

AACN Practice Alert

Prevention of Aspiration in Adults

Scope and Impact of the Problem

Critically ill patients are at increased risk of aspirating oropharyngeal secretions and regurgitated gastric contents. For those who are tube-fed, aspiration of gastric contents is of greater concern. Diagnosis of aspiration is difficult without the use of costly procedures; thus, the incidence of this condition is unclear. However, aspiration is clearly a common problem in acutely ill patients. For example, videofluoroscopically documented aspiration was reported in 42.6% of 1100 hospitalized adults (25% of the patients were aspirating silently).¹ In a laboratory study (using pepsin as a marker for aspiration of gastric contents), frequent microaspirations were identified in approximately half of 360 critically ill patients undergoing mechanical ventilation who were receiving tube feedings.² In the same study, risk for pneumonia was about 4 times greater in patients identified as frequent aspirators. Reportedly, aspiration pneumonia represents 5% to 15% of pneumonias in the hospitalized population.³ Because no bedside tests are currently available to detect microaspirations, efforts to prevent or minimize aspiration take on added importance.

Expected Practice

1. Maintain head-of-bed elevation at an angle of 30° to 45°, unless contraindicated. [level B]
2. Use sedatives as sparingly as feasible. [level C]
3. For tube-fed patients, assess placement of the feeding tube at 4-hour intervals. [level C]
4. For patients receiving gastric tube feedings,

AACN Levels of Evidence

- Level A** Meta-analysis of quantitative studies or metasynthesis of qualitative studies with results that consistently support a specific action, intervention, or treatment (including systematic review of randomized controlled trials)
- 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

assess for gastrointestinal intolerance to the feedings at 4-hour intervals. [level C]

5. For tube-fed patients, avoid bolus feedings in those at high risk for aspiration. [level E]
6. Consult with provider about obtaining a swallowing evaluation before oral feedings are started for recently extubated patients who had been intubated for more than 2 days. [level C]
7. 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

Evidence indicates that a sustained supine position (0° head-of-bed elevation) increases gastroesophageal



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reflux and the probability of aspiration; for example, in a study⁴ that used a radioactive-labeled formula, endobronchial counts were higher when patients were lying flat in bed (0°) than when they were semirecumbent (45° elevation). Thus, elevating the head of the bed to an angle of 30° to 45°, unless contraindicated, is recommended for patients at high risk for aspiration pneumonia (eg, a patient receiving mechanical ventilation and/or anyone who has a feeding tube in place).^{5,6} Although the effectiveness of the reverse Trendelenberg position in minimizing aspiration has not been studied, it is likely to produce results similar to the results for an elevated backrest position.⁶

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.^{7,8} To reduce this risk for aspiration, it is prudent to use the smallest effective level of sedation.^{9,10}

Assess Feeding Tube Placement at Regular Intervals

Expert panels recommend that correct placement of the feeding tube be verified at regular intervals to minimize the risk for aspiration.^{5,6,11} If feedings are administered at the wrong site (eg, the esophagus, or even the stomach of a patient who requires small-bowel feedings), the risk for aspiration is increased.¹¹ It is not uncommon for feeding tubes to become malpositioned during routine use. For example, in a study¹² of 201 critically ill patients, 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).

Assess for Gastrointestinal Intolerance to Tube Feedings

In a recent meta-analysis of 72 studies, researchers found that feeding intolerance (although inconsistently defined) occurred in 38% of the critically ill patients evaluated in the studies.¹³ Feeding intolerance was primarily based on large gastric residual volumes (GRVs) together with other gastrointestinal symptoms. Disease severity has an impact on GRVs.¹⁴

The necessity for GRV measurements is a matter of controversy. In a recent randomized trial,¹⁵ researchers found that the absence of gastric volume monitoring was not inferior to routine GRV monitoring in terms of development of ventilator-associated pneumonia; however, vomiting occurred more often in the group of patients without routine GRV measurements. Another group of investigators reported finding a greater incidence of vomiting and regurgitation in patients who had GRV measurements performed less frequently than at 4-hour intervals (as compared with measurements every 4 hours).¹⁶ Tube-fed patients who experience frequent regurgitation and aspiration of gastric contents are at increased risk for poor respiratory outcomes.² Authors of an extensive literature review¹⁷ regarding the significance of GRVs concluded that GRV measurements are necessary in critically ill patients at high risk for gastrointestinal dysfunction.

