

# Enteral feeding: Indications, complications, and nursing care

Get up to date on current enteral nutrition guidelines.

By Amanda Houston, MSN, MHA, RN, and Paul Fuldauer, RD, LDN

**ENTERAL FEEDINGS** deliver nourishment through a tube directly into the GI tract. They're ordered for patients with a functioning GI tract who can't ingest enough nutrition orally to meet their needs. The feeding tube may stay in place as briefly as a few days or permanently, until the patient's death. (See *Indications for enteral feeding*.)

This article discusses types of enteral feeding tubes, methods, and formulas. It also reviews enteral feeding complications and describes related nursing care.

## Defining malnutrition

People experiencing the physiologic stress of illness may have increased metabolic demands with reduced capacity to take in nutrition. Prolonged calorie restriction can lead to malnutrition. According to the Academy of Nutrition and Dietetics and the American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.), patients with at least two of the following criteria are malnourished:

- insufficient energy intake
- weight loss
- muscle mass loss
- subcutaneous fat loss
- localized or generalized fluid accumulation that may mask weight loss
- diminished functional status as measured by handgrip strength.

Malnourished patients with inadequate caloric and protein intake may suffer emaciation, poor healing, and pressure injuries. In severe cases, they may develop osteope-

nia, osteomalacia, osteoporosis, muscle weakness, increased fracture risk, polyneuropathy, paresthesias, confusion, dementia, and pancytopenia. Some also may have low albumin and prealbumin levels, which can cause fluid to pool in a localized or generalized distribution. But before blaming malnutrition for abnormal albumin or prealbumin levels, clinicians must consider such factors as persistent inflammation and hepatic or renal impairment.



## Types of enteral feeding tubes

The practitioner selects the type of feeding tube based on the specific enteral formula the patient requires and the anticipated duration of enteral feeding. The two main types of feeding tubes are prepyloric and postpyloric.

- **Prepyloric** tubes end in the stomach above the pyloric sphincter. They're preferred for intermittent feeding and to allow gastric absorption.
- **Postpyloric** tubes end beyond the pyloric sphincter in the jejunum. They're indicated for patients with gastroparesis, acute pancreatitis, gastric outlet stenosis, hyperemesis (including gravis), recurrent aspiration, tracheoesophageal fistula, and stenosis with gastroenterostomy. Postpyloric feedings must be administered on a continuous basis. (See *Comparing enteral feeding tubes*.)

## Enteral feeding formulas

Enteral feeding formulas fall into several general categories, such as polymeric formulas, feeding modules, elemental, and specialized or disease-specific formulas. Practitioners choose the formula that best meets the patient's individual needs. Nutritional demands vary with age, weight, height, current nutritional status, laboratory values, and activity level. Also, enteral feeding requirements may vary even within similar groups of patients, such as those with renal dysfunction or liver failure.

To calculate the correct volume to



### LEARNING OBJECTIVES

1. Compare types of enteral feeding delivery methods.
2. Describe complications of enteral feeding.
3. Discuss the nursing care of patients receiving enteral feeding.

The authors and planners of this CNE activity have disclosed no relevant financial relationships with any commercial companies pertaining to this activity. See the last page of the article to learn how to earn CNE credit.

Expiration: 1/1/20

## Indications for enteral feeding

Indications for enteral feeding include traumatic brain injury, stroke, dementia, and gastric dysfunction with malnutrition.

- Traumatic brain injury can alter the level of consciousness to the point where the patient can't eat or drink safely. Occasionally, a coma is induced to reduce pressure inside the brain or promote respiratory support.
- About 55% of patients with stroke experience dysphagia. Enteral feeding is an option if a speech therapist can't find a safe consistency of food that the patient can tolerate by mouth.
- For patients with dementia, enteral feeding is controversial if the condition stems from a progressive disease. In 2014, the American Geriatrics Society released a position statement against enteral feeding in advanced dementia, stating that hand feeding produces the same outcomes in terms of aspiration pneumonia, functional status, comfort, and death rates. However, family members may opt for enteral feedings out of concern that their loved one may experience hunger.
- Gastric dysfunction with malnutrition (for instance, from chronic pancreatitis or gastroparesis) may warrant a postpyloric (jejunal [JJ]) feeding tube. Patients with chronic pancreatitis also may benefit from a J tube due to complications of prolonged decreased nutrient intake. J tube feedings help prevent ileus in these patients, minimize further organ damage, and reduce pancreatic stimulation. In patients at high risk for aspiration due to gastroparesis, a postpyloric tube can help prevent tube-feeding intolerance.

