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Monitoring Adult Patients for Intolerance to Gastric Tube Feedings

Recent guidelines and best practices for the care of enterally fed adults.

ABSTRACT: Gastric tube feeding is a common and valuable intervention for patients in a variety of care settings. While tube feeding can save the lives of patients for whom oral feeding isn't possible, intolerance to tube feeding is a potential complication. This article discusses risk factors for feeding intolerance; the assessment of signs and symptoms of feeding intolerance; the various means of assessing gastric emptying, including the practice of monitoring gastric residual volume (GRV); the controversy surrounding GRV monitoring in assessing feeding tolerance; and the special considerations for monitoring feeding tolerance in acutely and critically ill adults with coronavirus disease 2019. The author, a nurse researcher with extensive experience in the area of enteral feeding, briefly summarizes recommendations and guidelines for enteral feeding published by national and international health care organizations between 2015 and 2020, and offers her perspective on best nursing practices for monitoring food tolerance in adults.

Keywords: COVID-19, enteral feeding, feeding intolerance, gastric residual volume, gastric tube feeding

Feeding intolerance is variably defined, but is commonly viewed as a constellation of gastrointestinal (GI) symptoms such as nausea, vomiting, abdominal distension, abdominal pain, diarrhea, reduced stool or flatus, and high gastric residual volume (GRV) that interrupt the delivery of enteral formula.

The inclusion of high GRV among the indications of gastric feeding intolerance has been shown to be highly predictive of ICU mortality.[1,2] Incidence of feeding intolerance is reported to be about 27% among hospitalized patients on general units and about 36% among patients in ICUs.[3]

SLOWED GASTRIC EMPTYING: A HIGH NURSING PRIORITY

Slowed gastric emptying associated with feeding intolerance increases the risk of regurgitation and aspiration of gastric contents. Early detection is thus a high priority for nurses, though there is controversy over the various bedside assessments employed for this purpose. Most controversial is the measurement of GRV, determined by withdrawing gastric contents from the stomach at various intervals during or following the completion of gastric feedings. Historically, GRV measurements have been used in many clinical settings. In fact, a 2012 survey of 2,298 intensive care and acute care nurses found that 97% reported performing this assess-

ment regularly.[4] Nonetheless, for a variety of reasons, the utility of this assessment has been challenged.[5-8]

RISKS FOR FEEDING INTOLERANCE

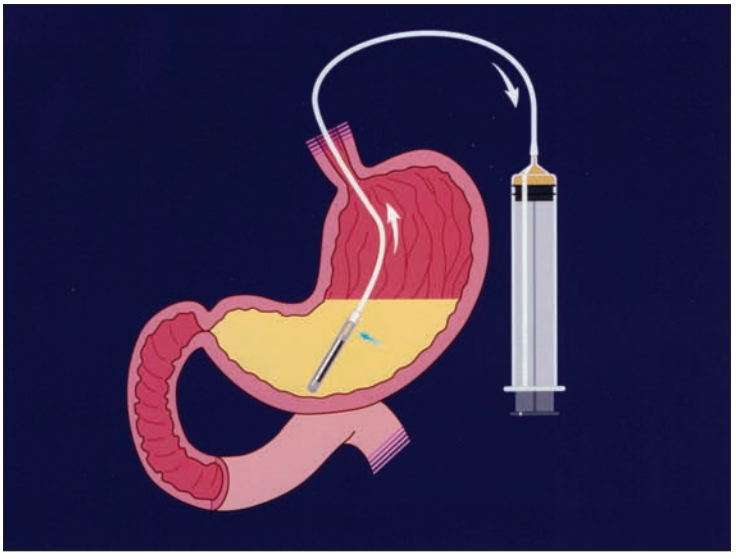
A number of factors affect a patient's likelihood of developing intolerance to gastric feeding, including the following conditions and medications, which predispose to delayed gastric emptying[9]:

- diabetes mellitus
- previous abdominal surgery
- burns
- pancreatitis
- spinal cord injury
- shock
- electrolyte disorders, such as hypokalemia
- sedatives and catecholamines
- opioids
- vasopressors
- anticholinergics

ASSESSING PATIENTS FOR FEEDING INTOLERANCE

Since no single assessment provides sufficient information to evaluate feeding intolerance, the American Society for Parenteral and Enteral Nutrition (ASPEN) recommends using a combination of assessments, including evaluation of symptoms such as nausea, bloating, and abdominal discomfort, and signs such as vomiting, diarrhea, visible abdominal distension, reduced passage of stool or flatus, and high GRV.[10] Bear in mind, however, that many tube-fed patients cannot communicate their symptoms because of altered mental status. In addition, neither these signs nor symptoms are specific to feeding intolerance since they may also be reactions to medication, formula characteristics, or underlying illness. A 2014 systematic review of 72 studies of gastric feeding intolerance found that 33 used GRV assessments in combination with such GI symptoms as vomiting, diarrhea, and abdominal distension to determine the presence of feeding intolerance, while 30 relied solely on GRV assessments.[11]

GRV assessments vs. scintigraphy and acetaminophen absorption tests. GRV monitoring is often used as a surrogate for more sophisticated gastric emptying tests that are impractical for routine use. The gold standard, scintigraphy, involves adding a radioactive marker to a solid or liquid test meal and using a gamma camera to determine the time required for the radiolabeled meal to leave the stomach. A more commonly used test involves administering a meal containing acetaminophen and measuring the amount of acetaminophen in serial blood samples as the meal is absorbed in its passage through the stomach.



Monitoring gastric residual volume is one way to assess gastric emptying in patients with tube feeding intolerance. Here aspirate is drawn from the stomach through the port (blue arrow) via a small-bore feeding tube. Illustration courtesy of the author.

The GRV advantage. GRV monitoring provides a simple bedside method to help identify GI dysfunction and requires no more equipment than a large syringe. GRV monitoring can enable clinicians to detect delayed gastric emptying earlier and intervene to minimize its clinical consequences.[12] A strong plus for GRV monitoring is that it doesn't require the patient to be lucid or verbal.

Disadvantages of GRV monitoring. No direct relationship has been established between GRV and aspiration. Furthermore, accuracy of measurements is affected by the feeding tube's diameter and port configuration, as well by the patient's position. In addition to potential measurement error, there is confusion about the level of GRV that increases risk of aspiration. Unnecessary feeding interruptions due to a falsely perceived high GRV is a serious problem that contributes to inadequate caloric intake. In addition, the act of measuring GRV may increase the risk of tube clogging,[13] though this problem can be averted by appropriate tube flushing.[10]

CONTROVERSY OVER GRV MONITORING

Controversy over the use of GRV monitoring to assess feeding tolerance can be explained largely by conflicting views regarding the significance of research on the topic. The following is a brief description of the more frequently cited studies.

Research supporting the utility of GRV monitoring. *GRV as predictive of upper digestive intol-*

erance, vomiting, lower caloric intake, and pneumonia. Mentec and colleagues evaluated the risk factors for and frequency of increased gastric aspirate volume and upper digestive intolerance to enteral feeding in a prospective, observational study of 153 ICU patients, all of whom were mechanically ventilated and were fed via 14-Fr nasogastric tubes.[14] Forty-seven (30.7%) of the patients had undergone recent surgery. Upper digestive intolerance was defined as one or more GRV measurements greater than 500 mL, two consecutive GRV measurements between 150 mL and 500 mL, or vomiting. A total of 20 (13.1%) of the patients had GRV measurements exceeding 500 mL, and another 29 (19%) had two or more consecutive GRV measurements between 150 and 500 mL.[14] Patients with high GRV measurements vomited significantly more often than those without high GRV measurements, and caloric intake was significantly lower among the patients with high GRV measurements. Furthermore, the presence of upper digestive intolerance was associated with a significantly higher incidence of pneumonia than its absence (43% versus 24%).[14] Upper digestive intolerance was also associated with a significantly longer ICU stay and a significantly higher ICU mortality rate.

