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Gastrostomy tubes: Uses, patient selection, and efficacy in adults

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INTRODUCTION

No disease process improves significantly with starvation, but providing nutrition can be a challenge in patients who cannot or will not eat. Failure of oral enteral supplements, dietary counseling, and appetite stimulation frequently leads to a decision about the use of tube feeding.

Enteral access must be obtained for tube feeding to begin. Gastrostomy tubes provide long-term enteral access, but nasal feeding tubes have also been used for extended periods of time with comparable safety [1]. Nasogastric and nasoenteric feeding tubes are placed at the bedside and can also be easily removed. All feeding tubes may be susceptible to clogging or inadvertent dislodgement, and published data have not demonstrated lower risk of adverse events with gastrostomy tubes [2]. Additionally, a report of hospitalized patients found that adverse events and severity of complications were higher in those with a gastrostomy tube [3]. Thus, the decision to place a gastrostomy should be based on the patient's clinical condition and preferences.

This topic will review clinical conditions for which gastrostomy tubes are placed, timing of placement, and the available evidence on effectiveness of gastrostomy tubes. Placement technique, routine care, and complications of endoscopically-placed gastrostomy tubes are

discussed separately. (See ["Gastrostomy tubes: Placement and routine care"](#) and ["Gastrostomy tubes: Complications and their management"](#).)

Pre-and post-pyloric enteral nutrition for adults is discussed in more detail separately. (See ["Enteral feeding: Gastric versus post-pyloric"](#).)

Inpatient placement and management of nasogastric and nasoenteric tubes in adults are discussed separately. (See ["Inpatient placement and management of nasogastric and nasoenteric tubes in adults"](#).)

PATIENT SELECTION

Clinical applications — Percutaneous endoscopic gastrostomy (PEG), radiologically-inserted gastrostomy, and surgical gastrostomy tubes are placed for a variety of conditions that interfere with a patient's oral intake or that require gastric decompression. Commonly, PEG tubes are used to provide a route for enteral feeding, hydration, and medication administration in patients who are likely to have prolonged inadequate oral intake. Gastrostomy tubes are occasionally placed for decompression in the setting of prolonged ileus, dysmotility, or inoperable intestinal obstruction.

The decision to place a gastrostomy tube must take into account the indication for the gastrostomy tube, the patient's prognosis, the goals of treatment, and the patient and family's beliefs and desires.

Gastrostomy tube placement may be performed for patients with the following conditions, provided that there are no contraindications (see ["Gastrostomy tubes: Placement and routine care"](#), section on 'Technical considerations'):

- Patients with dysphagia, provided that the dysphagia has persisted for at least two weeks and that the condition is expected to persist for at least four weeks. (See ["Complications of stroke: An overview"](#), section on 'Dysphagia'.)
- Head, neck, or esophageal cancer. (See ["The role of parenteral and enteral/oral nutritional support in patients with cancer"](#).)
- Palliative gastric decompression. (See ["Supportive care of the patient with locally advanced or metastatic exocrine pancreatic cancer"](#).)

Prior to deciding on whether to place a gastrostomy tube, it is important to:

- Define realistic goals and objectives given the indication and the patient's overall medical condition. Maintaining or improving a patient's quality of life (even in the short-term), reducing a patient's pain and suffering, and providing access for hydration or medication delivery. (See ['Efficacy'](#) below.)
- Clearly explain the potential risks and benefits to patients and their families. (See ["Gastrostomy tubes: Complications and their management"](#).)
- Ascertain the patient's and families' beliefs and desires regarding tube feeding.

Timing and other considerations — For hospitalized patients, we typically defer PEG placement until as close to discharge as possible rather than at the time of the request for gastrostomy. Following this observation period, access for enteral feeding may not be needed because the patient's oral intake has improved or because the patient's clinical status declined and prognosis is limited.

Deferring gastrostomy placement has been associated with lower mortality rates. However, earlier gastrostomy placement is often driven in part by requirements for disposition, since nasogastric tube feeding is not an option at many skilled-nursing facilities. In a study including nearly 200 patients for whom gastrostomy placement was requested during inpatient hospitalization, delay of gastrostomy until >30 days after hospital discharge was associated with lower 30-day mortality rates after gastrostomy insertion (36 versus 5 percent) [4].

