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ISMP

Nurse AdviseERR®

Educating the Healthcare Community About Safe Medication Practices

Part II: Survey results suggest action is needed to improve safety with adult IV push medications

PROBLEM: In our November 2018 newsletter (www.ismp.org/ext/145), we shared the findings from a recent 2018 ISMP survey of 977 practitioners (mostly nurses) on adult intravenous (IV) push medication practices and compared these results to related ISMP surveys conducted between 2010 and 2014. The 2018 survey revealed five unsafe practices associated with IV push medications that have persisted or worsened in the past decade:

1. Using prefilled syringes or cartridges as vials (withdrawing some or all medication from a prefilled syringe or cartridge into another syringe for administration)
2. Diluting adult IV push medications unnecessarily despite their availability in a ready-to-administer form (e.g., manufacturer or pharmacy-prepared syringes, single-dose vials)
3. Diluting or reconstituting an IV push medication in a prefilled 0.9% sodium chloride (saline) flush syringe that is rarely relabeled (see "**Is it really saline?**" to the right)
4. Failing to properly label syringes of IV push medications prepared away from the patient's bedside
5. Clinicians preparing or manipulating IV push medications on patient care units instead of pharmacy dispensing ready-to-administer syringes of medications

The survey also identified conditions that foster and perpetuate these five unsafe practices, including:

- Ongoing drug shortages, which have led to:
  - A declining number of adult IV push medications dispensed in ready-to-administer syringes
  - An increase in IV push medications being dispensed in unfamiliar formulations (concentrations and packages) and volumes greater than needed
  - Administering medications by the IV push route that were previously administered by infusion (which may continue after resolution of the drug shortage)
  - Unsafe drug conservation practices (e.g., using partial doses from prefilled syringes, cartridges, or single-dose vials and saving the remainder for future use)
- Beliefs associated with IV push drug administration:
  - Erroneous belief that a 10 mL syringe must be used to administer IV push medications via an implanted port or peripherally inserted central catheter (PICC)
  - Mistaken assumption that labeling a syringe is not necessary if only one drug or one syringe is prepared, or if syringes can otherwise be distinguished by visual appearance or location
- System vulnerabilities:
  - Lack of syringe (cartridge) holders to administer IV push medications in manufacturers' prefilled syringes/cartridges
  - Use of prefilled syringes without a needleless connector or removable needle to attach to an IV access port

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Is it really saline?

Eighty-one percent of respondents (mostly nurses) to our 2018 survey reported that they have used a prefilled 0.9% sodium chloride (saline) flush syringe to reconstitute or dilute an IV push medication, particularly the 5 mL or 10 mL flush syringes. This unsafe practice has increased since our 2014 survey, at which time 54% of practitioners said they had diluted medications using a saline flush syringe. When participants in our 2018 survey were asked to describe the process, three methods were reported, most often resulting in a saline flush syringe that also contains a medication (**Table 1**). Most respondents who described the process did not mention relabeling the flush syringe. Herein lies the problem: the syringe is labeled "0.9% saline flush" but contains additional medication.

If the syringe leaves the preparer's hands before being administered, it might be used by another practitioner as a saline flush. The result could be lethal if the syringe contains a high-alert medication such as an opioid, which about three-quarters of respondents

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Table 1. Reasons given for diluting medications using a saline flush syringe (descending order of frequency)

Description of Respondent's Process
Waste an appropriate amount of saline from the prefilled saline syringe, draw the proper amount of medication from a syringe (cartridge) or vial directly into the prefilled saline syringe, mix, and administer
Draw the dose of medication into a syringe, waste an appropriate amount of saline from the prefilled saline syringe, add the medication to the saline syringe, mix, and administer (mostly used for low volume doses to aid in measurement)
Draw the appropriate dose of medication into a syringe, add to that syringe the appropriate amount of saline diluent from the prefilled saline syringe, mix, and administer

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- ☐ Variability in procedures used to administer IV push medications to ensure slow administration, avoidance of patient discomfort, and a reduction in the risk of extravasation
- ☐ Recommendations for unnecessary dilution in drug references
- ☐ Lack of available labels for self-prepared syringes
- ☐ Organizational policies that do not require labeling of self-prepared syringes
- ☐ Perpetuation of unsafe IV push medication practices during professional education, orientation, and on-the-job training (e.g., unnecessary dilution)

In **Part II**, we offer recommendations for the safe preparation and administration of adult IV push medications based on the survey results. We are also providing practitioners with access to a new gap analysis tool that can be used to evaluate an organization's adherence to the ISMP ***Guidelines for Safe Practice of Adult IV Push Medications***[1] (see boxed information below).

