Did you know that administering drugs through a feeding tube can be prone to errors? Medication errors related to this route of administration happen more often than reported or recognized. These errors are often the result of administering medications that are incompatible with administration via a tube, preparing the medications improperly, and/or administering a drug using improper administration techniques. All of these can lead to resident harm or even death. The Centers for Medicare and Medicaid Services (CMS) recognizes the importance of this type of medication error and has instructed state surveyors to specifically look for errors involving medication administration via an enteral feeding tube. For more information on the CMS survey criteria, please see www.ismp.org/sc?id=340.

Incompatible route

Nurses should not assume oral medications intended to be taken by mouth can be safely administered through a feeding tube. The drug’s physical and chemical properties control its release and subsequent absorption. These very specific delivery mechanisms may be altered or destroyed if the drug is administered through a feeding tube, reducing its effectiveness or increasing the risk of toxicity. For example, oral tablets of ACCUPRIL (quinapril) contain magnesium carbonate. Crushing an Accupril tablet and dissolving it in water for enteral administration allows the carbonate to increase the pH of the solution, causing the drug to rapidly degrade into a poorly absorbed metabolite.

Improper absorption

Drug absorption depends on the drug’s solubility and ability to permeate the intestinal mucosa. The distal end of the feeding tube can be in the stomach, duodenum, or jejunum. Many drugs must be administered into the stomach or duodenum so they can be properly dissolved using gastric juices, bile, and pancreatic enzymes, and be fully absorbed through the intestines. Thus, a drug like warfarin (COUM-ADIN) that is absorbed high in the small bowel, or oral iron that is dissolved in the stomach and then absorbed in the duodenum, will not be properly absorbed if given via a jejunostomy tube.

Improper preparation

Oral medications intended to be taken by mouth must be prepared for enteral administration. Tablets must be crushed and diluted, capsules must be opened so the contents can be diluted, and even many commercially available liquid forms of drugs that can be given enterally should be further diluted before administration—a practice not well known to all nurses.

Many immediate-release tablets can be safely crushed into a fine powder and diluted prior to administration. But, sublingual, enteric-coated, and extended/delayed-release medications should not be crushed. In addition to destroying the drug’s protective coating, crushed enteric-coated tablets tend to clump and clog feeding tubes. Crushed sublingual or extended/delayed-release medications can lead to dangerous and erratic blood levels as well as dangerous side effects. Unfortunately, drug companies may not crush medications they believe will alter their effectiveness. As with many medications, this may not be the case.

Establish route suitability. Determine the location of the distal end of the feeding tube, and ask a pharmacist if the medication(s) will be properly dissolved and absorbed.

Establish drug and dosage form suitability. Ensure that the drug and dosage form are appropriate for enteral administration. Use only immediate-release dosage forms. Consult an up-to-date “Do Not Crush” list (www.ismp.org/Tools/DoNotCrush.pdf) or call a pharmacist to see if a liquid form of the drug is available and appropriate.

Crush solid dosage forms. Crush tablets into a fine powder using a self-contained, pill-crushing device (e.g., Silent Knight), which prevents residue from one medicine being mixed with another. The pharmacy should crush allergenic, cytotoxic, carcinogenic, or teratogenic drugs prior to dispensing them.

Open capsules. Open immediate-release gelatin capsules to remove the contents or to crush the solid contents.

Dilute the medication. Dilute the crushed drug as well as liquid medications. Purified water (e.g., distilled or sterile water) is preferred over tap water, as tap water often contains chemical contaminants (e.g., heavy metals) that might interact with a drug.

Don’t mix medications. Do not add medication(s) directly to the formula. Mixing drugs with the feeding formula may lead to dangerous and erratic blood levels as well as dangerous side effects. Unfortunately, drug companies may not recommend mixing medications with the feeding formula.

Check it out! Follow these guidelines for administering drugs via an enteral feeding tube:

- Crush solid dosage forms. Crush tablets into a fine powder using a self-contained, pill-crushing device (e.g., Silent Knight), which prevents residue from one medicine being mixed with another. The pharmacy should crush allergenic, cytotoxic, carcinogenic, or teratogenic drugs prior to dispensing them.
- Establish route suitability. Determine the location of the distal end of the feeding tube, and ask a pharmacist if the medication(s) will be properly dissolved and absorbed.
- Establish drug and dosage form suitability. Ensure that the drug and dosage form are appropriate for enteral administration. Use only immediate-release dosage forms. Consult an up-to-date “Do Not Crush” list (www.ismp.org/Tools/DoNotCrush.pdf) or call a pharmacist to see if a liquid form of the drug is available and appropriate.
- Crush solid dosage forms. Crush tablets into a fine powder using a self-contained, pill-crushing device (e.g., Silent Knight), which prevents residue from one medicine being mixed with another. The pharmacy should crush allergenic, cytotoxic, carcinogenic, or teratogenic drugs prior to dispensing them.
- Open capsules. Open immediate-release gelatin capsules to remove the contents or to crush the solid contents.
- Dilute the medication. Dilute the crushed drug as well as liquid medications. Purified water (e.g., distilled or sterile water) is preferred over tap water, as tap water often contains chemical contaminants (e.g., heavy metals) that might interact with a drug.
- Don’t mix medications. Do not add medication(s) directly to the formula. Mixing drugs with the feeding formula may lead to dangerous and erratic blood levels as well as dangerous side effects. Unfortunately, drug companies may not recommend mixing medications with the feeding formula.