Data supporting gastrostomy placement in patients with some conditions associated with inadequate oral intake are lacking. However, we recognize that it is occasionally necessary to consider gastrostomy tube placement on a case-by-case basis, and for such patients, consultation with palliative care and/or clinical ethics specialist is also advised:

- Patients with anorexia and weight loss due to cancer or other untreatable catabolic illness, as long as it is understood by the patient, caregivers, and family that the goal is not to correct the patient's nutritional status. The role of nutrition support for patients with advanced cancer is presented separately. (See ["The role of parenteral and enteral/oral nutritional support in patients with cancer"](#).)
- Patients with altered mental status and dysphagia (including patients with dementia) after discussion with the family and caregivers has established realistic goals (such as the provision of hydration or the use of nutrition or medications for comfort care), provided the condition is expected to last for at least four weeks. It may be unrealistic to expect improvement in functional status or survival [5]. (See ["Care of patients with advanced](#)

dementia", section on 'Feeding and nutrition' and "Stopping nutrition and hydration at the end of life".)

- Patients in a persistent vegetative state, if the goals of the family, or the wishes of the patient, were to provide comfort care. The exact definition of comfort often depends on the observer. Many families define comfort care as the provision of nutrition, hydration, and/or medications.
- Patients at high risk for aspiration [1]. In patients with significant regurgitation, we advise a jejunal extension, although published data are limited.

In skilled nursing facilities, the decision to place a gastrostomy tube is often driven by policies rather than published data. Such policies vary by geographic region, and a gastrostomy tube is often required, even if the duration of enteral access is expected to be short [6].

Decision-making surrounding gastrostomy placement is ideally guided by patients, their caregivers and clinicians, and supported by published evidence regarding the appropriateness of gastrostomy tube feeding. The opinion of the family appears to weigh heavily in the overall decision-making process. This was illustrated by a study of 180 clinicians who were interviewed regarding their decision to start tube feedings in a hypothetical patient population [7]. The majority of clinicians (90 percent) felt that initiating tube feedings was the right decision if family members were in agreement with the decision. On the other hand, only 50 percent of clinicians still believed that initiating tube feedings was the right decision when the family members or the patient were not in agreement with the decision. Clinicians concerned with the legal aspects of nutrition were more inclined to believe that tube feedings should be initiated, while those clinicians more concerned with health care costs were more likely not to initiate tube feeding.

EFFICACY

All patient populations

Survival — Observational studies including patients with various underlying conditions and comorbidities have reported short-term (typically 30-day) mortality rates following gastrostomy placement ranging from 10 to 43 percent [8-10]. In addition, longer-term survival rates were low [11-19]. Whether these data reflect patient selection is uncertain. The risk of short-term mortality may be related to the patient's underlying condition rather than a complication from gastrostomy tube placement [9]. Long-term mortality rates may also reflect the patient's underlying comorbidities.

Data to inform selecting patients who will most likely to benefit from gastrostomy are limited. One study examined 136 patients whose indications for percutaneous endoscopic gastrostomy (PEG) were cancer (49 percent) or non-cancer diagnoses (51 percent), the majority of which were stroke or amyotrophic lateral sclerosis (ALS) [12]. Survival was 90 percent at one month. A similar one-month survival rate (83 percent) was observed in a series of 317 patients [20]. Another study used the United States Nationwide Inpatient Sample to estimate in-hospital mortality rates following PEG tube placement in more than 180,000 patients [18]. The in-hospital mortality rate was 11 percent. Factors associated with an increased risk of death included increasing age, comorbid illnesses such as heart failure and renal failure, and PEG tube placement for an indication other than head and neck cancer. Factors associated with lower mortality rates included female sex, diabetes mellitus, and paralysis.

