November 17, 2022 ▪ Volume 27 Issue 23

ISMP
An ECRI Affiliate

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

Preventing errors when preparing and administering medications via enteral feeding tubes

Problem: Due to the complex nature of preparing and administering medications via enteral feeding tubes, reports of occluded tubes, reduced therapeutic effects, and toxicity leading to patient harm are prevalent. It has been over 12 years since we warned of feeding tube challenges that practitioners and patients often face. Unfortunately, we continue to receive reports related to a variety of issues, including the lack of readily accessible information, gaps in training/experience, unknown feeding tube status, incorrect or inappropriate route or tube size, improper preparation, and wrong administration techniques.

Lack of readily accessible information. Prescribing information and drug references do not always contain information about manipulating medications for administration via enteral feeding tubes. Practitioners may not be aware of the few available resources to guide decision-making. Also, limited or no data exist related to potential drug-enteral nutrition interactions in the gut when drugs and feedings are administered together.

Gaps in training and experience. Practitioners do not always receive training about the nuances associated with prescribing, verifying, preparing, and administering medications through an enteral feeding tube. Often, a comprehensive overview is lacking during professional education (e.g., medical, pharmacy, nursing school), and knowledge is only passed down from other practitioners or colleagues, without a standard policy and procedure for practitioners to follow.

Unknown feeding tube status. If a prescriber does not know that a patient has an enteral feeding tube, they may order medications via the oral route without considering that the enteral route may impact drug efficacy or toxicity. If the electronic health record (EHR) does not prompt to screen for enteral feeding tube status for each admission, or alert other healthcare practitioners when a feeding tube is ordered, pharmacists and other practitioners must remember to check and document this condition for each patient.

Incorrect route. If a prescriber selects the oral route of administration for a patient who requires a medication via an enteral feeding tube, the EHR will not prompt the pharmacist verifying the order to screen the medication and formulation for route compatibility. Furthermore, if a nurse knows that a patient receives medications via a feeding tube at home, but the prescriber does not order the correct route in the EHR, the nurse may still prepare and administer the medication via the enteral feeding tube without recognizing this might not be appropriate for a particular medication/formulation.

Inappropriate route or tube size. Even when prescribers indicate the correct route, practitioners cannot assume a medication intended for oral use can be safely crushed or opened and administered through a patient's feeding tube. Depending on the distal access site of the feeding tube, the medication may end up in the stomach, duodenum, or jejunum, which impacts how the medication is dissolved and absorbed and can either reduce its effectiveness or increase the risk of toxicity. The enteral route is also limited by the size or diameter of the feeding tube (e.g., measured in French [Fr] units with smaller numbers representing a smaller diameter). This limitation may result in clogging of smaller tubes.

continued on page 2 — Enteral feeding tubes >

Your Reports at Work

New ready-to-use vaccine presentations do not require reconstitution. We were pleased to see that the US Food and Drug Administration (FDA) recently approved two newly reformulated vaccine products that eliminate the need to mix two components together. GSK recently received approval for a ready-to-administer presentation of **ROTARIX** (rotavirus vaccine, live, oral). The new product will be available in early 2023 (www.ismp.org/ext/1031). Rotarix is administered orally to infants to prevent gastroenteritis caused by rotavirus.

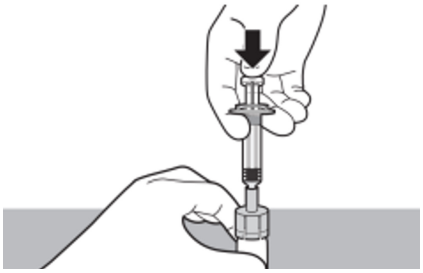

Figure 1. The older two-component Rotarix presentation requires reconstitution of the vial containing the lyophilized vaccine component with the liquid within the dosing applicator.

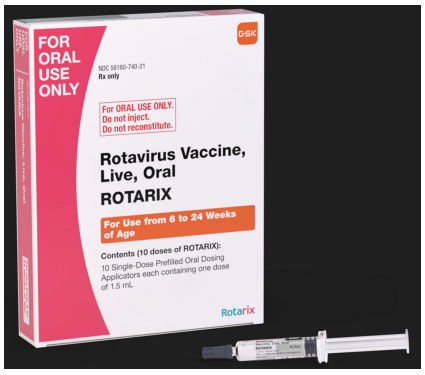

Figure 2. The new Rotarix oral dosing applicator-only presentation does not require reconstitution.