### Other indications

Patients recovering from treatment for cancer of the throat, esophagus, or stomach also may require nutrition through enteral feeding. Sedated and mechanically ventilated patients may receive nutrition through an orogastric tube. Other conditions that may require enteral feeding include liver failure, prolonged anorexia, and critical illness that causes significant nutrient depletion.

deliver, practitioners consider the total protein, fat, and carbohydrates needed to restore the patient's health. Some dietitians start with a basic formula of 25- to 35-cal/kg and adjust it to the patient's condition. Certain medical conditions create a higher metabolic demand, necessitating increased feeding volume.

Enteral formulas can be administered using either an open or a closed (ready-to-use) system and can be delivered through several methods. (See *Understanding enteral feeding systems and methods*.)

### Complications of enteral feeding

Patients with feeding tubes are at risk for such complications as aspiration, tube malpositioning or dislodgment, refeeding syndrome, medication-related complications, fluid imbalance, insertion-site infection, and agitation. To identify these problems, thoroughly as-

Verify *feeding tube*  
*integrity* at the  
start of each shift.

sess the patient before tube feeding begins and monitor closely during feedings. (For information on insertion-site infection and agitation, see *Other enteral-feeding complications*.)

#### Aspiration

Gastrostomy (G) tube feedings can cause pulmonary aspiration. Multiple factors contribute to aspiration, including recent hemorrhagic stroke, high gastric residual volume (GRV), high bolus feeding volumes, supine positioning, and conditions

that affect the esophageal sphincters (such as an indwelling endotracheal or tracheostomy tube with dysfunction of the upper esophageal sphincter and a nasogastric or an enteral tube traversing both esophageal sphincters).

Studies show that patients who received tube feedings of 500 to 1,500 mL/day didn't have a higher aspiration risk than those fed lower daily volumes; even some who received low volumes aspirated. However, relatively fast feeding rates with volumes exceeding 1,500 mL/day did place patients at higher risk for aspiration.

To help reduce risk, monitor GRV every 4 hours (or according to protocol) in patients receiving continuous tube feedings. A.S.P.E.N. and the Society of Critical Care Medicine guidelines for critically ill patients advise against halting tube feedings for GRVs below 500 mL unless the patient has other signs and symptoms of intolerance. Sometimes, healthcare providers order withholding of tube feedings at lower GRVs because of specific risk factors.

If you find tube feeding contents in the patient's mouth during oral care, assume the presence of reflux, which increases aspiration risk. To help prevent this problem, keep the head of the bed elevated 30 degrees or higher when possible.

During patient transport or when placing the head of the bed flat for patient repositioning, turn the tube feeding off, especially if the patient has a high aspiration risk. However, be aware that no conclusive evidence shows that pausing tube feeding during repositioning reduces aspiration risk for patients with high GRVs.

#### Tube malpositioning or dislodgment

During initial placement, the feeding tube may be positioned improperly. To prevent this problem, the tube should be placed by expe-

rienced personnel and its position confirmed radiographically. After initial placement, the tube may become fully or partially dislodged, causing such problems as bleeding, tracheal or parenchymal perforation, and GI tract perforation.

To help prevent malpositioning and dislodgment, verify feeding tube integrity at the beginning of each shift. Be aware that verbal patients with dislodged tubes may complain of new-onset pain at or near the insertion site of a percutaneous endoscopic gastrostomy (PEG) tube, G tube, gastric-jejunal (GJ) tube, or J tube. Nonverbal patients may respond with vital-sign changes (such as increased blood pressure or heart rate), increased agitation, and restlessness.