A few studies have described the survival rate with long-term follow-up. The available data suggest that long-term survival rates are low (approximately 40 percent at 12 to 18 months, and as low as 20 percent at three years) [11,14,21]:

- The largest report focused on 80,000 patients who had undergone PEG or surgical gastrostomy [14]. The majority (75 percent) were more than 75 years of age. The most common indications for gastrostomy tube placement were cerebrovascular disease, neoplasms, fluid and electrolyte disorders, and aspiration pneumonia. The overall in-hospital mortality rate was 15 percent. Survival rates at one and three years were 37 and 19 percent, respectively.
- Another study included 97 patients in whom 1-, 18-, and 48-month survival rates were 78, 35, and 27 percent, respectively [11]. Survival was better for women, for patients without diabetes, and for patients undergoing gastrostomy tube placement for conditions or diseases of the central nervous system (CNS). The most common CNS indication was hemispheric stroke. The majority of patients (65 percent) were discharged to a nursing home, while 6 percent were discharged to other local hospitals.
- In an analysis of a large database including critically ill adults who had gastrostomy tube placement, in-hospital mortality rates were lower in 2014 compared with 1994 (11 versus 26 percent) [22]. Whether the difference in mortality was due to patient selection, critical care advances, or other factors was uncertain.

Mortality rates have also been compared between patients who undergo gastrostomy tube placement and patients who decline the intervention. In a series of 1327 patients for whom gastrostomy tube placement was recommended, 304 patients (23 percent) declined to undergo the procedure [23]. The primary indications for gastrostomy tube placement were

oropharyngeal malignancy and progressive neurologic conditions. Compared with patients who underwent gastrostomy tube placement, the patients who did not had higher mortality rates at 30 days (36 versus 11 percent) and at one year (74 versus 41 percent). However, another cohort study did not demonstrate a survival benefit for patients with dementia who received gastrostomy tube feeding [5].

Functional and nutritional status — Placing a gastrostomy tube provides enteral access for the administration of nutrition, hydration, and medications. Whether establishing enteral access with a gastrostomy tube improves functional and nutritional status is uncertain [21,24]. An observational study included 150 patients who underwent gastrostomy tube placement in a community setting during a 14-month period [21]. Indications for gastrostomy tube placement included cerebral vascular accident (41 percent), neurodegenerative disorders (35 percent), and cancer (13 percent). The neurodegenerative class was not defined but was presumed to be dementia. Subjective ratings on health and performance were collected before and after gastrostomy tube placement. Survival was 78 percent at one month and 40 percent at one year and was similar in all three groups. In patients surviving at least 60 days, 70 percent had no improvement in functional status, subjective health status, or nutritional status. In addition, the majority of the patients required assistance with many activities of daily living and were incapable of communicating verbally.

Quality of life — The effect of gastrostomy tube placement on quality of life is unclear. Randomized trials comparing gastrostomy with nasal feeding tubes did not demonstrate improved quality of life, although gastrostomy seemed favorable for cosmetic reasons [1].

Patients in long-term care facilities — Some patients who reside in long-term care facilities may benefit from enteral nutrition. However, the effects of gastrostomy tube placement on clinical outcomes are unclear. Tube feeding in long-term care, especially when compared to feeding by hand, may be associated with increased social isolation and other effects on quality of life, such as loss of the pleasure of eating, reduction in freedom of movement, and tube placement-related pain and risk of complications. In addition, the value of gastrostomy tubes for patients with advanced dementia has been uncertain. (See '[Dementia](#)' below.)

Long-term care facilities (LTCFs) account for a large proportion of patients who have undergone gastrostomy tube placement. LTCFs frequently prefer gastrostomy tubes rather than nasal feeding tubes because of the possible increased risk of clogging and dislodgement with nasal tubes, in addition to facility-based requirements [2]. Whether the risk of complications is lower for gastrostomy tubes is uncertain. In a meta-analysis of 11 trials including 735 patients with dysphagia, there were no significant differences in the risk of overall complications or mortality for patients with gastrostomy tubes compared with nasogastric tubes [1]. The risk of treatment

failure, defined as feeding interruption, blocking or leaking of the tube, or non-adherence, was lower for patients with a gastrostomy tube (relative risk [RR] 0.18, 95% CI 0.05-0.59). However, some issues related to nasal feeding tubes such as clogging are largely preventable with regular flushing, use of liquid medications, and avoiding measurements of gastric residual volume.