GRV as predictive of aspiration. Another prospective, observational study described the relationship between GRV measurements and aspiration in a population of 206 critically ill, mechanically ventilated patients, 147 (71.4%) of whom were cared for in a surgery–trauma or neuromedicine–neurosurgery ICU.[15] Notably, 72.8% of GRV measurements at or above 150 mL, 74.5% at or above 200 mL, and 80% at or above 250 mL were obtained from patients with large-bore feeding tubes, ranging in size from 14 Fr to 20 Fr. Aspiration was defined as pepsin-positive tracheal secretions. A majority (92.7%) of the patients had aspirated at least once during the study period. Although aspiration occurred in the absence of high GRV measurements, it happened significantly more often when GRV was high. Using an adjusted logistic regression model including a number of other risk factors for aspiration, two or more GRV measurements of at least 200 mL and one or more GRV measurements of at least 250 mL were significantly predictive of aspiration.[15]

Research challenging the utility of GRV monitoring. *A seven-day prospective before-and-after study* was conducted by Poulard and colleagues to evaluate the effects of not monitoring GRV in mechanically ventilated patients receiving enteral feedings.[6] During the first phase of the study, which was conducted in a control (standard practice) group of 102 patients, continuous feedings were started at 25 mL/hour and increased incrementally to 85 mL/hour. In accordance with standard practice, GRV was measured at six-hour intervals with feeding intolerance defined as a GRV greater than 250 mL within any six-hour interval, or vomiting. In the second phase of the study, which was conducted in an intervention group of 103 patients, continuous feedings were initiated as in the first phase, but GRV was not monitored and feeding intolerance was defined only as vomiting. Outcomes included median enteral nutrition delivery per day, feeding intolerance (as defined in each group), vomiting, and ventilator-associated pneumonia (VAP). Neither vomiting nor VAP differed significantly between the two groups. The median daily volume of delivered enteral formula was slightly higher in the intervention group than in the control group (1,489 mL versus 1,381 mL), and feeding intolerance was lower in the intervention group,[6] which would be expected given that intolerance was more narrowly defined in that group.

An open-label, multisite trial conducted in nine medical or medical–surgical ICUs by Reignier and colleagues focused specifically on whether GRV monitoring of mechanically ventilated adults receiving enteral feedings reduced the risk of developing VAP.[7] Patients were randomized to either a control group of 215 patients whose GRV was monitored every six hours, or an intervention group of 208 patients whose GRV was not monitored. Tube size used in the study was not described. Outcomes of interest included VAP incidence and cumulative caloric deficit. Exclusion criteria were as follows[7]:

- abdominal surgery within the past month
- a history of esophageal, gastric, duodenal, or pancreatic surgery
- esophageal, stomach, or bowel bleeding
- contraindications to prokinetic agents, enteral nutrition delivered by jejunostomy or gastrostomy
- pregnancy
- treatment-limiting decisions
- current inclusion in trials involving VAP prevention or enteral feeding intolerance

In the control group, GRV measurements greater than 250 mL at any of the six-hour intervals monitored would indicate feeding intolerance, as would vomiting (defined as gastric contents found in the oropharynx or outside the mouth, including spontaneous regurgitation of feeding solution but excluding regurgitation associated with procedures that might trigger the vomiting reflex). In the intervention group, only vomiting (defined as above) would indicate feeding intolerance. Development of VAP did not differ significantly between the GRV-monitored control group and the non-GRV-monitored intervention group. Vomiting, however, occurred in more patients in the intervention group than in the control group (41.8% versus 26.5%).[7] Although caloric intake was higher in the non-GRV-