### Refeeding syndrome

Patients with sustained malnutrition are at risk for refeeding syndrome—the body's reaction to digestion after depleted electrolytes shift from the serum to the intracellular space. This syndrome may trigger life-threatening arrhythmias and multi-systemic dysfunction. It occurs when a depleted metabolic system with little to no mineral reserve (for instance, from vitamin B deficiency) becomes exhausted by the body's increased demands to process proteins and produce glycogen. An insulin response to reintroducing nutrition causes an anaerobic state, as the body can't meet the demand for oxygen and other resources needed to metabolize nutrients. Serum electrolytes then move into the intracellular space to help satisfy the higher demands, resulting in acute electrolyte abnormalities.

In patients with long-term malnutrition, monitor for intolerance at the onset of enteral feedings by checking heart rate and rhythm and electrolyte levels. Although refeeding syndrome incidence is low, failure to recognize the sudden drop in potassium and magnesium levels can have catastrophic consequences.

## Comparing enteral feeding tubes

This table lists types of enteral feeding tubes along with their features.

| Tube type                                | Features   |
|--|--|
| <b>PREPYLORIC</b>                        |  |
| Nasogastric tube                         | <ul style="list-style-type: none"> <li>Can be placed at bedside by qualified nurse</li> <li>With weighted tube (Dobhoff), fluoroscopic or radiologic confirmation of placement required before stylet removal</li> <li>For short-term use (4-6 weeks); longer use poses risk of nasal mucosal damage or sinusitis</li> </ul>   |
| Gastrostomy tube                         | <ul style="list-style-type: none"> <li>Inserted surgically</li> <li>Terminates in stomach</li> <li>Poses risk of implantation in stomach wall</li> <li>Allows administration of crushed medications</li> </ul>   |
| Percutaneous endoscopic gastrostomy tube | <ul style="list-style-type: none"> <li>Inserted endoscopically</li> <li>Minimally invasive</li> <li>Allows administration of crushed medications</li> </ul>  |
| <b>POSTPYLORIC</b>                       |  |
| Nasojejunal tube                         | <ul style="list-style-type: none"> <li>Terminates in jejunum</li> <li>Commonly placed in radiology lab under fluoroscopic guidance; can be placed at bedside with radiographic confirmation</li> <li>For short-term use (4-6 weeks); poses risk of nasal mucosal damage or sinusitis with longer use</li> </ul>  |
| Gastric-jejunal tube                     | <ul style="list-style-type: none"> <li>Terminates in small intestine</li> <li>Can be used in patients requiring both stomach drainage and intestinal feeding at same time</li> <li>Poses risk of jejunal extension becoming clogged from inappropriate medication administration or from attempt to rotate tube (as with G tube), causing it to curl back into stomach or protrude out through skin</li> </ul> |
| Percutaneous endoscopic jejunal tube     | <ul style="list-style-type: none"> <li>Terminates in small intestine</li> <li>Preferred for patients who need single tube for feeding into small bowel</li> <li>Required for gastrectomy or esophagectomy patients with gastric pull-up</li> </ul>   |

To reduce the risk of refeeding syndrome in patients with vitamin and mineral deficiencies, supplements may be ordered for parenteral administration before enteral feedings begin. Refer to specific guidelines based on total energy needs and specific micronutrient deficiencies; thiamine and other B-vitamin deficiencies are the most pressing ones to address before initiating enteral feeding. As the tube-feeding goal rate is achieved, taper micronutrient supplement dosages as indicated.

### Fluid imbalance

Most patients need supplemental free-water flushes to maintain adequate hydration; on average, they need 30 mL/kg of water per day, given either as free-water flushes or I.V. hydration.

If a free-water flush is ordered, calculate its volume by subtracting the volume of water in the feeding formula from the patient's total daily requirement; then divide the remaining volume over a regular routine of tube flushing. Before and

# Understanding enteral feeding systems and methods

An enteral feeding system may be open or closed.

- With an *open system*, a bolus of formula from a container is placed in the feeding tube with a syringe or poured into a feeding bag and delivered through the tube. This system allows continuous feedings when closed ready-to-hang options aren't available.



- With a *closed ready-to-hang system*, a container of prefilled formula is spiked by the feeding tube and delivered by pump. A closed system offers better protection against contamination by limiting contact between the enteral nutrition formula and the outside environment.