Historically, Rotarix has only been available as a two-component product that requires reconstitution of lyophilized vaccine with the liquid contained in an oral dosing applicator,

continued on page 2 — REPORTS >

> Enteral feeding tubes — continued from page 1

Improper preparation. If a practitioner crushes a hazardous medication without utilizing appropriate personal protective equipment (PPE) and containment controls, drug exposure can result in harm not only to the person preparing the medication but also to the patient. If a practitioner crushes enteric-coated, controlled-release, sustained-release, orally disintegrating, or effervescent medications, toxicity or reduced drug efficacy may result. Unfortunately, practitioners often do not discover that a formulation was inappropriate for enteral tube administration until the patient experiences an occluded tube or adverse clinical outcome.

Wrong administration technique. Common inappropriate administration techniques include: 1) mixing multiple medications together to give at once; 2) neglecting to flush the tube prior to and after medication administration; and 3) mixing medications with enteral feedings. These can lead to incompatibility issues with other medications and feedings. The following events demonstrate some additional challenges:

A physician ordered potassium chloride oral solution for an elderly patient with a low potassium level to be administered via the patient's gastrostomy tube (G-tube). Due to the cost of the liquid formulation, potassium chloride extended-release tablets were the organization's preferred formulation. The pharmacist modified the order from the oral solution to an extended-release tablet without confirming whether this product was appropriate for G-tube administration. The nurse crushed and administered the tablet, which resulted in the patient's G-tube occluding. Furthermore, these extended-release tablets should not have been crushed.

A nurse crushed a furosemide tablet, mixed it with 60 mL of water, and administered it to a patient via an orogastric (OG) tube. After the nurse administered the dose, the physician told the nurse that, since the patient was fluid-restricted, the tablets should be mixed with 20 mL of water for future doses. The organization did not have a standard policy or procedure for mixing and flushing medications via feeding tubes, and the order did not specify the dilution volume. After consulting with the pharmacist, the nurse was informed that most furosemide tablets do not need to be crushed, as practitioners can disperse them in 20 mL of water by placing the tablet into an enteral syringe barrel, replacing the plunger, drawing up water, and gently agitating. While there is an oral liquid formulation of furosemide, this is not a good option for enteral feeding tube administration as it requires significant dilution because of its high osmolality and pH.

A prescriber ordered a dronabinol 2.5 mg capsule for a nurse to administer orally to a patient. Even though the order specified the "oral route," the patient had a nasogastric (NG) tube, so the nurse cut off the top of the capsule and tried to squeeze out medication into the patient's NG tube. The pharmacist who verified the order was not aware that the patient had an NG tube until the nurse contacted the pharmacy, concerned that the patient did not receive the entire dose inside the capsule. The pharmacist notified the prescriber and recommended updating the route from oral to NG tube and from capsules to oral solution.

A patient received lansoprazole orally disintegrating tablets (ODT) via a size 10 Fr feeding tube at home. Once admitted, a prescriber ordered lansoprazole capsules. While ODT can be dispersed in a syringe and safely administered through a size 8 Fr tube or larger, capsules require at least a size 16 Fr tube. When the nurse questioned the change in formulation, the pharmacist recognized the error and notified the prescriber, who updated the order to an ODT.

Safe Practice Recommendations: Organize an interdisciplinary team to review any concerns or events that have occurred within your organization or those published externally, such as in the ***ISMP Medication Safety Alert!*** Also, review information from other sources, including national organizations, such as the American Society for

continued on page 3 — Enteral feeding tubes >

Your *Reports* at *Work*

continued from page 1

which looks like a prefilled syringe, using a supplied transfer device (**Figure 1**, page 1). However, there have been long-standing issues with practitioners inadvertently omitting reconstitution and using the liquid in the syringe by itself. Or the vaccine was mixed, transferred to a parenteral syringe, and injected. To avoid the need for dilution and to facilitate the correct route of administration, the new, fully liquid formulation is provided in an oral dosing applicator (**Figure 2**, page 1), and the tip does not allow for a needle to be attached (www.ismp.org/ext/1032). However, practitioners still need to be educated to never transfer the vaccine into a parenteral syringe for injection. Also, to avoid a choking hazard, those administering the vaccine must ensure the protective cap on the dose applicator is removed and discarded prior to giving the dose (**Figure 3**).