Key Guideline Recommendations for Monitoring Enteral Feeding Tolerance in Adults

- **Canadian Clinical Practice Guidelines**[16]
  - To optimize the delivery of enteral nutrition in critically ill adults, use a GRV of 250 to 500 mL and check residuals every four or eight hours.
- **SCCM/ASPEN guidelines for the provision and assessment of nutrition support therapy in the adult critically ill patient**[17]
  - Monitor patients daily for tolerance to enteral nutrition.
  - Do not include GRV monitoring as part of routine care for ICU patients receiving enteral nutrition.
  - If GRV monitoring is eliminated, monitor critically ill patients receiving enteral nutrition by performing daily physical examinations, reviewing abdominal radiologic films, and evaluating clinical risk factors for aspiration.
  - In ICUs in which GRV monitoring is performed, avoid withholding feedings for GRV measurements of less than 500 mL in the absence of other signs of feeding intolerance.
- **ESPEN guideline on clinical nutrition in the ICU**[18]
  - Measuring GRV may help identify intolerance to gastric feeding during initiation and progression but may be unnecessary after tolerance to feedings has been established.
  - Delay enteral feeding in critically ill patients with a GRV measurement greater than 500 mL per six hours.
- **ASPEN Safe Practices for Enteral Nutrition Therapy**[10]
  - Tolerance to enteral nutrition should be monitored in accordance with the acuity of the patient population and the health care setting.
  - High-risk patients, such as those who are clinically unstable due to critical illness or surgery require particularly close monitoring of feeding tolerance.
  - Use a combination of parameters appropriate to the specific patient to assess feeding tolerance, including patients' report of symptoms; objective observations of GI function, such as vomiting and GRV measurements; and physical examination, such as assessment for abdominal distension and firmness.
  - Do not routinely check gastric residuals in ICU patients receiving enteral nutrition, but for patient care areas in which GRV is monitored, GRV measurements between 250 and 500 mL should prompt measures to reduce risk of aspiration. In the absence of other signs of feeding intolerance, avoid withholding feedings for GRV measurements less than 500 mL.
- **ESICM clinical practice guidelines: early enteral nutrition in critically ill patients**[19]
  - Delay enteral nutrition in critically ill adults if gastric aspirate volume is above 500 mL per six hours.
  - After a single large gastric aspirate volume, administer prokinetics and reassess but do not withhold enteral nutrition for prolonged periods.
- **ACG clinical guideline: nutrition therapy in the adult hospitalized patient**[20]
  - GRV should not be used routinely to monitor hospitalized patients receiving enteral nutrition.

ACG = American College of Gastroenterology; ASPEN = American Society for Parenteral and Enteral Nutrition; ESICM = European Society of Intensive Care Medicine; ESPEN = European Society of Parenteral and Enteral Nutrition; GI = gastrointestinal; GRV = gastric residual volume; SCCM = Society of Critical Care Medicine.

monitored group over the first week of the study, the clinical significance of a median difference of about 15 kcal/d is questionable.[12]

GUIDELINES ON ENTERAL NUTRITION

Six guidelines and practice recommendations developed by national and international organizations address intolerance to enteral feeding in adults (see *Key Guideline Recommendations for Monitoring Enteral Feeding Tolerance in Adults*[10,16-20]):

- Canadian Clinical Practice Guidelines[16]
- Society of Critical Care Medicine (SCCM)/ASPEN guidelines for the provision and assessment of nutrition support therapy in the adult critically ill patient[17]
- ESPEN [European Society of Parenteral and Enteral Nutrition] guideline on clinical nutrition in the ICU[18]
- ASPEN Safe Practices for Enteral Nutrition Therapy[10]
- ESICM [European Society of Intensive Care Medicine] clinical practice guidelines: early enteral nutrition in critically ill patients[19]
- ACG [American College of Gastroenterology] clinical guideline: nutrition therapy in the adult hospitalized patient[20]