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 and complaints of abdominal pain, observing for passage of flatus and stool, and monitoring GRVs.¹⁸ Because gastric distention predisposes to regurgitation, it is recommended that GRVs be measured every 4 hours in critically ill patients.⁶

The 2013 Canadian clinical practice guidelines¹⁹ indicate that data are insufficient to recommend a specific GRV threshold; however, the guidelines indicate that a GRV between 250 mL and 500 mL is acceptable as a strategy to optimize enteral nutrition in critically ill patients. GRVs of 200 mL and 250 mL are frequently cited values for initial concern.²⁰⁻²² Prokinetics are sometimes advocated to improve gastric emptying when GRVs exceed a stipulated value. Several sources^{6,11,23} recommend that feedings not be interrupted until GRVs exceed 500 mL.

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.¹¹

Avoid Bolus Tube Feedings in Patients at High Risk for Aspiration

No guidelines exist for bolus feedings. On the basis of logic, however, administering an entire 4-hour

volume of formula in just a few minutes is more likely to predispose patients to regurgitation of gastric contents than is the steady administration of the same volume during a period of 4 hours. It is possible that the bolus method of feeding may decrease the lower esophageal pressure and thus predispose patients to reflux and aspiration.²⁴

An expert panel has concluded that no recommendation can be made regarding the best method for delivering formula (continuous or intermittent).¹⁹ However, 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).²⁵

Swallowing Evaluation Before Oral Feedings for Recently Extubated Patients

Tracheal intubation interferes with overall swallowing physiology.²⁶ Thus, it is reasonable to expect some degree of swallowing impairment when patients are initially extubated.²⁷ Investigators recently concluded that trauma patients requiring mechanical ventilation for more than 2 days are at increased risk for dysphagia and should undergo routine swallowing evaluations after extubation.²⁸

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.²⁹ To minimize aspiration of secretions pooled above the endotracheal tube's cuff, hypopharyngeal suctioning should be performed before the cuff is deflated.⁵

Actions for Nursing Practice

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

1. If backrest elevation is not tolerated, consider use of the reverse Trendelenberg position to elevate the head of the bed, unless contraindicated
2. If necessary to lower the head of the bed for a procedure or a medical contraindication,

return the patient to head-of-bed elevated position as soon as feasible

Use sedatives as sparingly as feasible.

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

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

1. Observe for a change in length of the external portion of the feeding tube, as indicated by movement of the marked portion of the tube
2. Review routine chest and abdominal radiography reports to look for notations about tube location
3. 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 in the stomach³⁰; persistent inability to withdraw fluid (or only a few drops of fluid) from the tube may signal upward displacement of a gastric tube into the esophagus³¹
4. If pH strips are available, measure the pH of feeding tube aspirates if feedings are interrupted for an hour or more^{32,33}
5. Encourage obtaining a radiograph to confirm tube position if the tube's position is in doubt

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

1. 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 provider notified
2. Measure residual volumes from all types of gastric tubes, including gastrostomy tubes
 - a. A 60-mL syringe is most suitable for measuring residual volumes; withdraw as much fluid from the tube as possible to make an accurate assessment
 - b. It is helpful to inject 30 mL of air before attempting to aspirate fluid from flexible, small-diameter tubes³⁴

- c. It may be helpful to reposition the patient to facilitate withdrawal of fluid from the tube (eg, turning the patient from side to side may allow the feeding tube's ports to enter a pool of gastric fluid)
3. Evaluate the significance of a single abnormal finding, such as high GRV, in relation to other indicators of gastrointestinal intolerance to tube feedings, such as abdominal distention, abdominal discomfort, and nausea and vomiting
4. 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 aspiration¹⁸

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

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

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

1. Patients may experience dysphagia following extubation, especially if intubation has been prolonged; thus, it is prudent to observe for swallowing problems before introducing oral feedings
2. If a formal swallowing assessment is needed, it will most likely be performed by a speech pathologist

Maintain endotracheal cuff pressures at an appropriate level.

1. The American Thoracic Society recommends that endotracheal tube cuff pressures be maintained at greater than 20 cm H₂O to prevent leakage of secretions around the cuff into the lower part of the respiratory tract³⁵

2. Moreover, it has been recommended that cuff pressure be maintained at less than 30 cm H₂O to prevent tracheal injury³⁶
3. To minimize aspiration of pooled secretions from around the cuff, hypopharyngeal suctioning is recommended before the cuff is deflated⁵

Need More Information or Help?

1. Contact a clinical practice specialist for additional information: go to www.aacn.org/practice-resource-network
2. AACN Practice Alert: Initial and Ongoing Verification of Feeding Tube Placement in Adults. *Crit Care Nurse*. In press.
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None reported.

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