## Enteral feeding methods

Be sure you understand how to care for patients receiving enteral feedings through the various methods. Generally, check gastric residual volume (GRV) every 4 hours during the first 48 hours for gastrically fed patients. Once the feeding goal rate is achieved, check GRV every 6 to 8 hours, unless the patient is critically ill. In that case, continue to monitor every 4 hours. If GRV is 250 mL or greater after a second residual check, notify the healthcare provider, who may order a promotility agent.

If GRV exceeds 500 mL, withhold the feeding and reassess the patient's tolerance by evaluating GI status and glycemic control. If possible, minimize sedation and give a promotility agent, as prescribed.

Review the nursing considerations below for the three main types of enteral feeding methods.

### Gravity-feed infusion

- Check GRV before starting every infusion.
- Know that this method can be used only with prepyloric tubes.
- Attach syringe without piston to unclamped tube, elevate tube above stomach level to create flow of fluid into stomach, and pour in feeding solution until ordered amount is delivered or as tolerated (whichever comes first).

### Intermittent pump feeding

- Check GRV before starting every infusion.

- For high-risk patients\*, check GRV every 4-6 hours (or according to facility policy) while infusion is running.
- Know that A.S.P.E.N. guidelines don't require routine GRV checks for patients without signs or symptoms of intolerance.
- Be aware that closed system is preferred to avoid formula contamination. Change system every 24 hours.
- When closed system isn't available, hang only 8 hours' worth of formula at a time.

### Continuous pump feeding

- Check GRV before starting infusion and every 6-8 hours thereafter.
- For high-risk patients, check GRV every 4-6 hours (or according to facility policy) for first 48 hours if patient tolerates feedings.
- Stop feeding and contact healthcare provider for GRV > 500 mL, unless lower threshold is ordered.
- Know that A.S.P.E.N. guidelines don't require routine residual checks for patients without signs or symptoms of intolerance.
- Be aware that closed system is preferred to avoid formula contamination. Change system every 24 hours.
- When closed system isn't available, pour only 8 hours' worth of feeding volume into open system; refill open system every 8 hours until system is due to be changed (usually every 24 hours).

\*High-risk patients are those with endotracheal tubes or known feeding intolerance and those receiving medications that relax the upper esophageal sphincter. A.S.P.E.N. = American Society for Parenteral and Enteral Nutrition

after medication administration, flush the tube with about 30 mL of fluid or more, depending on drug characteristics. *Note:* Be aware that some patients are at high risk for fluid overload and depend on a concentrated feeding formula to meet dietary needs.

## Medication-related complications

Until recently, clinicians assumed diarrhea in patients receiving enteral feedings stemmed from malabsorption and feeding intolerance. But more recent research points to

medications, especially those high in sorbitol, as the main culprit. So be sure to rule out medications as the cause of diarrhea before looking for other causes, including malabsorption and rapid delivery rates.

The sorbitol content of certain premade liquid drugs (such as potassium chloride, acetaminophen, and theophylline) can cause a rapid fluid shift into the intestines, leading to hyperosmolarity and diarrhea. This effect increases when sorbitol-based liquid medications are given through a J tube. (Gastric acid in the

stomach acts as a buffer to medications and reduces osmolarity of fluid entering the small intestine.) Consider a pharmacy consult for patients who experience diarrhea while receiving multiple sorbitol-based drugs. Changing the administration time as appropriate or switching to a non-sorbitol-based alternative may relieve diarrhea without necessitating feeding-rate adjustment.

Medications administered through a feeding tube also may cause clogging, especially if they're crushed. Don't give medications that must be



crushed through a J tube, because the clogging risk is greater than with a G tube. Take additional precautions with medications linked to a higher clogging risk, including psyllium, ciprofloxacin suspension, sevelamer, and potassium chloride tablets that can be dissolved in water.

Know that tube replacement due to clogging is costly and subjects the patient to anesthesia. To help prevent clogging, maintain proper tube maintenance and flushing. For instance, massage potential clots in the tube, irrigate with warm water, administer alkalinized enzymes as ordered, and use a manual declogger (such as the Bionix DeClogger® or CorPak Clog Zapper®) if needed.

Be aware that some medications must be given on an empty stomach to ensure effective absorption, including phenytoin, carbamazepine, alendronate, carbidopa levodopa, and levothyroxine. You may need to withhold tube feedings for 1 to 2 hours before and after administering these medications. For a patient with a GJ tube, as long as medications are given through the gastric port, you needn't withhold feedings from the jejunal port; follow pharmacy guidelines. Keep in mind that patients receiving multiple drugs may have absorption problems due to extended withholding of feedings, causing dehydration and malnutrition.