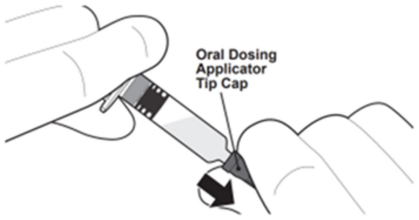

Figure 3. Remove and discard the oral dosing applicator tip cap prior to administration.

GSK also received FDA approval for a ready-to-use **MENVEO** solution for intramuscular (IM) injection (www.ismp.org/ext/1033) (**Figure 4**). Menveo, which is used to prevent disease caused by meningococcal bacteria serogroups A, C, Y, and W, has historically only been available as a two-component product that requires the reconstitution of MenA lyophilized powder with the vial containing MenCYW-135 liquid (**Figure 5**, page 3) prior to IM administration. The ***ISMP National Vaccine Errors Reporting Program*** (ISMP VERP) has received multiple reports over the years where the MenCYW-135 liquid conjugate vaccine component was given by itself (www.ismp.org/node/260). The

continued on page 3 — *REPORTS* >

Figure 4. The new Menveo ready-to-use vial (pink cap) does not require reconstitution.

> Enteral feeding tubes — continued from page 2

Parenteral and Enteral Nutrition (ASPEN). Consider the following resources to promote the safe preparation and administration of medications via enteral feeding tubes:

- **ASPEN Safe Practices for Enteral Nutrition Therapy:** Boullata JI, Carrera AL, Harvey L, et al. ASPEN safe practices for enteral nutrition therapy. *JPEN J Parenter Enteral Nutr*. 2017;41(1):15-103. www.ismp.org/ext/1011
- **Guidebook on Enteral Medication Administration:** This book, edited by Boullata JI, provides information on safe medication administration via feeding tubes, as well as many drug monographs. www.ismp.org/ext/1012
- **Making the Enteral Route Safe and Effective for Tube-Fed Patients:** Boullata JI. Enteral medication for the tube-fed patient: making this route safe and effective. *Nutr Clin Pract*. 2021;36(1):111-32. www.ismp.org/ext/1013
- **Drug Information Resources:** Drug monographs contain information on enteral access device administration for select medications commonly administered via feeding tubes.

Establish drug and dosage form suitability. When adding a medication to the formulary, screen for enteral feeding tube restrictions. Although immediate-release tablets and certain capsules are generally acceptable formulations, each product should be evaluated. Avoid oral liquids with high viscosity and osmolarity as they can clog tubes, alter the liquid's bioavailability, or cause adverse gastrointestinal effects. For solid dosage forms, refer to the ***List of Oral Dosage Forms That Should Not Be Crushed*** (www.ismp.org/node/140) by Thomas Land Publishers (see *Clarification about the* ***Do Not Crush List***, right column, page 3). Of note, this list does not address French tube size (a small diameter is more likely to clog). Practitioners should use this information in conjunction with the official prescribing information, drug information references, and primary literature.

Create a policy or procedure. Document and compile medication- and formulation-specific recommendations in a central location for practitioners to use as a reference. Revise this document regularly as the latest information is collected.

Educate practitioners. During orientation and annual competency assessments, educate practitioners on how to safely prescribe, dispense, prepare, and administer medications via feeding tubes. When the organization adds a new medication to the formulary, share pertinent administration information with staff members. Make resources accessible.

EHR to guide practice. When a prescriber orders an oral drug, the EHR should prompt them to select the route (i.e., oral or enteral tube) and the access site (i.e., gastric or post-pyloric). Restrict prescribers from being able to order medications/formulations in the EHR that are contraindicated for tube administration. When a practitioner orders the placement of an enteral feeding tube, the order can be set up to prompt a medication administration record (MAR) entry of "TUBE," and the EHR can be set up to trigger an alert if an inappropriate formulation is ordered. When possible, build preparation instructions into medication orders, warning about medications that should not be crushed or prepared for tube administration.