Nutritional status and survival — Longer-term data comparing gastrostomy to other forms of nourishment are limited. In short-term observational studies, 30-day mortality has ranged from 10 to 43 percent [8,9].

Observational studies have tended to be small, and vary on whether feeding gastrostomy placement in patients in LTCFs is associated with improved nutritional status and survival:

- A series of 46 patients who underwent gastrostomy placement observed an overall one-year survival rate of 50 percent; among the subset of patients who were 40 years of age or younger, the survival rate was 100 percent [25]. At six months, 50 percent of the patient population had gained weight, while 31 percent had no change in their weight.
- A prospective series of 70 patients in a LTCF suggested that placement of a gastrostomy tube was associated with stabilization of weight and an increase in serum albumin within two months of beginning gastrostomy tube feedings [26].
- A retrospective study compared 58 patients in a LTCF who underwent gastrostomy tube placement and enteral feeding with 50 patients with swallowing disorders or anorexia who refused a gastrostomy tube or in whom it was felt to be inappropriate [27]. Short-term survival was similar between the groups. However, survival at two months or greater was higher in patients who received a gastrostomy tube.
- Another study followed patients in a LTCF who developed a swallowing deficit and total dependence on others for feeding. Patients who received a feeding tube had higher one-year survival rates compared with those who did not (50 versus 39 percent; risk ratio [RR] for death at one year 0.71, 95% CI 0.59-0.86) [28].

Functional status and quality of life — Studies have reached variable conclusions regarding the effect of gastrostomy tube placement on functional status and quality of life in patients in LTCFs:

- Improved functional status was not observed in a study of 46 patients in LTCFs, one-half of whom had dementia [25].
- The effect of gastrostomy tube placement on quality of life was evaluated in an observational report of 100 patients with a median age of 76 years who were residents of

LTCF [29]. Using a standardized quality-of-life scale, 35 percent improved, 37 percent showed no change, and 28 percent worsened after gastrostomy tube placement. In a follow-up questionnaire with families and patients, 78 percent reported that the gastrostomy benefited the patient, and 68 percent of patients reported that it improved their quality of life.

Pressure ulcers — Gastrostomy tubes do not appear to be beneficial with regard to the development or healing of pressure ulcers among nursing home residents. In a retrospective study that matched nursing home residents with dementia and a gastrostomy tube to those with dementia but without a gastrostomy tube, the presence of the gastrostomy tube was associated with worse outcomes with regard to pressure ulcer development and healing [30]. After a mean follow-up of 23 days, patients with gastrostomy tubes who did not have pressure ulcers were more likely to develop them compared with those without gastrostomy tubes (36 versus 20 percent, adjusted odds ratio [OR] 2.3, 95% CI 1.2-2.7). In addition, patients with gastrostomy tubes who had pre-existing pressure ulcers were less likely to show ulcer improvement (27 versus 35 percent, adjusted OR 0.7, 95% CI 0.6-0.9). These data are difficult to interpret given the possibility of selection bias (ie, patients with more comorbidities were more likely to have a gastrostomy).

Patients with neurologic disorders

Stroke, brain injury, or neurodegenerative disease — Patients with neurologic disorders that impair swallowing require alternative means for providing enteral nutrition. Gastrostomy tubes can provide long-term enteral access for such patients. Gastrostomy tube placement for patients with stroke is typically deferred for several weeks to determine whether swallowing function will recover. In a trial including 321 patients with recent stroke, there were no significant differences in survival for patients with gastrostomy placement within 30 days of hospital admission compared with use of a nasal feeding tube [31]. However, early gastrostomy tube placement was associated with a nonsignificant trend toward increased absolute risk of poor functional outcome or death of 7.8 percent (95% CI 0.0-15.5). In a trial of 41 patients with stroke or head injury requiring ventilator support, the early use of gastrostomy tubes for feeding resulted in a decreased number of ventilator-associated pneumonias compared with the early use of nasogastric tubes [32]. (See "[Complications of stroke: An overview](#)", section on '[Dysphagia](#)'.)

A systematic review evaluated observational studies of enteral feeding in patients with ALS [33]. A benefit with gastrostomy tube placement with regard to improved nutritional indices and survival was seen in studies that included a control group. PEG tube placement has been shown

to be safe in patients with ALS who have a forced vital capacity <50 percent (ie, severely impaired) [34].

