



Prevention of Aspiration

Scope and Impact of Problem

Critically ill patients have an increased risk for aspirating oropharyngeal secretions and regurgitated gastric contents. For those who are tube-fed, aspiration of gastric contents is of greater concern. While witnessed large-volume aspirations occur occasionally, small-volume clinically silent aspirations are far more common. For example, a laboratory study identified frequent microaspirations in approximately half of a large population of critically ill, mechanically ventilated patients who were receiving tube feedings.¹ In the same study, risk for pneumonia was about 4 times greater in patients identified as frequent aspirators. Because no bedside tests are currently available to detect microaspirations, efforts to prevent or minimize aspiration take on added importance.

Expected Practice

Maintain head-of-bed elevation at an angle of 30 to 45 degrees, unless contraindicated. [Level B]

Use sedatives as sparingly as feasible. [Level C]

For tube-fed patients, assess placement of the feeding tube at 4-hour intervals. [Level C]

For patients receiving gastric tube feedings, assess for gastrointestinal intolerance to the feedings at 4-hour intervals. [Level C]

For tube-fed patients, avoid bolus feedings in those at high risk for aspiration. [Level E]

Consult with physician about obtaining a swallowing assessment before oral feedings are started for recently extubated patients who have experienced prolonged intubation. [Level C]

Maintain endotracheal cuff pressures at an appropriate level, and ensure that secretions are cleared from above the cuff before it is deflated. [Level B]

Supporting Evidence

Head-of-Bed Elevation

There is evidence that a sustained supine position (zero-degree head-of-bed elevation) increases gastroesophageal reflux and the probability for aspiration; for example, using a radioactive-labeled formula, endobronchial counts were higher when patients were lying flat in bed (zero degree) compared to when they were in a semirecumbent (45-degree) position.² Thus, elevating the head of the bed to an angle of 30 to 45 degrees, unless contraindicated, is recommended for patients at high risk for aspiration pneumonia (eg, a patient receiving mechanical ventilation and/or one who has a feeding tube in place).^{3,4} Although effectiveness of the reverse Trendelenberg position in minimizing aspiration has not been studied, it is likely to produce similar results to an elevated backrest position.⁴

Sedation

Sedation causes reduced cough and gag reflexes and can interfere with the patient's ability to handle oropharyngeal secretions and refluxed gastric contents; in addition, sedation may slow gastric emptying.^{5,6} To reduce the risk for aspiration, it is prudent to use the smallest effective level of sedation.

Assess Feeding-Tube Placement at Regular Intervals

Expert panels recommend that correct feeding-tube placement be verified at regular intervals to minimize the risk for aspiration.^{3,4,7} If feedings are administered at the wrong site (such as the esophagus, or even the stomach of a patient who requires small-bowel feedings), the risk for aspiration is increased.⁸ It is not uncommon for feeding tubes to become malpositioned during routine use. For example, in a study of 201 critically ill patients, it was found that the distal tips of 24 of 116 feeding tubes originally positioned in the small bowel were displaced upward into the gastrointestinal tract (23 into the stomach and 1 into the esophagus).⁹

Assess for Gastrointestinal Intolerance to Tube Feedings

Tube-fed patients who experience frequent regurgitation and aspiration of gastric contents are at increased risk for poor respiratory outcomes.¹ Guidelines developed jointly by the Society of Critical Care Medicine and the American Society for Parenteral and Enteral Nutrition recommend that patients be monitored for tolerance to enteral feedings by noting abdominal distention, complaints of abdominal pain, observing for passage of flatus and stool, and monitoring gastric residual volumes.¹⁰ Because gastric distention predisposes to regurgitation, it is recommended that gastric residual volumes (GRVs) be measured every 4 hours in critically ill patients.⁴

Practice varies widely in regard to GRVs; however, 200 ml and 250 ml are frequently cited values for initial concern.^{11,12} In a study of 206 critically ill patients, 2 or more GRVs of at least 200 ml and 1 or more GRVs of at least 250 ml were found significantly more often in patients who experienced frequent aspiration.¹¹ Prokinetics are sometimes advocated to improve gastric emptying when GRVs exceed a stipulated value. Several sources recommend that feedings be stopped when GRVs exceed 500 ml.^{4,7}

In a study of gastrointestinal (GI) symptoms in critically ill patients, investigators found that those with 2 or more simultaneous GI symptoms (such as high gastric aspirate volume, absent or abnormal bowel sounds, vomiting/regurgitation, diarrhea, bowel distension, and gastrointestinal bleeding) were less likely to have successful enteral feedings than those with fewer than 2 GI symptoms (84% vs 12.2%, respectively, $p < .001$).¹³ Although bedside assessments for GI function such as GRVs and abdominal girth are difficult to evaluate,¹⁴⁻¹⁶ they are frequently used in combination to provide an estimate of GI tolerance to enteral feedings. Small bowel feeding with the tube's ports situated at or below the Ligament of Treitz is strongly recommended for patients with persistent intolerance to gastric feedings and documented aspiration.⁷

Avoid Bolus Tube Feedings in Patients at High Risk for Aspiration

An expert panel has concluded that no recommendation can be made regarding the best type of formula delivery method (continuous or intermittent).³ Also, no guidelines exist for bolus feedings. On the basis of logic,

however, administering an entire 4-hour volume of formula over a period of a few minutes is more likely to predispose to regurgitation of gastric contents than is the steady administration of the same volume over a period of 4 hours.