Validate the route and tube size. As part of the admission process, prescribers should confirm the patient's enteral feeding tube status, including tube type, location, distal access site, size, and clinical use. During medication reconciliation, document whether the patient receives all of their medications via tube, or whether some are administered orally. When practitioners place or remove an enteral feeding tube, ensure the route of administration is updated for medications that are impacted by the change.

Seek expertise. Before a prescriber places a medication order, and prior to a nurse preparing and administering a medication via an enteral tube, consult a pharmacist with any questions about the safety of a drug to be given via an enteral feeding tube.

continued on page 4 — Enteral feeding tubes >

Your *Reports* at *Work*

continued from page 2

new one-vial presentation is a significant improvement because it prevents this possibility. The Menveo one-vial presentation will become available in mid-2023. However, since the new presentation is for individuals 10 through 55 years, the two-component presentation will still be available for patients as young as 2 months (www.ismp.org/ext/1034). Organizations should develop transition plans for the introduction of these products and phasing out of discontinued products (in the case of two-component Rotarix) (www.ismp.org/node/32208).

ISMP would like to acknowledge those who reported concerns with the two-component vaccines and encourage organizations to continue to provide feedback to us so we can work with manufacturers and the FDA to improve the safety of product labeling and packaging.

Figure 5. The two-component Menveo presentation requires the reconstitution of the MenA lyophilized powder vial (orange cap) with the MenCYW-135 liquid vial (gray cap).

Clarification about the *Do Not Crush List*

The ***List of Oral Dosage Forms That Should Not Be Crushed*** (commonly referred to as the ***Do Not Crush List***) was first posted on ISMP's website in 2006 (www.ismp.org/node/140). The list was originally compiled and updated by John Mitchell, PharmD, who passed away on June 10, 2014. The list has since been maintained and updated by Thomas Land Publishers and is available for purchase as a wall chart on ISMP's website.

In 2021, a journal article was published describing an in-depth analysis of products on the ISMP *Do Not Crush List*, with the goal of removing

continued on page 4 — *Do Not Crush List* >

> Enteral feeding tubes — continued from page 3

Use ENFit devices. For patient safety, ENFit feeding tubes and associated devices should be used in your facility (https://stayconnected.org/).

Standardize the technique. To promote a standard and safe administration technique, provide nurses with a checklist that includes the following:

- **Prepare each medication separately.** Avoid mixing two or more medications together, whether solid or liquid formulations, as this can create a new unknown entity with an unpredictable release and bioavailability.
  - **Capsules.** Open immediate-release capsules and completely remove the powder or crush the solid contents. If prepared in a container (e.g., medicine cup), rinse the container to collect all the particles into an ENFit syringe (https://stayconnected.org/).
  - **Tablets.** Certain immediate-release tablets can be dispersed in water (in an ENFit syringe), so the practitioner does not need to crush them. Pharmacists can be consulted for such information. If the formulation requires crushing, then crush the tablet into a fine powder using a self-contained pill-crushing device such as the RxCrush (www.ismp.org/ext/989) or the Silent Knight Pill Crusher (www.ismp.org/ext/991).
  - **Liquids.** Draw up the prescribed dose into an ENFit syringe. If dilution is needed, pull in some air prior to adding the diluent.
- **Dilute and disperse.** Mix each crushed solid and appropriate liquid medication with purified water free of chemical contaminants, microorganisms, and pyrogens (e.g., sterile water for irrigation). Gently agitate to disperse.
- **Do not mix medications with formula.** Avoid directly adding medications to the feeding formula as this could cause drug-enteral nutrition interactions (i.e., incompatibility and instability) as well as tube blockages.
- **Flush.** Stop the feeding and flush the tube with at least 15 mL of purified water (for adults) before and after the administration of each medication. In neonatal and pediatric patients, flush feeding tubes with the lowest volume necessary to clear the tube, taking into account the internal volume of the tube. In a survey conducted by ASPEN, the consensus was to use 2 to 5 mL as the flushing volume in pediatric patients and 1 mL or less of water or air in place of water in neonates (www.ismp.org/ext/1011).
- **Administer separately.** Give each medication separately through the feeding tube using a clean ENFit syringe.
- **Flush again.** Flush the tube with at least 15 mL of purified water for adults (less for pediatric patients) to ensure the entire dose of medication has been administered to the patient and to clear the tube.
- **Restart the feeding.** After flushing, resume the feeding. Certain medications may require a delay of 30 minutes or more to avoid interactions or to optimize absorption.