Four of the six[16-19] refer primarily to enteral feeding in critically ill patients, which is understandable because most of the research on feeding intolerance has been conducted in critical care settings. However, since the same general principles apply across practice settings, findings can usually be extrapolated to all patient populations, including subacute, rehabilitation, long-term care, and home settings, as discussed in the ASPEN Safe Practices for Enteral Nutrition Therapy guidelines,[10] which provide bedside nurses with the most comprehensive and relevant discussion of assessing feeding tolerance. This document emphasizes the need to assess tolerance to enteral nutrition, using a combination of parameters appropriate to the individual patient, while paying close attention to patients who are clinically unstable due to critical illness or surgical conditions.[10]

radiology reports, such signs and symptoms as distension and abdominal pain, vomiting, and clinical risk factors for aspiration.[17] Components of the physical examination are not described. While abdominal X-ray reports provide useful data, they are not typically available for most patients on a regular basis. When feasible, elevating the head of the bed between 30° and 45° is standard practice to minimize risk of aspiration during gastric tube feedings.

Both the ESPEN guideline on clinical nutrition in the ICU[18] and the ASPEN Safe Practices for Enteral Nutrition Therapy guidelines[10] concur that GRV monitoring of established enteral feeding may not be needed as part of routine care for patients in an ICU.

GUIDELINE THRESHOLDS OF GRV SIGNIFICANCE

The Canadian Clinical Practice Guidelines recommend using a GRV threshold of 250 to 500 mL when delivering enteral nutrition to critically ill patients.[16]

Close to half of patients who are critically ill with COVID-19 develop GI hypomotility, which results in at least 24 hours of feeding intolerance.

GUIDELINE POSITIONS ON GRV MONITORING

The Canadian Clinical Practice Guidelines recommend that GRV be assessed either every four or every eight hours as a means of optimizing delivery of enteral nutrition in critically ill patients.[16] This recommendation was partly based on findings from the two prospective, observational studies discussed earlier.[14, 15] The guidelines committee concluded that findings of the 2013 trial by Reignier and colleagues[7] were insufficient to recommend abandoning GRV assessments.[16] A primary concern noted by the committee was underrepresentation of high-risk patients in this trial. As Berger and colleagues noted in their 2019 review, fewer than 10% of the participants in the Reignier study were surgical patients and the incidence of vomiting was higher in the group that did not receive GRV monitoring.[7, 21] Furthermore, though caloric intake was higher during the first week of the study in the group that received no GRV monitoring, the gain was small (only 111 calories).[7, 16]

The SCCM/ASPEN guidelines, by contrast, presented the 2013 Reignier trial,[7] along with the 2010 study by Poulard and colleagues[6] and the 1993 study by Powell and colleagues,[13] as providing sufficient evidence to recommend *not* using GRV monitoring as part of routine care.[17] In the absence of GRV assessments, these guidelines suggest using alternative strategies to assess feeding tolerance, such as physical examination, assessment of flatus and stool,

The ASPEN Safe Practices for Enteral Nutrition Therapy guidelines advise that GRV measurements between 250 and 500 mL suggest a need to employ strategies that reduce risk of aspiration. The authors further maintain that it is inappropriate to stop enteral nutrition for GRV measurements below 500 mL in the absence of other indications of feeding intolerance.[10]

The SCCM/ASPEN guidelines agree that GRV measurements ranging from 250 to 500 mL should prompt actions to reduce risk of aspiration and also indicate that GRV measurements less than 500 mL should not automatically result in the withholding of enteral feedings unless other signs of feeding intolerance are present.[17]

The ESPEN guideline on clinical nutrition in the ICU makes a similar recommendation in stronger terms, suggesting that enteral feedings should be delayed in critically ill patients whose GRV exceeds 500 mL within a six-hour period.[18]

The ESICM clinical practice guidelines suggest delaying enteral nutrition in critically ill adults if gastric aspirate volume is above 500 mL within any six-hour interval, either for a limited period or until prokinetics can be administered.[19] For persistently large GRV measurements, the guidelines suggest considering postpyloric feedings rather than with-

