

**Abstract:**

**Routine monitoring of GRV (gastric residual volume) in patients receiving EN (enteral nutrition) is a common practice in hospitals throughout the world.** While the practice is wide-spread, current evidence does not support its efficacy related to patient care. In addition to the limited benefit of GRV monitoring in the patient population, it has been shown to result in high associated costs while diverting limited nursing resources. Misguided perceptions related to the effectiveness of continuous GRV monitoring among health care providers has led to a practice that drains hundreds of thousands of dollars each year from any given hospital. These added time and labor costs have been shown to be unnecessary when related to patient outcomes in the hospital setting. In the past, providers assumed that continuous monitoring of patients receiving enteral feeding was a necessary precaution to avoid aspiration pneumonia. Several studies have now shown no association between GRV and pneumonia as well as no correlation with ICU mortality, or hospital mortality. These studies have demonstrated that elevated residual volumes have little clinical meaning by themselves. Only when increased GRV are combined with signs of intolerance such as vomiting, sepsis, sedation, or the need for vasopressor agents does a correlation exist. Additionally, frequent holding of tube feeds may adversely affect patient outcomes due to decreased energy and nutrient delivery during critical healing and recovery periods. Routine GRV checks have also been linked to increased EAD (enteral access device) clogging which leads to inadequate nutrient delivery and increased utilization of nursing time. Current ASPEN guidelines recommend not discontinuing EN for GRVs < 500 ml in the absence of other signs of intolerance. This study confirmed the high cost and limited benefits realized through continuous GRV monitoring. Only 13% of patients showed signs of intolerance, and of those, only 3 had elevated GRV of 200-400 ml. One patient out of 84 experienced aspiration pneumonia which was **not** correlated with documented GRV.

**Learning Outcome:**

To recognize the high costs and limited benefit of continuous GRV monitoring.

**Introduction:**

This study was conducted in a 409 bed hospital in downtown Atlanta, Georgia. The hospital treats a wide variety of diseases and critical care patients form a diverse demographic landscape. Due to its location within a major metropolitan area, the prevalence of major traumatic injury and resulting need for enteral feeding is relatively high. This is a retrospective study which examined the entire population of patients in the month of May 2017, who were administered enteral nutrition. GRV prevalence and signs of intolerance were documented and analysed to determine correlation.

**Methods:**

Data was collected from review of 84 patient records. All patients receiving enteral nutrition during the month of May 2017, were included in a data mining process which identified information including age, gender, type of tube, estimated caloric needs, days of TF, residual volume aspirated per 24 hours, volume discarded per 24 hours, kcal concentration of formula, evidence of intolerance and if so what type of intolerance. Twenty randomly selected nurses were enlisted to participate in the survey. Ten nurses from the ICU unit and ten nurses from the general floor provided informed consent to take part in the survey which asked a variety of questions related to GRV

**Results:**

**100% of surveyed nurses reported checking GRV routinely.** 90% of nurses reported checking GRV every 4 hours and 10% reported checking every 6 hours. Average reported time spent checking GRV was 7.4 minutes per episode. Average checks per patient within 24 hours was 5.8 times. Average daily time spent per patient checking GRV was 42.9 minutes. Approximately \$22.31 in nursing labor was utilized per patient, per day checking GRV. Average monthly nursing labor cost per patient spent monitoring GRV was \$679. Average nursing labor cost spent monitoring GRV for a single patient for 365 days is **\$8,143**. 55% of nurses held tube feeds for 1 hour. 25% of nurses held tube feeds for 2 hours. 100% of nurses reported reinfusing aspirated GRV following checks. 65% of nurses rated checking tolerance as the #1 reason for monitoring GRV. 25% rated risk of aspiration as the #1 reason. Average amount of GRV aspirated by nursing staff was 28 ml per check. On average nursing staff reported considering GRV of 185.75 ml as high. Tube feeds were held when GRV reached an average volume of 189 ml. Of 84 patients on tube feed in May 2017, 11 patients had documented aspirated GRV. 3 had GRV > 500 ml. Eleven (13%) showed signs of intolerance. Seventy three (**88%**) of patients on tube feed had **no documented GRV**.

**Nursing Resources Diverted to GRV Monitoring**

Total Patients Receiving EN in May	84
Daily Frequency of Monitoring for Each Patient	5.8
Average Minutes per Encounter	7.4
Average Daily Minutes Utilized per Patient	42.9
Total Tube Feed Days for all Patients in May	1430
Average Days Spent Receiving EN	17
Average Daily Nursing Cost per Patient	\$22.3
Average Monthly Nursing Cost to Continuously Monitor 1 Patient	\$679
Average Annual Nursing Cost to Continuously Monitor 1 Patient	\$8,143

**Discussion:**

Gastric residual monitoring among nursing staff is a common practice. Past rationale for continuous GRV monitoring has been linked to perceived risks associated with GRV and aspiration pneumonia.<sup>1</sup> To date however, no adequately powered studies have demonstrated a relationship to aspiration pneumonia and GRV. Additionally, no adequately powered studies have shown that elevated GRV are reliable markers for increased risk of aspiration pneumonia.<sup>1</sup> GRV cannot be correlated with pneumonia (after the initiation of enteral feedings), ICU mortality, or hospital mortality.<sup>1</sup> Studies suggest that “the elevated residual volumes by themselves have little clinical meaning and only when combined with vomiting, sepsis, sedation, or the need for vasopressor agents does the correlation with worsening patient outcome emerge.”<sup>2</sup> Continuous monitoring of GRV leads to increased EAD clogging, inappropriate cessation of EN, consumption of nursing time, and utilization of healthcare resources, and may adversely affect patient outcome through reduced volume of EN delivered.<sup>3</sup> Studies have shown that eliminating the practice of measuring GRV improves delivery of EN without jeopardizing patient safety. Elimination of GRV measurement was shown to significantly increase EN delivery through increased volume received or greater reduction in energy deficit.<sup>4</sup> GRV in the range of 200-500 ml may raise concern and lead clinicians to begin protocols to reduce risk of aspiration, but it is not recommended to discontinue EN for GRVs < 500 ml in the absence of other signs of intolerance.<sup>4</sup> Our study revealed that standardized protocols that offer guidance related to GRV monitoring are ambiguous. Appropriateness of tube feed cessation is largely subjective but is only warranted in a small percentage of patients. Continuous monitoring of GRV in patients receiving tube feed is not shown to be beneficial considering its limited prevalence within the patient population. Long held beliefs and habits have created a routine that has no basis in scientific fact, and continues despite obvious ineffectiveness. Routine monitoring of GRV incurs high labor costs and diverts valuable resources from more productive patient care activities. This study illuminates the excessive amount of time and money that is spent annually to continue a practice that has little benefit and high associated costs. The nursing resources that could be diverted from this unnecessary practice and used in more productive endeavors is evident. Hopefully we have shed light on a hidden cost that can be eliminated with little effort and maximum benefit. Hospitals may potentially save hundreds of thousands of dollars per year in labor costs by discontinuing the practice of routine GRV monitoring.

**Conclusion:** Hospitals continue to spend a significant percentage of nursing labor on unnecessary monitoring of GRV. Routine GRV monitoring has not been shown to improve patient outcomes. Routine monitoring results in increased labor costs and loss of valuable nursing time that could be better spent providing patient care.

**Implications/Future Research:** Hospitals could incur substantial cost reductions by eliminating routine GRV monitoring.

**Limitations:** GRV data was based on documentation. Some data may not be captured through this process.

**References:**