



Guideline

A practical guide for enteral nutrition from the Korean Society for Parenteral and Enteral Nutrition: Part II. selection and initiation of enteral feeding routes

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Abstract

Purpose: We developed evidence-based recommendations for selecting and initiating the enteral nutrition (EN) delivery route in adult and pediatric patients to improve safety and standardize practice in Korea.

Methods: Key questions covered feeding tube selection, methods to verify tube placement, confirmation in pediatric patients, and timing of EN following percutaneous endoscopic gastrostomy (PEG). Recommendations were drafted and refined through multidisciplinary expert consensus under the Korean Society for Parenteral and Enteral Nutrition (KSPEN).

Results: Feeding tube selection should be based on gastrointestinal anatomy, function, and expected EN duration. Short-term feeding is

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recommended with nasogastric or orogastric tubes, whereas long-term feeding should use percutaneous or surgical routes such as PEG. Tube position must always be verified before use, preferably with radiography or pH testing; auscultation alone is unreliable and should not be used. In pediatric patients, radiographic confirmation remains the gold standard, although pH testing and insertion-length assessment may be considered when imaging is not feasible. After PEG, EN can be initiated safely within 4 hours in both adults and children without increasing complications if trained staff monitor for leakage or infection.

Conclusion: This guideline offers a structured framework for safe and timely EN tailored to patient characteristics. Early verification and multidisciplinary collaboration help reduce complication, improving outcomes of EN therapy.

Keywords: Consensus; Delivery of health care; Enteral nutrition; Gastrostomy; Patient safety

Introduction

This chapter is a continuation of Part I, which addressed the prescription of enteral nutrition (EN) orders. Part II focuses on selecting feeding routes and initiating EN administration. Proper route selection and verification are essential to ensure safe and effective nutritional support. Misplacement or delayed initiation may lead to aspiration, infection, or inadequate nutrient delivery.

In clinical practice, the choice of feeding tube is influenced by the patient's anatomical and functional gastrointestinal condition, along with the expected duration of feeding. Radiographic or pH-based verification of tube position is necessary to prevent complications. Pediatric patients require additional caution because of anatomical differences and a higher risk of tube misplacement.

Furthermore, early initiation of EN after percutaneous endoscopic gastrostomy (PEG) has been shown to be safe in both adults and children, contributing to shorter hospital stays and improved outcomes. This chapter summarizes practical, evidence-based recommendations to guide health-care professionals in selecting the appropriate delivery route, confirming tube placement, and determining optimal timing for EN initiation after PEG.

Methods

The methodology followed in Part II is identical to that described in Part I.

The Korean Society for Parenteral and Enteral Nutrition (KSPEN) Enteral Nutrition Committee identified key questions concerning: (1) factors to consider when selecting the feeding tube; (2) methods for verifying tube placement in adults; (3) methods for verifying tube placement in children; and (4) timing of EN initiation after PEG placement.

Each question was assigned to experts in surgery, nutrition, nursing, pediatrics, and gastroenterology. A comprehensive literature search was performed using databases such as

PubMed, Embase, and the Cochrane Library. International guidelines from the European Society for Clinical Nutrition and Metabolism (ESPEN), the American Society for Parenteral and Enteral Nutrition (ASPEN), the Society of Critical Care Medicine (SCCM), and the American Gastroenterological Association (AGA) were also reviewed.

Draft recommendations were developed based on evidence strength and clinical applicability. These were peer-reviewed within each discipline and cross-reviewed by additional specialists. The final recommendations were approved by the KSPEN Guideline Committee to ensure validity and multidisciplinary consensus.

The structure of this part follows the same evidence-based practice format as Part I, including key questions, practice recommendations, and rationales, supported by international and domestic references.

Practice guide

Considerations when deciding on a feeding tube

Key question 1. What factors should be considered when deciding on a feeding tube?

Practice recommendation

- Feeding tubes should be selected based on the patient's specific circumstances.
 1. Anatomical changes in the gastrointestinal tract
 2. Changes in gastrointestinal function
 3. Duration of feeding
- For short-term feeding (4–6 weeks or less), nasogastric or orogastric tubes are recommended.
- For long-term tube feeding (4–6 weeks or more), invasive procedures such as PEG are recommended.