Dementia — Dementia frequently leads to anorexia, dysphagia, and weight loss. As a result, it is a common reason for referring patients for gastrostomy tube placement (approximately 36,000 are placed each year in the United States) [35]. The role of gastrostomy tubes in patients with dementia is controversial because patients with dementia are usually severely impaired and frequently near death [36], and the American Geriatric Society recommends careful hand feeding be offered as an alternative to tube feeding for patients with advanced dementia [37]. The benefit of providing enteral nutrition to patients with dementia is unclear, a situation similar to that of patients with terminal malignancies [38,39]. In addition, observational studies have not consistently shown that enteral tube feeding in patients with dementia leads to improvements in survival or quality of life [40,41], though the studies are limited because variations in the severity of the patients' illnesses may have influenced the decision to place a gastrostomy tube [5,42,43]. (See "[Care of patients with advanced dementia](#)", section on '[Oral versus tube feeding](#)'.)

A systematic review found that there is no evidence that enteral tube feeding in patients with advanced dementia is associated with prolonged or increased quality of life [40]. Similarly, a subsequent large database study that looked at a cohort of more than 36,000 patients with dementia found no survival benefit with tube feeding compared with no tube feeding [41]. However, in a subsequent retrospective study including 585 patients (mean age 86 years) who received enteral tube feeding, both mortality and complication rates were not significantly different between patients with dementia compared with those without dementia [44].

Some nutrition and neurology experts would argue that the use of survival as the primary outcome marker for the effectiveness of gastrostomy tube placement in patients with dementia may not be justified. Other issues related to quality of life, such as providing a means to deliver medications, maintaining hydration, and relieving pain and suffering may be important for these individuals. However, it is difficult if not impossible to measure quality of life in patients with advanced dementia [29,35]. In addition, discontinuing nonessential medications may be an option for some patients rather than providing access for medication delivery, and this is discussed separately. (See "[Deprescribing](#)".)

Patients with cancer — Patients with treatable cancer may merit consideration for gastrostomy tube placement, particularly in the setting of oropharyngeal or esophageal obstruction. Guidelines recommend against the use of nutrition support in patients with cachexia due to untreatable or advanced cancer [45]. (See "[The role of parenteral and enteral/oral nutritional support in patients with cancer](#)".)

Patients with malignant gastric outlet or bowel obstruction may require placement of a gastrostomy tube to provide for gastric decompression. This is typically accompanied by the placement of a separate jejunostomy tube to provide enteral feeding or central venous access for [parenteral nutrition](#).

Patients at risk for aspiration — There are conflicting data regarding the use of gastrostomy tubes for the prevention or reduction of aspiration events. Neither gastrostomy tubes or nasal feeding tubes were superior in decreasing aspiration risk in patients with swallowing difficulties [1]. Additionally, the focus on aspiration as an outcome may be inappropriate since it is a frequent and normal event [46]. Randomized trials examining the impact of gastrostomy on the risk of pneumonia are lacking [47].

Studies that specifically evaluate aspiration risk among patients with dementia who are hand-fed compared with those who have a nasogastric tube or gastrostomy tube are also lacking.

Pneumonia is common in patients with dysphagia following a stroke. In a study of 126 patients who underwent gastrostomy tube placement after suffering a dysphagic stroke, aspiration pneumonia occurred in 22 patients (18 percent) during 77 patient-years of follow-up [48]. It has been estimated that half of patients with dysphagia following a stroke who are fed orally will experience aspiration, and a third of patients will develop pneumonia [49].

Comparison of gastrostomy tubes with nasogastric tubes — Studies have reached variable conclusions about whether the risk of aspiration pneumonia is lower in patients fed through a gastrostomy tube compared with those fed through a nasogastric tube [1,50-52]:

- A retrospective study with 109 patients noted a reduction in aspiration events at 14 days in patients fed through gastrostomy tubes compared with patients fed through nasogastric tubes, with similar rates noted during subsequent follow-up [50].
- A prospective analysis of 90 patients noted no difference in aspiration events comparing gastrostomy tube and nasogastric tube fed patients [51].
- In a study of 56 patients with head and neck cancer who had received chemoradiotherapy, there was no difference in long-term swallowing function between patients who had a nasogastric tube placed as needed for feeding during treatment and those who had a PEG tube placed prophylactically [52].