SAFE PRACTICE RECOMMENDATIONS: ISMP recommends the following actions to reduce the risk of medication errors or other adverse patient outcomes associated with adult IV push medication administration.

Assessing Unsafe Practices

Conduct a gap analysis. ISMP strongly encourages all organizations to conduct an assessment of adult IV push medication practices using our recently launched ***ISMP Gap Analysis Tool (GAT) for Safe IV Push Medication Practices*** (see boxed information below). The GAT will help facilities identify and address the five unsafe behaviors identified in the recent ISMP survey as well as conduct a broader analysis of compliance with all the evidence- and expert consensus-based best practices found in the ISMP ***Guidelines for Safe Practice of Adult IV Push Medications***.[1] The GAT will also help facilities identify opportunities for improvement and track their progress over time. The tool is available for **FREE** thanks to support from the Baxter Healthcare Corporation.

Dispensing Ready-to-Administer Prefilled Syringes

Dispense prefilled syringes. When possible, dispense IV push medications in ready-to-administer prefilled syringes in the correct concentration and volumes needed for common or patient-specific doses. If prefilled syringes are not available commercially, pharmacy should prepare and dispense syringes of medications in patient-specific doses. If stability conditions do not allow for such preparation, commercially available single-dose vials should be dispensed. All prefilled parenteral

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Find and minimize your IV push safety gaps with NEW ISMP tool

ISMP has launched a new tool to help healthcare facilities identify and manage targeted risks associated with the use of IV push medications in adults. The ***ISMP Gap Analysis Tool (GAT) for Safe IV Push Medication Practices*** is designed to assist practitioners in evaluating their practices, pinpointing specific challenges and potential areas for improvement, and tracking progress over time. The GAT is based on ISMP's IV push medication guidelines and consists of 50 items. The tool is being made available at no charge, thanks to support from Baxter Healthcare Corporation. Healthcare facilities that submit their findings to ISMP anonymously via a secure internet portal by **March 31, 2019**, will receive a gap analysis score and will have access to aggregate data after the submission period. The aggregate data can be used to compare a facility's experiences to that of demographically similar healthcare facilities. Participation can also help facilities assess their compliance with local policies and procedures for management of IV push medications, as well as requirements from regulatory or accrediting agencies such as the Centers for Medicare & Medicaid Services (CMS). For more information, or to access the GAT, visit: www.ismp.org/node/1188.

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admitted to diluting even when the medication was provided in manufacturer or pharmacy-prepared syringes.

Some saline flush manufacturers have widened the gradations on flush syringes to a full mL to discourage dilution since more precise gradations are needed to measure medications accurately. Others have added "For Flush Only" to the label to remind practitioners of their intended use. However, this unsafe behavior has persisted.

Please educate staff about the serious risks associated with this practice and that dilution of medications provided in a ready-to-administer form is unnecessary.

SAFETY wires

Inpatient ketamine overdose with 503B compounded syringe. A patient was supposed to receive ketamine 10 mg as needed for pain. The patient's nurse removed a 503B compounded prefilled ketamine syringe from an automated dispensing cabinet (ADC) to administer a dose. (503B compounding pharmacies are external pharmacies that prepare large batches of certain medications for hospitals to purchase and use within their facility.) The ketamine was packaged in a 5 mL syringe prominently labeled as "Ketamine, 10 mg/mL." The total



Figure 1. This syringe contains 50 mg of ketamine but was thought to hold just 10 mg given the prominent expression of the concentration as 10 mg/mL.

dose and total volume in the syringe can be found only in the smaller print under the highlighted text, outside the yellow background (**Figure 1**). Unfortunately, the nurse did not recognize the total volume in the syringe (5 mL) and the entire 50 mg amount was administered. Because of the 5-fold overdose, the patient became somnolent but, fortunately, recovered.

It was later identified that the way the 10 mg/mL concentration was highlighted

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syringes should allow administration via a needleless system (e.g., have a luer connector or removable needle). To facilitate use of manufacturer's prefilled cartridge syringes, be sure designated syringe (cartridge) holders are readily available and practitioners know how to access and use them.

