

# Pediatric G-Tube Medication Administration

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## WHAT IS ENTERAL NUTRITION?

Enteral nutrition is used in patients for whom it is anticipated oral feedings will be inadequate for at least 5–7 days, leading to malnutrition. Malnutrition is associated with poor outcomes, including increased risk of infection. Children may be indicated for tube feeding use because of the following: dysphagia; aspiration; congenital complications of the mouth, esophagus, or intestines; administration of medications needed to sustain life or for special diet; head trauma; craniofacial abnormalities; or failure to thrive. This article aims to provide guidance on which medications can be crushed, concerns for tube clogging, and instructions for proper administration of medications given via enteral tube feeding (ETF).

There are multiple ways a patient may receive ETF, including gravity control (tubing that is fitted with a roller clamp to allow for infusion into the stomach); continuous infusion by an enteral pump (used in hospital settings because of a lower risk of aspiration compared with bolus feeding and must only be used with jejunal or duodenal feedings); cyclic feedings (continuous feeding over 10–12 hours); and intermittent bolus feedings of 100–300 ml for up to 60 minutes every 4–6 hours, which is typically reserved for stable patients whose feeding tube ends in the stomach.

Complications include improper placement, displacement, clogged feeding tubes, aspiration, diarrhea, constipation, dehydration, electrolyte imbalances, nasopharyngeal erosions, and sinusitis (Hamilton, 2019).

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Drug administration can further complicate tube feedings depending on compatibility with the enteral nutrition, interactions with the tubing, or inadequate dosing to the patient depending on the drug formulation. Considerations for medication administration and ETF include knowing which medications can be crushed and if there are alternative dosing forms, such as liquids, which allow for easier ETF administration. Other considerations include clinical need for medications that cannot be administered via ETF because of absorption location of medication and alternative medications with similar mechanisms of action. If the incorrect medication or formulation is inadvertently given via ETF, this can lead to tube obstruction, reduced efficacy, and toxicity.

## MEDICATION SELECTION CONSIDERATIONS AND ADMINISTRATION INSTRUCTIONS

Medication selection considerations include whether the drug is immediate or extended release. Extended-release medications containing the suffix ER, XR, or XL should not be crushed. Crushing these formulations alters the pharmacokinetics of the medication, releasing the entirety of the dose at once and resulting in toxicity. Similarly, enteric-coated (EC) medications, like budesonide EC have a unique formulation to ensure that the medications that would normally cause stomach irritation are not released until reaching the small intestine. The enteric coat prevents dissolution by the patient's stomach acid, and these protective effects are eliminated if the medication is crushed (American Academy of Pediatrics, 2011).

When choosing a liquid alternative, differentiation between solutions and suspensions must be made. Suspensions are more viscous in comparison with solutions. To improve the fluidity of the medication, sterile or distilled water can be added to the dose. This decreases the likelihood of the tube clogging upon administration (Kaufman, 2009). Choosing liquid formulations of medications is preferable to ensure the proper dose is administered as well as the likelihood of crushed tablets causing irritation to the upper gastrointestinal or clogging the tubing.

The quantity of medication to be given via ETF should also be considered, as large doses could cause gastrointestinal distress because of inactive ingredients such as sorbitol. It may be recommended to further dilute the medication with sterile or distilled water before administration (Iannelli & Garbi, 2019).

Helpful resources include Lexicomp, the American Drug Index, and Red Book, which provide information regarding medications that should not be crushed.

What to do when administering medications through a gastrostomy tube (McConnell, 2002):

- Assess if the medication can be given via ETF. If a tablet or capsule is ordered, verify if there is a liquid formulation to prevent clogging of the tube. Dilution of the medication with 30 ml of sterile or distilled water can help prevent clogging.
- If no liquid formulation is available, use a pill crusher to grind medication into a powder to dilute with 30 ml of sterile or distilled water (Figure 1).
- Verify the following before administering medication via ETF:

o Does the medication need to be given on an empty stomach?

o Does tube feeding need to be held before or after administration of the medication, and for how long?



FIGURE 1. A pill crusher to assist in administering medications through a gastrostomy tube.

What not to do:

- Do not mix the medication with feeding formula.
- Do not give the following types of medications in a feeding tube: those that should not be crushed, such as EC or extended release; sublingual; buccal; irritants; atropine sublingual; and chemo toxic agents such as carbamazepine ER.

Steps for medication administration (Williams, 2008) are the following:

- 1. Stop the pump.
- 2. Flush tubing with 15–30 ml of sterile or distilled water.
- 3. Insert the desired diluted medication into the tube.
- 4. Do not force the medication down the tube.

5. Flush the tubing after medication administration with 15–30 ml of sterile or distilled water to ensure the patient received the full dose of medication and to prevent clogging.

### What to Do in the Event of Tube Clogging

In the event of the ETF becoming clogged, recommendations include warm water flushes, commercially available enzyme treatments, or mechanical clearing devices. Of the options, mechanical clearing devices were shown to be the most effective (Garrison, 2018).

Below is a list of commonly used medications in the pediatric setting that may or may not be crushed. These lists provide examples and are not all-inclusive (White & Bradnam, 2015; Wyman et al., 2008).

Acceptable to Crush	Do Not Crush
Acetaminophen tablets, solution*	Metoprolol tartrate*
Loratadine tablets, solution*	Amoxicillin/clavulanic acid*
Cefuroxime suspension*	Bupropion (SR, XL) <sup>^</sup>
Levetiracetam solution*	Carbamazepine ER <sup>^</sup>
Ibuprofen tablets, solution*	Ciprofloxacin suspension*
Ciprofloxacin tablets*	Lansoprazole packets*
Lansoprazole tablets*	

\*Immediate-release (IR) medications. ^Extended-release (ER) medications.

Medications With Solution/Suspension Alternatives (American Academy of Pediatrics, 2011)
Amoxicillin
Amoxicillin-clavulanate
Azithromycin
Cephalexin
Clindamycin
Penicillin V
Oseltamivir
Acetaminophen
Ibuprofen
Prednisone/prednisolone
Amphetamine
Dextroamphetamine

Finally, when administering medications, it should be kept in mind that there are different types of G tubes used in practice (O'Dowd et al., 2004; Williams, 2008).

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Type of G Tube	Description
PEG Tube	Inserted through the patient's abdominal wall.
Mic-Key	Provides gastric decompression and feeding. Contains a retention balloon to ensure that the tube is kept securely enterally.

## **CLINICAL PEARLS**

Below are clinical pearls (Ekincioglu & Demirkan, 2013):

- 1. Tetracyclines and quinolones such as ciprofloxacin, levofloxacin, and moxifloxacin as well as levothyroxine can chelate with metals (calcium, magnesium, iron), which reduces drug availability; therefore, it is recommended to separate administration of these medications from tube feeds. Ciprofloxacin oral suspension is an oil-based suspension that adheres to the feeding tube, and it is recommended to crush and mix immediate-release ciprofloxacin tablets with water and to flush the line before and after administration.
- 2. Phenytoin levels are reduced when the medication binds to the feeding solution, leading to subtherapeutic levels. It is recommended to separate tube feeds by 2 hours when administering this medication.

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