had a process for pharmacy to review orders for "pharmaceuticals," but the pharmacy was not required to review the imaging center's orders. To complicate matters, medication names in the ordering system were long and detailed, often hard to interpret, and some selections lacked product photos.

Recommendations

Organizations should evaluate practices around scanning sodium chloride products and consider the following recommendations.

Evaluate workflow. Review the current workflow at all steps of the medication-use process, including ordering, prescribing, dispensing, storing, and administering saline. Consider conducting a failure mode and effects analysis (FMEA) to determine potential risks and develop mitigation strategies. Require prescribers to enter orders in the EHR for all medications **and** fluids, including 0.9% sodium chloride (or include in order sets). When possible, hospitals should have ADCs in clinical areas such as the radiology department, requiring pharmacist review and approval of orders prior to access. Gather feedback from end users about barriers to scanning (e.g., access to equipment) and solutions to address them.

Restrict medication purchasing. Review medication and fluid (including saline fluids and flush syringes) ordering policies and procedures for all organizational locations (e.g., radiology, perioperative areas, outpatient infusion centers), including those purchased by non-pharmacy departments. Ensure medications are restricted to pharmacy purchasing unless an exception is specifically justified.

Maximize barcode scanning. Use barcode scanning when receiving, dispensing, filling the ADC or other storage location, and prior to administering any medication, including sodium chloride infusions and flush syringes. The ISMP Targeted Medication Safety Best Practices for Hospitals, Best Practice 18, calls for maximizing the use of BCMA by expanding use beyond inpatient care areas, including perioperative areas, radiology, and the emergency department. Regularly observe scanning practices and review scanning data (e.g., compliance, alerts) to identify products commonly administered without scanning to help uncover potential workflow or product issues. Supervisors should be on constant lookout for staff who bypass this important safety system; gather feedback from end users about barriers to scanning (e.g., access to equipment) and solutions to address them.

Prompt nurses on the MAR. Prompt nurses on the MAR to scan barcodes on saline infusions and flush syringes prior to administration or flushing IV lines.

Conduct a safety review. Have pharmacy complete a proactive review of the packaging and labeling of products when purchased, especially during drug shortages when products could be changing frequently. Consider purchasing a product from a different vendor when problems are

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add engineering controls to the needle that protect people against needlestick injuries. Amneal has escalated our concern for further follow-up.

Organizations should consider purchasing products with automatic mechanisms to prevent needlestick injuries. Continue to report issues and concerns with devices that do not have safety mechanisms in place to ISMP, FDA, and the respective manufacturer.

RifAMPin and rifapentine mix-ups. A hospital pharmacist reported that two different community pharmacies inadvertently dispensed rif**AMP**in instead of rifapentine to patients. The prescribers had ordered rifapentine for the initial treatment of tuberculosis (TB). In both cases, the community pharmacists were unfamiliar with rifapentine, had not dispensed it before, and did not have the product in the pharmacy.

The hospital pharmacist who reported these mix-ups was concerned that practitioners may not be aware of the Updated Guidelines on the Treatment of Drug-Susceptible and Drug-Resistant TB. These guidelines recommend using rifapentine as an initial TB treatment option, which has a longer half-life and can reduce the patient's pill burden and frequency of administration compared to rif**AMP**in. For example, depending on the indication and phase of treatment, rifapentine may be administered once *weekly*, while rif**AMP**in is administered *daily*.

It is easy to see how this error could occur, as both rifapentine tablets and rif**AMP**in capsules are available in 150 mg dosage strengths, and both are rifamycin-class antibiotics with an FDA-approved indication to treat TB. While no patient harm was reported, it is possible that, if left undiscovered, the patients would have been inadequately treated which may contribute to drug resistance.

Practitioners should be aware of these updated guidelines and the various dosing parameters and indications for all rifamycins.

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identified. If look-alike products must be purchased, implement strategies (e.g., auxiliary labels) to call out their differences and ensure availability and use of BCMA.

Communicate product packaging changes. Communicate with staff when there is a change in product packaging, or when a new product is available, and review the packaging, storage location, and other pertinent information.

Safeguard storage. Store look-alike products separately and in a way that keeps their labels as visible as possible. Manufacturers' and outsourcers' product labels and packaging might change, so identifying physical features (e.g., cap color, label color) alone should not be used to identify any medication. This speaks to the importance of scanning the barcode along with reading the product label.

Educate staff. Provide practitioners with initial and annual barcode scanning competency assessments, emphasizing the risk and rationale for scanning all saline infusions and flushes to detect the wrong product selection.

Report errors. Report errors that reach patients and close calls with saline internally and to ISMP.

Another potentially contaminated calcium gluconate bag—now by Amneal

A hospital reported sterility concerns with a calcium gluconate 2,000 mg/100 mL injection bag manufactured by Amneal (NDC 80830-2363-1, lot number AH250052, expiration date 3/31/2027). A nurse went to remove a patient's dose from the automated dispensing cabinet (ADC) and, upon removing the overwrap, observed a black/brown substance resembling mold inside the sealed, unopened inner bag (**Figure 1**). The nurse never spiked or administered the product. It was immediately sequestered and reported to the pharmacy. The pharmacy removed the entire supply of 2,000 mg/100 mL calcium gluconate bags by Amneal from patient care areas.

In our September 2025, newsletter article, Contaminated WG Critical Care Calcium Gluconate 2,000 mg/100 mL Bag, we shared a similar concern with 2,000 mg/100 mL calcium gluconate bags made by WG Critical Care. In this case, WG Critical Care attributed the contamination to a microchannel defect at the seal between the tubing and the bag, compromising the product's sterility. According to instructions on the WG Critical Care bag label, practitioners should check for leaks by squeezing the container. WG Critical Care confirmed that the bag was contaminated with mold, and this was an isolated event.

Figure 1. A black/brown substance was found inside a sealed, unopened bag of calcium gluconate 2,000 mg/100 mL manufactured by Amneal.

We have reported this issue to FDA and Amneal. At this point, we do not know if this is the same issue as the WG Critical Care bags. These incidents underscore how critical it is for end users to stay vigilant in reviewing product integrity and to escalate potential safety issues. If your organization purchases calcium gluconate 2,000 mg/100 mL from Amneal or WG Critical Care, review your inventory and ensure end users are aware of this concern. If potentially impacted product is found, sequester it and report it to the manufacturer, FDA, and ISMP. Remind staff to visually inspect all medication injectable solutions for particulate matter, discoloration, and potential contaminants prior to use.

Special Announcements

Survey on IV push medications

If you prepare, dispense, administer, or analyze errors related to IV push medications, we want to hear from you! Med Safety Board, an ISMP company, is conducting a short survey to reassess current practices and safety risks. Please take 5-10 minutes to complete the survey; the deadline has been extended to **October 15, 2025**. Thank you!

FREE ISMP webinar with CE

Join us on **October 9, 2025** for our webinar, ***Applying Best Practices to Prevent Wrong Drug Errors Associated with Generic Names***. Pharmacy and nursing continuing education (CE) will be offered. This activity is supported by an educational grant from Azurity Pharmaceuticals. For more information and to register, click here.

Virtual MSI workshop

You still have time to join us for one of our ***ISMP Medication Safety Intensive (MSI)*** workshops before the end of the year. This two-day virtual workshop is designed to help you successfully address current medication safety challenges that impact patient safety. Program faculty will provide you with the knowledge, as well as specific tools and resources needed to establish and sustain an aggressive, yet focused medication safety program. Upcoming sessions will be held on: **October 16 and 17**; and **December 4 and 5, 2025**. For more information and to register, click here.

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