Key Recommendations for Monitoring Enteral Feeding Tolerance in Adults with COVID-19

- **ASPEN: nutrition therapy in critically ill patients with COVID-19**[26]
  - Monitor for feeding intolerance by performing daily physical examinations and confirming passage of stool.
  - Do not check GRV.
  - Signs of feeding intolerance may include unremitting vomiting, unexplained abdominal pain or distension, or unexplained diarrhea.
  - Many patients tolerate gastric feeding while prone, though some experience reflux or vomiting.
  - When introducing enteral nutrition to patients in the prone position, elevate the head of the bed 10° to 25° (a reverse Trendelenburg) to reduce risk of aspiration.
- **ESPEN expert statements and practical guidance for nutritional management of individuals with SARS-CoV-2**[24]
  - In the case of a GRV measurement above 500 mL, the gastric tube should be quickly replaced with a duodenal tube.
- **BAPEN: enteral tube feeding safety in COVID-19 patients**[27]
  - For patients with high GRV measurements, consider nasojejunal tubes or parenteral nutrition to reduce risk of aspiration.
- **COVID-19 PhilSPEN updates**[25]
  - Monitor GRV only if signs of GI intolerance, such as diarrhea, nausea, vomiting, or abdominal distension, are present.
- **Nutrition management for critically and acutely unwell hospitalised patients with COVID-19 in Australia and New Zealand: guideline endorsed by AuSPEN**[23]
  - Measure GRV every eight hours if appropriate PPE is available, using a GRV threshold below 300 mL.
  - For patients who are not prone, stop measuring GRV when levels are below 300 mL for more than 48 hours.
  - For patients who are prone, monitor GRV every eight hours.
  - Pause feedings and aspirate the nasogastric tube prior to position changes, restarting feedings as soon as possible.

ASPEN = American Society for Parenteral and Enteral Nutrition; AuSPEN = Australasian Society of Parenteral and Enteral Nutrition; BAPEN = British Association for Parenteral and Enteral Nutrition; ESPEN = European Society of Parenteral and Enteral Nutrition; GI = gastrointestinal; GRV = gastric residual volume; PhilSPEN = Philippine Society for Parenteral and Enteral Nutrition; PPE = personal protective equipment; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2.

holding enteral nutrition, unless obstruction or bowel ischemia is suspected.

SPECIAL CONSIDERATIONS FOR ADULTS WITH COVID-19

The previous discussion of feeding intolerance also applies to the care of acutely and critically ill patients with coronavirus disease 2019 (COVID 19). These patients, however, have specific characteristics that require additional consideration. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus causing COVID-19, appears to directly affect the GI tract, which presents additional challenges in providing these patients with adequate nutrition. Close to half of patients who are critically ill with COVID-19 develop GI hypomotility, which results in at least 24 hours of feeding intolerance.[22] To help patients mount a defense to SARS-CoV-2, it's recommended that feedings be initiated as soon as is feasible. Most often, nasogastric feedings are initiated because nasogastric tubes are easy to place. When gastric feedings are not tolerated, either postpyloric or parenteral nutrition is necessary. It's especially difficult to monitor feeding intolerance in patients with COVID-19 because of their high acuity level and rapidly changing illness-related physiological changes.

GRV monitoring practices for adults with COVID-19 vary widely. Five national and international organizations have addressed the issue of monitoring patients with COVID-19 for feeding intolerance (see *Key Recommendations for Monitoring Enteral Feeding Tolerance in Adults with COVID-19*[23-27]). Given the novel nature of the virus, it's important to recognize that recommendations for managing COVID-19 are fluid and may change as more is learned about the disease. Although the same indicators of feeding intolerance in patients without COVID-19 are applicable to those with the virus, including nausea, vomiting, abdominal pain, abdominal distension, diarrhea, and elevated GRV, GI hypomotility is particularly common in patients with

COVID-19 and is worsened by sedatives needed to facilitate mechanical ventilation or the prone position. Patients who are seriously ill with COVID-19 are heavily sedated and unlikely to be able to report symptoms. It is also difficult to assess patients for abdominal distension when they are prone.