ISMP wishes to recognize the medication safety efforts in long-term care facilities during National Nursing Home Week. May 11-17, 2014
Crushing drugs such as TRACLEER (bosentan) or PROSCAR (finasteride), or opening ZAVESCA (miglustat) capsules, can expose female nurses to powder that can cause a variety of birth defects. Some orally disintegrating tablets, such as PREVACID (lansoprazole) SOLTABS, must not be crushed because they contain enteric-coated microgranules. Some capsules contain both immediate- and extended/delayed-release granules. With liquid-filled capsules, it is difficult to ensure that all the liquid has been removed to give the correct dose.

Using a commercially available liquid form of the medication or other preparations used to make oral suspensions may seem like a safe alternative, but some, such as Prevacid Oral Suspension Packets, may not be appropriate for administration via feeding tubes. Also, excipients in some oral solutions and suspensions, such as sweeteners, gums, stabilizers, and suspension agents, can increase viscosity and osmolality, causing diarrhea, clogged tubes, and/or undelivered medication left in the tube.

**Improper administration technique**

Most nurses rely chiefly on their own experience and that of coworkers for information regarding the preparation and administration of enteral medications; few rely on pharmacists or printed guidelines, which has resulted in a variety of improper techniques and an overall lack of consistency. The most common improper administration techniques include giving multiple drugs together, and failing to flush the tube before administering the first drug and between each drug.

Appropriate administration techniques must be used to prevent compatibility issues between the medication and the feeding formula and tube occlusions. Information about drug compatibility with feeding formulas is limited and may not be applicable to different formulations of the same drug or drugs within the same class, which may have a different pH. Issues related to the compatibility between the formula and drug are likely to result in tube occlusions.

Oral solutions should never be administered into an enteral feeding tube using a parenteral syringe.

Compatibility between multiple drugs being administered at the same time can also be a problem, particularly if two or more drugs are crushed and mixed together before administration. Mixing two or more drugs together, whether solid or liquid forms, creates a brand new, unknown entity with an unpredictable mechanism of release and bioavailability. Proper flushing of the tube before, between, and after each drug can help avoid problems.

Finally, oral solutions should never be administered via an enteral feeding tube using a parenteral syringe. An oral syringe should be used. This is one of the ISMP 2014-2015 Targeted Medication Safety Best Practices for Hospitals. There have been numerous fatal errors involving the accidental administration of an oral solution via the IV route, because the drug was in a parenteral syringe. Although most errors have been reported in hospitals, these errors could easily occur in the long-term care setting as well. All it takes is one minor distraction or mental lapse on the healthcare provider’s part for an error to occur.

**Check it out! cont’d from page 1**

Mula could cause interactions, leading to tube blockages, altered bioavailability, and changes in bowel function.

- **Flush.** Flush the tube with at least 15 mL purified water before and after administering each medication.
- **Administer separately.** Administer each drug separately through the feeding tube using a clean 30 mL or larger oral (non-Luer tip) syringe.
- **Flush again.** Flush the tube again with at least 15 mL purified water to ensure drug delivery and clear the tube.
- **Restart the feeding.** The feeding can usually be restarted after drug administration and flushing. (Some drugs require a delay of 30 minutes or more.)
- **Report and investigate.** Feeding tube occlusions or unexpected responses to drug therapy should be reported and investigated to determine the cause.
- **Use oral syringes.** Do not use parenteral syringes to administer drugs into an enteral tube (or by the oral route). Use oral syringes, which are designed to not allow connection to parenteral tubing systems. This will prevent misadministration via the parenteral route. Oral syringes, preferably labeled in metric (mL) volume markings only, should be available in all patient care areas.


**Safety wires**

More on wrong resident fax errors. In the October 2013 newsletter, we highlighted the issue of wrong resident medication errors. One of the causes we discussed was faxing medication orders for two different residents on the same fax page. We recently received two reports in which orders continued on page 3—Feeding tube.
OIG report highlights medication-related adverse events in nursing homes

In February 2014, the Department of Health and Human Services Office of Inspector General (OIG) released the report: Adverse Events in Skilled Nursing Facilities: National Incidence Among Medicare Beneficiaries (see www.ismp.org/sc?id=339). Seventy-nine percent of all adverse events resulted in prolonged skilled nursing facility (SNF) stay, transfer to a different SNF or other post-acute facility, and/or hospitalization. Another 14% required intervention to sustain the resident’s life, and 6% contributed to or resulted in the resident’s death. The report noted that the vast majority (66%) of preventable adverse events were medication-related.

Of the 37% of all adverse events that were classified as medication-related, 12% resulted in drug-induced delirium or other change in mental status; 5% led to excessive bleeding; 4% were from a fall or other trauma with injury secondary to the effects of medication; and 4% led to constipation, obstruction, or an ileus. Drug-related events that contributed most to resident death involved excessive bleeding due to anticoagulants, and acute hypoglycemia. Factors that contributed to preventable adverse events causing temporary harm included substandard treatment, inadequate resident monitoring, or failing to provide treatments.

The OIG is recommending that the Agency for Healthcare Research and Quality (AHRQ) and the Centers for Medicare and Medicaid Services (CMS) encourage nursing homes to report adverse events in confidence to Patient Safety Organizations (PSOs), of which ISMP is one. Thus, we encourage you to share your medication safety stories and error reports by calling ISMP at 1-800-FAILSFA(E), via our website (www.ismp.org/MERP), or by email (ismpinfo@ismp.org).

We thank Joseph Boullata, PharmD, BPh, BCNSP, for providing ISMP with the information necessary for this article, which was adapted from a comprehensive article he authored on the subject: Boullata JI, Drug administration through an enteral feeding tube. Am J Nurs. 2009;109(10):34-42.