## Nursing care

When beginning enteral feedings, monitor the patient for feeding tolerance. Assess the abdomen by auscultating for bowel sounds and palpating for rigidity, distention, and tenderness. Know that patients who complain of fullness or nausea after a feeding starts may have higher a GRV.

On an ongoing basis, monitor patients for gastric distention, nausea, bloating, and vomiting. Stop the infusion and notify the provider if the patient experiences acute abdominal pain, abdominal rigidity, or vomiting.

## Other enteral-feeding complications

As described below, take steps to prevent infection at the tube insertion site and to manage patient agitation.

- **Infection at the insertion site of an abdominally placed tube.** Secure the tube to minimize movement and erosion at the site. Assess the site daily and cover it with a dry gauze dressing. Change the dressing daily or more often as needed for drainage or suspected infection. Monitor for redness and drainage at the site, and report these findings to the provider promptly.
- **Agitation.** Patients with traumatic brain injury or other cognitive deficits may become agitated by tube presence. To help prevent them from removing it, apply an abdominal binder, mitten restraints, or limb restraints as necessary. (Use the least restrictive method before resorting to limb restraints.) If an agitated patient is at risk for pulling out the tube, encourage family members to stay at the bedside to help distract their loved one. However, know that in some cases, their presence may increase agitation, not reduce it. Nonetheless, they may be able to tell you what techniques could help calm the patient. As indicated, take steps to provide a calm environment by dimming lights, playing soft music, and offering comfort, as appropriate.

## Successful management of the patient's nutritional needs requires a team approach.

### Multidisciplinary approach to patient care

Successful management of the patient's nutritional needs requires a team approach. Each discipline is responsible for managing and monitoring the patient's physiologic and psychological needs. Caloric requirements calculated by a dietitian must be ordered by a healthcare provider and delivered and monitored by a nurse. (However, some states permit dietitians to initiate nutritional interventions.) Nursing assistants can help with patient positioning and comfort care as well as behavioral monitoring. Consult additional specialists, such as a wound ostomy nurse, about the risk of pressure injuries compounded by malnutrition or dehydration.

Keep the goal of care in mind. For terminally ill patients, palliative care specialists can help evaluate

the benefits and risks of continuing enteral feeding and help clinicians navigate ethical issues, such as whether to continue enteral feedings and other life-prolonging measures. They can also help manage symptoms and make suggestions based on the patient's or family's goal of care.

### Future of enteral feedings

Enteral feedings have the potential to advance patient care. For example, enteral formulas specific to the patient's condition and fluid requirements are now available. Also, trials currently are underway in critical care units to study the use of feeding tubes with magnetic components at the end, which could allow confirmation of correct tube placement with a magnet instead of radiography. As technology progresses, enteral feeding efficiency will progress as well. For the best outcomes, healthcare providers must work as a team to treat the patient holistically. ★

Visit [AmericanNurseToday.com/?p=24736](http://AmericanNurseToday.com/?p=24736) for a list of selected references.

The authors work at Halifax Health in Daytona Beach, Florida. Amanda Houston is a professional development education specialist at Halifax Health in Daytona Beach, Florida. Paul Fuldauer is a clinical nutritional coordinator.

## POST-TEST • Enteral feeding: Indications, complications, and nursing care

Earn contact hour credit online at <http://www.americanursetoday.com/continuing-education/>

CNE: 1.4 contact hours

### Provider accreditation

The American Nurses Association's Center for Continuing Education and Professional Development is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation. ANCC Provider Number 0023.

Contact hours: 1.4

ANA's Center for Continuing Education and Professional Development is approved by the California Board of Registered Nursing, Provider Number CEP6178 for 1.7 contact hours.

Post-test passing score is 80%. Expiration: 1/1/20

ANA Center for Continuing Education and Professional Development's accredited provider status refers only to CNE activities and does not imply that there is real or implied endorsement of any product, service, or company referred to in this activity nor of any company subsidizing costs related to the activity. The authors and planners of this CNE activity have disclosed no relevant financial relationships with any commercial companies pertaining to this CNE. See the banner at the top of this page to learn how to earn CNE credit.