The Australasian Society of Parenteral and Enteral Nutrition (AuSPEN) recommendations suggest different GRV monitoring protocols for prone and nonprone patients.[23] For patients who are not prone, AusPEN suggests measuring GRV every eight hours, provided that appropriate personal protective equipment is available and airborne precautions are in place, and stopping GRV measurements when they have been lower than 300 mL for more than 48 hours.[23]

In the ESPEN guidelines for nutritional management of individuals with SARS-CoV-2, a GRV greater than 500 mL is cited as a reason to move the feeding tube into the duodenum.[24]

The Philippine Society for Parenteral and Enteral Nutrition guidelines recommend monitoring GRV only when other signs of feeding intolerance are present.[25]

The ASPEN's recommendations for nutrition therapy in critically ill patients with COVID-19 recommend not monitoring GRV at all in patients with the disease, citing the 2013 Reignier and colleagues trial as the rationale.[7,26]

The British Association for Parenteral and Enteral Nutrition guidelines, while not providing specific information about GRV monitoring, imply that GRV measurements can help determine if gastric feedings need to be stopped and postpyloric feedings or parenteral nutrition started.[27]

Prone positioning. Hospitalized patients with COVID-19 often develop acute respiratory distress syndrome and can benefit from prone positioning.[28] While known to improve oxygenation and increase clearance of bronchial secretions, the prone position predisposes to increased abdominal pressure and reflux of gastric contents.

The heavy sedation that is usually required while patients are in a prone position raises the risk of aspiration. To minimize this risk, the reverse Trendelenburg position (10° to 25°) is often employed. Changing a patient's position increases risks of vomiting and aspiration; for this reason, it's been suggested that tube feeding be held one hour prior to proning.[22]

INTERPRETING THE RECOMMENDATIONS

Recommendations and guidelines that suggest not using GRV measurements as part of routine care[10,17] are not suggesting there are no situations in which GRV assessments are warranted. Since risk of feeding intolerance varies among patients, it's important to consider patients' specific characteristics and circumstances.[21] For example, medical patients generally require less GRV monitoring than surgical or trauma patients.[12] Foregoing GRV assessments in patients who are able to describe symptoms of feeding intolerance and in those whose tolerance to feedings has been established is reasonable.

Based on my 36 years of experience as a nurse researcher in the area of enteral feeding, I find insufficient evidence to support the complete elimination of GRV assessments in patients with multiple risk factors for feeding intolerance and aspiration, as advised in the ASPEN's recommendations for nutrition therapy in critically ill patients with COVID-19.[26] I concur with recommendations to consider GRV measurements between 250 mL and 500 mL a concern to relay to prescribers of enteral nutrition[10] and agree that a GRV measurement of 500 mL is a reasonable threshold at which to delay or withhold feedings, especially in the presence of other signs of feeding intolerance.[10,18]

Risk vs. benefit. It is helpful to consider "risk versus benefit" when considering the need for GRV monitoring. The major risk of GRV monitoring is unnecessary cessation of feedings due to a faulty assumption that a GRV measurement is "too high." This risk, however, is minimal if a GRV threshold of 500 mL is accepted. A potential benefit of monitoring GRV in high-risk patients is an increased probability of detecting feeding intolerance early enough to take measures that reduce risk of aspiration. Although GRV measurements are undeniably flawed, other bedside indicators of feeding intolerance, such as nausea, vomiting, abdominal pain, abdominal distension, and diarrhea, also lack specificity for this condition. It is therefore reasonable to use a combination of assessments to increase the likelihood of detecting feeding intolerance and preventing associated complications.

Since nurses are responsible for around-the-clock care of hospitalized tube-fed patients, they should share in the decision-making as to when GRV assessments are indicated. This is best accomplished through their participation in interdisciplinary clinical practice committees. ▼

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