Monitor and report. Observe patients and escalate any unanticipated clinical outcomes after administering medications via feeding tubes.

Teach patients. Often patients will follow the same techniques to prepare and administer medications at home that were utilized while hospitalized. Educate patients about safe practices at home and have the patient or caregiver demonstrate the proper technique using the teach-back method. Notify patients of common issues seen when administering medications via tubes and when to seek medical attention.

We thank Allison Blackmer, PharmD, BCPS, BCPPS, FCCP, FASPEN, and Joseph Boullata, PharmD, RPh, CNS-S, FASPEN, FACN, for providing ISMP with the information for this article.

> *Do Not Crush List* — continued from page 3

unnecessary restrictions and providing conditional recommendations when needed (Uttaro E, Zhao F, Schweighardt A. Filling the gaps on the Institute for Safe Medication Practices [ISMP] Do Not Crush List for immediate-release products. *Int J Pharm Compd.* 2021;25[5]:364-71).

ISMP would like to take this opportunity to clarify that we do not own, update, or review content on this list. ISMP recognizes the *Do Not Crush List* as a clinically important resource and appreciates Uttaro and colleagues for their efforts to reconcile discrepancies.

ISMP encourages organizations to maintain, update, and periodically review a list of oral dosage forms that may require alteration through evaluation of package inserts, drug manufacturer inquiries, tertiary drug information resources, and primary literature. Any inquiries regarding the *Oral Dosage Forms That Should Not Be Crushed* should be directed to: mary@thomasland.com.

REMINDER: Please take our survey on tall man letters!

We are asking for your input so we can update our list of tall man letters. Please take our survey and submit your responses by **December 2, 2022**, online at: www.ismp.org/ext/1014.

To subscribe: www.ismp.org/node/10

ISMP Medication *Safety Alert!* Acute Care (ISSN 1550-6312)

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.

Walk the Red Carpet with Safety Stars

ISMP 25th Annual Cheers Awards

Join us on Tuesday evening, **December 6, 2022**, at 6:00 pm for the ISMP 25th Annual Cheers Awards at Stoney's Rockin' Country in Las Vegas. The awards will celebrate a group of healthcare leaders who are shining bright and have developed innovative strategies that resulted in sustained improvements in patient safety.

You can help honor this year's blockbuster Cheers Award winners **by making a donation and/or attending the awards dinner.** Your participation helps bring attention to safety advances and enables ISMP to continue the core of its lifesaving work – preventing medication errors. To make a donation and/or register for the dinner, please visit: **www.ismp.org/node/34185.**

Keynote Speaker and Lifetime Achievement Award Winner:
Michael R. Cohen, RPh, MS, ScD (hon), DPS (hon), FASHP

ISMP ACTIVITIES AT THE 2022 ASHP MIDYEAR MEETING IN LAS VEGAS

Workshop *(registration required)*

Thursday, December 1 & Friday, December 2
Medication Safety Intensive
7:30 am – 4:30 pm ET
Virtual format
To register, visit: www.ismp.org/node/32779

Symposium *(at Mandalay Bay North Convention Center)*

Monday, December 5
Optimizing Sterile Compounding Best Practices: Leveraging Technologies and Removing Barriers to Improve Safety

11:30 am – 1:00 pm PT, Doors open at 10:45 am
Room: South Pacific J, Lower Level
To register, visit: www.ismp.org/node/45374

Educational Sessions with ISMP Speakers

Sunday, December 4
The Pharmacy Team: A Patient Safety Anchor in a Turbulent Sea

1:00 pm – 4:00 pm PT
Room: Islander Ballroom I, Lower Level

Tuesday, December 6
High on Safety: Practical Approaches to Becoming Highly Reliable
8:00 am – 9:15 am PT
Room: Breakers C, Level 2

Wednesday, December 7
ISMP Medication Safety Update 2022

2:00 pm – 3:30 pm PT
Room: Breakers C, Level 2

ISMP Institute for Safe Medication Practices
An ECRI Affiliate