Continuous feedings are used in most critical care units. Supportive of this action is a small study of neurologically impaired adult patients; aspiration was observed more frequently in those with intermittent feedings (3 of 17) than in those who received continuous feedings (1 of 17).¹⁷ It is possible that the bolus method of feeding may decrease the lower esophageal pressure and thus predispose patients to reflux and aspiration.¹⁸ Other researchers reported that adult burn patients who received continuous tube feedings had less stool frequency and less time required to reach nutritional goals than did intermittently fed patients.¹⁹

Swallowing Assessment Before Oral Feedings for Recently Extubated Patients

Tracheal intubation interferes with overall swallowing physiology.²⁰ Thus, it is reasonable to expect some degree of swallowing impairment when patients are initially extubated. A systematic literature review found that recently extubated patients were at increased risk for swallowing difficulties; more than 20% of the patients in many of the reviewed studies experienced dysphagia.²¹

Management of Endotracheal Tubes

A persistent low cuff pressure (< 20 cm H₂O) predisposes patients to pneumonia, presumably by predisposing to aspiration of oropharyngeal secretions and/or refluxed gastric contents.²² To minimize aspiration of secretions pooled above the endotracheal tube's cuff, hypopharyngeal suctioning should be performed before deflating the cuff.³

Actions for Nursing Practice

Maintain head-of-bed elevation at an angle of 30 to 45 degrees, unless contraindicated

- If backrest elevation is not tolerated, consider use of the reverse Trendelenberg position to elevate the head of the bed, unless contraindicated.
- If necessary to lower the head of bed for a procedure or a medical contraindication, return the patient to a head-of-bed elevated position as soon as feasible.

Use sedatives as sparingly as feasible

- Use an appropriate sedation scale to guide the administration of sedatives.
- Consider clinical situations that affect the need for sedatives.

For tube-fed patients, assess feeding-tube placement at 4-hour intervals to ensure the tube has remained in the desired location.

- Observe for a change in length of the external portion of the feeding tube, as determined by movement of the marked portion of the tube.
- Review routine chest and abdominal x-ray reports to look for notations about tube location.

- Observe changes in volume of aspirate from the feeding tube; a large increase in volume may signal the upward dislocation of a small-bowel feeding tube into the stomach.
- If pH strips are available, measure the pH of feeding-tube aspirates if feedings are interrupted for more than a few hours. Also, observe the appearance of feeding-tube aspirates if feedings are interrupted for more than a few hours.
- Obtain an x-ray to confirm tube position if there is doubt about the tube's position.

For patients receiving gastric tube feedings, assess for intolerance to feedings every 4 hours by monitoring GRVs, abdominal discomfort, nausea/vomiting, and abdominal girth/tension

- Although it is easier to withdraw gastric contents from large-bore feeding tubes than from small-bore tubes, it is important to measure residual volumes from all types of gastric tubes, including gastrostomy tubes.
 - A 60 ml syringe is most suitable for measuring residual volumes.
 - It is helpful to inject 30 ml of air before attempting to aspirate fluid from flexible, small-diameter tubes.
 - Withdraw as much fluid as possible to make an accurate assessment.
 - It may be helpful to reposition the patient to facilitate withdrawal of fluid from the tube (for example, turning the patient from side to side may allow the feeding tube's ports to enter a pool of gastric fluid).
- If patients are able to communicate, ask if they are experiencing abdominal discomfort or nausea. If vomiting is present, feedings should be stopped, and the physician notified.
- Palpate the abdomen for firmness; a millimeter tape may be used to measure abdominal girth.
- Evaluate the significance of a single abnormal finding, such as a high GRV, in relation to other indicators of GI intolerance to tube feedings, such as abdominal distention, abdominal discomfort, and nausea and vomiting.
- Although clinicians disagree about the necessity for small bowel feedings to minimize aspiration risk in all critically ill patients, small bowel feedings have been recommended when patients are intolerant of gastric feedings or when they have documented aspiration.⁷

For tube-fed patients, avoid bolus feedings for those at high risk for aspiration

- As indicated above, it is better to introduce feedings evenly over a period of hours to minimize risk for regurgitation and aspiration of gastric contents.
- Consult with a dietitian and a physician about the best feeding method for individual patients.

Consult with the patient's physician about obtaining a swallowing assessment before beginning oral feedings for a recently extubated patient who has undergone prolonged intubation

- As indicated above, studies have shown that patients may experience dysphagia following extubation, especially if intubation has been prolonged. As such, it is prudent to observe for swallowing problems before introducing oral feedings. If a swallowing assessment is needed, it will likely be performed by a speech pathologist.

Maintain endotracheal cuff pressures at an appropriate level

- The American Thoracic Society recommends that endotracheal tube cuff pressure be maintained at > 20 cm H₂O to prevent leakage of secretions around the cuff into the lower respiratory tract.²³
- Moreover, it has been recommended that cuff pressure be maintained at < 30 cm H₂O to prevent tracheal injury.²⁴
- To minimize aspiration of pooled secretions from above the cuff, hypopharyngeal suctioning is recommended before the cuff is deflated.³

AACN Levels of Evidence

Level A	Meta-analysis of quantitative studies or metanalysis of qualitative studies with results that consistently support a specific action, intervention, or treatment
Level B	Well-designed, controlled studies with results that consistently support a specific action, intervention, or treatment
Level C	Qualitative studies, descriptive or correlational studies, integrative reviews, systematic reviews, or randomized controlled trials with inconsistent results
Level D	Peer-reviewed professional and organizational standards with the support of clinical study recommendations
Level E	Multiple case reports, theory-based evidence from expert opinions, or peer-reviewed professional organizational standards without clinical studies to support recommendations
Level M	Manufacturer's recommendations only

Need More Information or Help?

Contact a clinical practice specialist for additional information (www.aacn.org); then select Practice Resource Network and Ask the Clinical Practice Team.

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