Establishing Safe Practices Around Dilution

Seek alternatives when possible. For medications where dilution may be needed for patient comfort or to reduce the risk of extravasation or injury during IV push administration, have the pharmacy determine if alternatives exist that do not need to be diluted, or if the medication can be administered via a syringe pump or small volume IV infusion.

Be clear about dilution. Establish a facility-specific policy regarding which, if any, adult IV push medications should be diluted prior to administration, where the medication should be diluted (pharmacy, if possible), and guidelines for how the medication should be diluted and administered. Communicate the policy and guidelines to appropriate practitioners.

Pharmacy dilution. When possible, require pharmacy to prepare all IV push medications that must be diluted according to the manufacturer's guidelines or facility's policy. The syringe of diluted medication should be labeled for each patient with the patient's name, drug name, strength, dose, directions for administration (e.g., slow IV push over 3 to 5 minutes), and the beyond-use date/time.

Nurse/frontline practitioner dilution. If stability requires a medication to be diluted immediately prior to IV push administration, provide the medication in a single-dose vial (not a prefilled syringe) along with specific directions for dilution via written or electronic guidelines or checklists that provide the appropriate diluent, standard diluent volumes, and resulting concentrations (e.g., mg/total volume). Also provide dilution instructions on the medication administration record (MAR) or another document that is readily accessible prior to drug administration. Be sure directions for withdrawing the patient's dose are included, as well as proper labeling of the drug's concentration after dilution. Encourage nurses/frontline practitioners to always reference the facility's policy and guidelines when diluting medications, and to call the pharmacy with questions (as commercial drug references may provide less specific or different recommendations compared to the facility's policy and guidelines).

Do not dilute in flush syringes. Eliminate the use of saline flush syringes for diluting and administering medications. These syringes are considered medical devices, not medications, and have not been evaluated or approved for the dilution and administration of IV push medications (see "**Is it really saline?**" on page 1, right column).

Coaching and Educating Practitioners

Dispel myths. Conduct educational programs to dispel myths that lead to unsafe practices associated with IV push medication administration. For example, an update may be in order based on the Infusion Nurses Society (INS) guidelines that note it is safe to use a syringe that is *appropriately sized* (e.g., 3 mL) for the administration of IV push medications via an implanted port or PICC once patency has been confirmed using a 10 mL (or 10 mL diameter-sized) syringe to flush the line.[2] Also, dispel any misunderstandings regarding the benefits and risks of diluting all adult IV push medications prior to administration in the absence of manufacturers' recommendations (which may differ from some drug reference recommendations).

Coach practitioners to see the risk. Hold discussions with practitioners and present educational programs to help them clearly see the risks associated with these five unsafe practices. In particular, emphasize the unacceptable risks associated

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in yellow on both the manufacturer's outer packaging and the syringe itself, led the nurse to believe that the total amount in the syringe was just 10 mg, which was the dose ordered for the patient. Currently, 503B outsourcers are not required to follow USP <7> labeling requirements to list the concentration as the total amount of drug per the total volume in the syringe, as is required by all commercial manufacturers. However, most practitioners have come to expect labeling that prominently displays the total amount of drug per total volume in the container. The ketamine error was discussed during a hospital-wide safety huddle, and a decision was made to alert all nursing staff about the labeling issue. An auxiliary label indicating the total dose is now also attached to the product.

This error is similar to previously reported errors described in our March 22, 2018 acute care newsletter article, *FDA guidance needed to assure safe labeling practices by 503A and 503B compounders* (www.ismp.org/node/998). As noted in that article, the total quantity per total volume (above 1 mL) should be the primary and prominent expression on the principal display panel of the label, followed by quantity per mL in parentheses; for example, 50 mg per 5 mL (10 mg/mL). For safety reasons, we highly recommend purchasing and using only outsourced syringes that are labeled following USP <7> requirements. Unfortunately, some 503B pharmacies say many hospitals have specifically requested the per mL expression, which is why they label the medications in this manner. They are concerned that, if they stopped labeling medications using a per mL designation, they would lose business to other outsourcers that continue to label this way. The US Food and Drug Administration (FDA) must step in and require the USP <7> standard so every outsourcer is safely labeling syringes the same way. ISMP has had ongoing communication with FDA in support of this position. For organizations that desire the per mL designation, this expression of strength is already on the label when USP <7> is followed although it is not the most prominent expression.