Pre- versus post-pyloric feeding — Whether to feed patients pre- or post-pylorically is a matter of debate. A systematic review of eight studies showed similar rates of pneumonia and mortality, percentage of caloric goal achieved, and length of intensive care unit stays in patients

being fed pre- and post-pylorically [53]. However, jejunostomy feeding has been shown to prevent aspiration of nutrient solutions, leading most experts to recommend feeding deep into the small bowel in patients with regurgitation and aspiration of feeding solutions [54]. Options for long-term jejunal feeding include gastrostomy tube placement with a jejunal extension tube (J-tube), surgical insertion of a feeding tube into the small bowel, or percutaneous endoscopic jejunostomy. (See "[Enteral feeding: Gastric versus post-pyloric](#)".)

The most common approach to long-term jejunal feeding is placement of a gastrostomy tube with a J-tube extension (gastrojejunostomy tube). However, the tubes frequently become displaced into the stomach and, due to their smaller diameter, the tubes are more prone to clogging. Overall, tube dysfunction is reported in 27 to 84 percent of cases [55]. Thus, placement of jejunal feeding tubes is generally limited to centers with expertise and experience in the placement and maintenance of these tubes.

SUMMARY AND RECOMMENDATIONS

- Gastrostomy tubes are used to provide a route for enteral feeding, hydration, and medication administration in patients who are likely to have prolonged inadequate oral intake. (See '[Patient selection](#)' above.)

Prior to deciding on whether to place a gastrostomy tube, it is important to:

- Define realistic goals and objectives given the indication and the patient's overall medical condition
- Clearly explain the risks and expected benefits to patients and their families
- Ascertain and strongly consider the patient's and family's beliefs and desires regarding tube feeding
- Whether establishing enteral access with a gastrostomy tube is beneficial for many patients is unclear. Gastrostomy tube placement appears to be beneficial early in some patients with dysphagic stroke (eg, those who require mechanical ventilation), and is potentially beneficial in patients with brain injury, neurodegenerative diseases, and obstruction due to head, neck, and esophageal cancer. No benefits have been demonstrated in patients with dementia, however data from randomized trials are lacking. In patients at risk for aspiration, gastrostomy tubes may be superior to nasogastric tubes for the delivery of enteral nutrition. (See '[Efficacy](#)' above.)
- There are no established guidelines indicating which patients should receive a gastrostomy tube. Considering the available data and our clinical experience, we suggest

gastrostomy tube placement for the following conditions, provided that there are no contraindications (**Grade 2C**) (see 'Clinical applications' above and "Gastrostomy tubes: Complications and their management"):

- Dysphagia, if the underlying condition is expected to persist for at least four weeks (see "Complications of stroke: An overview", section on 'Dysphagia')
- Head, neck, or esophageal cancer (see "The role of parenteral and enteral/oral nutritional support in patients with cancer")
- Palliative gastric decompression (see "Supportive care of the patient with locally advanced or metastatic exocrine pancreatic cancer" and "Gastric outlet obstruction in adults", section on 'Malignant obstruction')
- For some patients, the decision to place a gastrostomy tube is made on a case-by-case basis after consideration of patient characteristics and other factors (see 'Timing and other considerations' above):
 - Patients with significantly altered mental status and dysphagia (including patients with dementia) after discussion with the family and caregivers has established realistic goals (such as the provision of hydration or the use of nutrition or medications for comfort care), provided the condition is expected to last for at least four weeks. It may be unrealistic to expect improvement in functional status or survival.
 - Patients in a persistent vegetative state, if the goals of the family, or the wishes of the patient, were to provide comfort care. The exact definition of comfort often depends on the observer. Many families define comfort care as the provision of nutrition, hydration, and/or medications.
 - Patients at high risk for aspiration. In patients with regurgitation, we advise a jejunal extension, although data on this intervention are limited.

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