Rationale

Selecting an appropriate feeding tube requires careful

evaluation of the patient's disease status and gastrointestinal anatomy. The tip of the tube should be placed in either the stomach or the small intestine. In general, gastric placement is suitable for patients with a functional stomach and no delayed gastric emptying, obstruction, or fistula. Small-bowel feeding, such as via a nasojejunoscopy or jejunostomy, is more appropriate for patients with gastric outlet obstruction, severe gastric atrophy, gastric reflux, or aspiration of gastric contents. A double-lumen gastric tube may be used when gastric decompression is required simultaneously with small-bowel feeding. Tubes inserted through the nose or mouth are typically intended for short-term use (4–6 weeks or less) in hospitalized patients, although nasal feeding can also be implemented in outpatient settings. For medium- to long-term EN, a gastrostomy is appropriate [1]. When long-term EN (4–6 weeks or more) is anticipated, gastrostomy placement should be planned based on treatment duration, long-term goals, and the condition of both the patient and caregiver. Two studies that randomly assigned adults with persistent dysphagia due to neurologic disease to either nasogastric or percutaneous endogastric tubes showed superior outcomes in weight gain and feeding volume in those receiving a percutaneous endogastric tube. These results appear related to the difficulties of managing tube feeding in patients using nasogastric tubes [2,3].

Enteral feeding in pediatric patients is determined according to the child's clinical status [4–6]. In children aged 1 year or older, inadequate oral intake and inability to meet 60%–80% of nutritional requirements for 5 days or longer are considered criteria for initiating tube feeding. In children under 1 year, the inability to meet 60%–80% of nutritional requirements for 3 days or more is considered a threshold for beginning tube feeding.

The following contraindications should be considered when selecting an enteral feeding tube (Table 1) [7].

How to confirm the feeding tube position

Key question 2. What is the best way to confirm the feeding tube position in an adult patient?

Practice recommendation

- When inserting a feeding tube, the correct placement should be confirmed using the following methods:
 1. Checking the pH of the tube aspirate
 2. Measurement of carbon dioxide using capnography
 3. Abdominal or chest radiograph
 4. Auscultation

- Auscultation alone should not be used to confirm tube position because it is inaccurate and difficult to distinguish from misplacement.
- After inserting a feeding tube, ensure correct positioning before starting nutrition or medication.
- The length of the feeding tube should be checked and recorded, and this measurement should be used periodically to monitor for changes in tube position.
- If a change in tube position is suspected, nutrition or medication should not be administered until the exact location is confirmed through X-ray or another reliable method.
- It is recommended not to use tubes for feeding other than those specifically designed for tube feeding (e.g., Levin tubes). However, due to legal limitations in Korea, the use of dedicated feeding tubes is restricted.

Rationale

Insertion of a feeding tube is an essential procedure for providing EN and is routinely performed in clinical practice. However, incorrect insertion into the trachea or lungs can lead to complications such as pneumothorax, atelectasis, and pneumonia [8]. In addition, failure to confirm safe positioning of the tube tip after insertion may result in the direct delivery of feeding solution into the lungs, leading to aspiration and potentially severe complications such as pneumonia [9].

Historically, the most common method for confirming tube placement was to inject air through the feeding tube and listen for air sounds in the upper abdomen. However, these methods have a very limited capacity to accurately determine tube position, and because they cannot detect misplacement during the insertion process, complications such as pneumothorax or lung injury may only be recognized after they occur [10]. Therefore, after inserting the tube, it is safest to confirm its position with an X-ray before initiating nutrition or medications [11]. In addition, after tube insertion, measuring the pH of aspirated contents to confirm whether the tube is located in the stomach can be helpful [12,13]. Typically, a pH of 5.5 or lower suggests gastric placement [14]. However, neither radiography nor pH testing can detect

Table 1. Contraindications for enteral tube placement

Absolute contraindications	Relative contraindications
Mechanical bowel obstruction	Gastrointestinal bleeding
Acute peritonitis	Hemodynamic instability
Uncorrected coagulopathy	Massive ascites
Intestinal ischemia or necrosis	Respiratory failure
	Ventriculoperitoneal shunt placement
	Morbid obesity

airway entry during the insertion itself. Recently, new devices using electromagnets or miniature cameras have been developed to more accurately guide and confirm tube placement [15]. Although effective, they are expensive and currently have limited availability in Korea. Several studies have reported that measuring carbon dioxide during tube insertion using capnography can help predict whether the tube has entered the trachea or lungs [16,17]. However, this method cannot differentiate between esophageal and gastric placement, so final confirmation must still rely on radiographs or other validated methods.

Even after nutrition or medication administration begins, the tube's position must be checked periodically. Patient movement or changes in body position may cause the tube to advance deeper, resulting in small-bowel feeding, or may cause it to retract into the esophagus, which significantly increases the risk of aspiration [18]. Because daily radiographic confirmation is not feasible, the external tube length should be measured and recorded. Any change in length should raise suspicion of tube displacement. In such cases, feeding should be stopped, and the actual tube location should be verified with radiographs or another reliable method before restarting nutrition.