DOBUTamine concentration mix-ups. Baxter **DOBU**Tamine 1,000 mg per 250 mL

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Newsletter also partially supported by an educational grant from NEOMED®

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with: withdrawing a medication from a prefilled syringe and transferring it into another syringe; diluting medications dispensed in a ready-to-administer form, particularly opioids, anxiolytics/antipsychotics, and antiemetics; using a prefilled saline flush syringe to dilute or reconstitute a medication (see "**Is it really saline?**" on page 1, right column); and failing to label a syringe prepared away from the patient's bedside, even if only one syringe or medication has been prepared, or if practitioners believe they can distinguish multiple syringes by visual appearance or location alone. When appropriate, recognize the role that drug shortages may play in these unsafe practices, and let practitioners know how the organization will manage the shortages in a way that reduces the need to engage in these practices.

Assess orientation content. Review orientation program content to ensure that new practitioners are not being taught unsafe adult IV push administration practices, such as unnecessary dilution or dilution using a flush syringe, and to ensure they are being taught the best practices found in the ISMP ***Guidelines for Safe Practice of Adult IV Push Medications***.[1] Consider creating an orientation checklist of competencies associated with IV push medication administration based on the ISMP Guidelines.

Safe Labeling of Self-Prepared Syringes

Make labeling an expectation. Establish policies and procedures that require practitioners to label all IV push medications prepared away from the bedside (or not administered immediately if prepared at the bedside), even if only one syringe or medication has been prepared. Provide practitioners with the required content for all medication labels and be sure this expectation is communicated to all practitioners.

Provide patient care units with labels. To facilitate proper labeling of self-prepared syringes, provide patient care units with blank, preprinted, peel-off, and/or automated labels (e.g., labels for patient-specific or unit-dose medications that are created or printed from automated devices such as an automated dispensing cabinet). Avoid using tape to create a label or taping a medication vial to the syringe as a method of labeling. Handwriting on the tape may not be legible, may smear, or the tape may fall off; and the syringe and vial may come apart during transport. Instead, pursue more accurate and safe ways to label self-prepared syringes.

Other Recommendations

Reduce variability with IV push administration. Establish a clear procedure for administering IV push medications to ensure slow administration, avoidance of patient discomfort, and a reduction in the risk of extravasation. Be sure practitioners do not mistakenly believe that further dilution of ready-to-administer medications is the only way to achieve these goals.

List the rate of administration. For quick reference, include the rate of administering all IV push medications on the MAR.

References

1) ISMP. Guidelines for safe practice of adult IV push medications. 2015. www.ismp.org/node/97
2) Infusion Nurses Society. Infusion therapy standards of practice (standard 40, flushing and locking, practice criteria D3). *J Infus Nurs.* 2016;39(1S):S1-S159.

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(4,000 mcg/mL) premixed bags were erroneously placed in a bin holding **DOBUT**amine 250 mg per 250 mL (1,000 mcg/mL). The two different concentrations were noticed when stocking new inventory. Separately labeled bins are normally used to store each concentration. The overwrap for the premixed **DOBUT**amine bags, which is available in three different concentrations (250 mg, 500 mg, and 1,000 mg per 250 mL), looks nearly identical (**Figure 1**). Similar mix-ups have been reported by other hospitals. We have communicated with Baxter but also wanted to bring this to your attention. If you are using these products, you should alert staff about the issue and segregate the various concentrations. Also, place a prominent warning about the potential for mix-ups wherever these products are stored, and always scan the barcode when selecting and administering any product.



Figure 1. Outerwraps on **DOBUT**amine infusions in various concentrations look very similar.

what's in a Name?

Drug name stem articles

We hope you are enjoying our "**what's in a *Name?***" feature articles on drug stem names. Please look for our next stem name feature article in the **January 2019** issue of the *ISMP Medication Safety Alert! Nurse AdviseERR*.

If you would like to subscribe to this newsletter, visit: www.ismp.org/node/138

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Production of this peer-reviewed newsletter would not be possible without the assistance of a reliable and talented clinical advisory board. As 2018 nears an end, we want to thank each of the following members of the advisory board for their dedication to making this newsletter a valuable medication safety resource for clinicians.

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from the staff and trustees at the Institute for Safe Medication Practices. We wish you joy, health, and happiness this holiday season!

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