### Please mark the correct answer online.

**1. Your 72-year-old male patient with a tracheoesophageal fistula will require enteral feeding. Which type of tube would be most appropriate for him?**

- a. Gastrostomy
- b. Percutaneous endoscopic gastrostomy (PEG)
- c. Percutaneous endoscopic jejunal (PEJ)
- d. Nasogastric (NG)

**2. A 54-year-old woman develops postoperative ileus after small-bowel resection surgery. An NG tube is placed for enteral feeding. Which complication could occur if the tube stays in place longer than expected?**

- a. Nasal mucosal damage or sinusitis
- b. Tube implantation in the stomach wall
- c. Curling of the tube into the jejunum
- d. Tube implantation in the small intestine

**3. Which tube is appropriate for a patient who requires short-term enteral feeding?**

- a. PEG
- b. Nasojejunal
- c. PEJ
- d. Gastric-jejunal (GJ)

**4. Which statement about gravity-feed infusion is correct?**

- a. Gastric residual volume (GRV) should be checked every 2 hours.
- b. GRV should be checked daily.
- c. This method can be used only with prepyloric tubes.
- d. This method can be used only with postpyloric tubes.

**5. Which statement about intermittent enteral feedings via a pump is correct?**

- a. Use of an open system is preferred.
- b. The system should be changed every 72 hours.
- c. For patients with endotracheal tubes, GRV should be checked every 8 to 12 hours when the infusion is running.

- d. For patients with endotracheal tubes, GRV should be checked every 4 to 6 hours when the infusion is running.

**6. Which statement about continuous enteral feeding via a pump is correct?**

- a. GRV doesn't need to be checked in patients without signs or symptoms of intolerance.
- b. GRV should be checked every 4 hours in patients without signs or symptoms of intolerance.
- c. An open system is preferred for continuous enteral feeding.
- d. The feeding system should be changed every 72 hours.

**7. Your 65-year-old patient is receiving continuous enteral feeding via a gastrostomy (G) tube. How can you reduce the patient's risk of aspiration?**

- a. Don't check GRV as frequently as with other patients.
- b. Don't turn the feeding off when transporting the patient.
- c. Keep the head of the bed elevated 30 degrees or higher when possible.
- d. Keep the head of the bed flat when possible.

**8. Which statement about tube malpositioning or dislodgment is *not* accurate?**

- a. Patients with a dislodged tube may complain of new-onset pain at or near the insertion site of a PEG tube.
- b. Patients with a dislodged tube may complain of new-onset pain at or near the insertion site of an NG tube.
- c. Placement of the feeding tube should be confirmed radiographically before it's used for feeding.
- d. Tube dislodgment can cause bleeding, tracheal or parenchymal perforation, or GI tract perforation.

**9. A 75-year-old homeless man is brought to the emergency department with severe malnutrition and inability to take food by mouth. A G tube is placed. Because he is at risk for refeeding syndrome, what should you keep in mind?**

- a. Refeeding syndrome refers to the body's reaction to digestion after depleted electrolytes shift from the intracellular space to the serum.
- b. Refeeding syndrome refers to the body's reaction to digestion after depleted electrolytes shift from the serum to the intracellular space.
- c. Micronutrient deficiencies should be corrected at least 48 hours after enteral feeding begins.
- d. Micronutrient deficiencies should be corrected within 24 hours after enteral feeding begins.

**10. Which statement about supplemental free water is correct?**

- a. Calculate free flush volume by subtracting the volume of water in the feeding formula from the patient's total daily requirement.
- b. Calculate free flush volume by adding the volume of water in the feeding formula to the patient's total daily requirement.
- c. Patients receiving enteral feeding rarely require supplemental free water.
- d. Patients receiving enteral feeding need an average of 100 mL/kg of water per day.

**11. According to the Academy of Nutrition and Dietetics and the American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.), malnutrition criteria include:**

- a. increased subcutaneous fat and diminished handgrip.
- b. reduced fluid accumulation and weight loss.
- c. increased handgrip strength and loss of muscle mass.
- d. insufficient energy intake and muscle mass loss.