When using a Levin tube for EN, the tube's side hole extends up to 20 cm from the distal end; therefore, the tube must be inserted deeply enough to prevent feeding solution from entering the esophagus.

How to confirm the feeding tube position in children

Key question 3. How can the feeding tube position be confirmed in children?

Practice recommendation

- Auscultation alone should not be used to confirm feeding tube position.
- If confirmation by abdominal X-ray is not possible, the exact insertion length may be measured, or 0.5–1 mL of fluid can be aspirated from the tube for pH measurement using a pH indicator.
- If accurate feeding tube position cannot be confirmed using non-radiological methods, abdominal X-ray is the most accurate method. Given radiation exposure concerns, X-ray use in children should be performed cautiously.

Rationale

Before administering nutrition or medications through a newly inserted tube, it is essential to confirm both tube

patency and correct positioning. In 2012, the Child Health Patient Safety Organization recommended immediate discontinuation of relying solely on auscultation to verify nasogastric tube placement. Their report, based on more than 2,000 insertions, found that 1.3%–2.4% of tubes were misplaced outside the gastrointestinal tract and that over 20% led to pulmonary complications [19]. For these reasons, abdominal X-ray confirmation remains the gold standard until reliable non-imaging alternatives become available.

If abdominal X-ray is not feasible, measuring the accurate insertion length and aspirating gastric fluid for pH testing may be considered [19,20]. In neonates, children with neurological impairment, and those with a reduced gag reflex due to encephalitis or decreased consciousness—groups with a high risk of complications from tube misplacement—abdominal X-ray confirmation is essential [21,22].

A retrospective study by Ellett et al. [23] reported a 21% incidence of misplaced tubes, and in a prospective follow-up study, Ellett and Beckstrand [24] reported an even higher incidence in children, 22%–44%, which exceeds that observed in adults.

Even when placement is confirmed by abdominal X-ray, there is currently no consensus regarding the optimal position of the tube tip within the stomach [25].

Timing of initiation of tube feeding after PEG insertion

Key question 4. When can tube feedings be initiated after PEG?

Practice recommendation

- Enteral feeding via gastrostomy may begin within 4 hours post-procedure.
- Review the timing of PEG insertion and the sequence of procedures.
- Educate nurses administering tube feeding solutions regarding the appropriate timing for initiating tube use after PEG placement.

Rationale

In the absence of standardized protocols regarding the timing of post-PEG feeding and due to concerns about complications such as intraperitoneal leakage of feeding solutions, initiation of tube feeding has commonly been delayed until the following day or 12–24 hours after the procedure [26]. A 2011 web-based survey found that, despite reports since 2002 demonstrating the safety of initiating tube feeding 4 hours after gastrostomy, 59% of surveyed healthcare professionals

were unaware of standardized guidelines or updated evidence regarding this practice [27].

In five randomized controlled trials, there were no significant differences in mortality or gastric residual volume-related complications within 72 hours between groups that began early tube feeding within 3 hours of gastrostomy and those that began delayed feeding the following day [28].

In a retrospective comparative study involving 1,048 pediatric patients, early tube feeding initiated within 6 hours of gastrostomy was evaluated. The early-feeding group had a significantly shorter hospital stay, and there was no significant difference in complications—including gastrostomy infection, leakage, vomiting within 24 hours, aspiration, bleeding, peritonitis, or death—compared with the group for whom feeding was delayed beyond 6 hours [29].

Randomized controlled trials and retrospective studies consistently demonstrate that early tube feeding within 1–6 hours after PEG does not increase complication rates, including wound infection, melena, vomiting, leakage, aspiration pneumonia, mortality within 72 hours, or 30-day mortality. Meta-analyses similarly show no significant increase in complications associated with initiating tube feeding within 4 hours after gastrostomy in both adults and children [30–34].

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Authors' contribution

Conceptualization: all authors. Data curation: all authors.

Formal analysis: all authors. Methodology: all authors. Project administration: all authors. Visualization: all authors. Writing—original draft: all authors. Writing—review & editing: all authors. All authors read and approved the final manuscript.

Conflict of interest

Ye Rim Chang has served as the editor of the *Annals of Clinical Nutrition and Metabolism* since 2024. However, she was not involved in the peer review process or decision-making regarding publication. Otherwise, no potential conflict of interest relevant to this article was reported.

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Data availability

Not applicable.

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Supplementary materials

None.

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