

**Title:** Overcoming Barriers to Implementing Enteral Nutrition Orders in an Intensive Care Unit.

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**Introduction:**

Providing adequate calories via enteral feeding in a critical care setting can be challenging. Enteral feedings are often disrupted for many reasons, including procedures, tests, pressure support trials to facilitate ventilator weaning, and/or high gastric residuals. The purpose of this continuous quality improvement project was to explore the extent to which such disruptions compromised delivery of nutrition formula and therefore adequate calories and nutrients.

**Methods:**

Charts of patients being enterally fed on the medical intensive care unit of a major university hospital from the end of February through March 2012 were considered for review. A convenience sample of twenty charts was selected for review. Five charts were excluded because patients were only on a tube feeding or on the unit for one day. For each patient, the following information was collected daily: standing diet order (including formula, rate of administration, hours of administration), number of times feeding held and duration and reason for each hold, number of times residuals checked and volume of residuals, and total volume of formula delivered.

**Results:**

Data were analyzed for all days on patients receiving tube feedings, and re-analyzed excluding day 1 when infusion rates were being adjusted. Data were collected for an average of 5.1 days per patient, with a range of 2 to 7 days. Admitting diagnoses varied widely, i.e. pneumonia, sepsis, acute renal failure, and esophageal cancer. None of the patients were on bilevel positive airway pressure. Nine patients had nasogastric tubes and 5 patients had orogastric tubes and 1 tube type was unknown. Formulas delivered also varied: Osmolite (n=1); Jevity 1.2 (n=2); Glucerna 1.2 (n=3); Vital 1.5 (n=4); and Nepro 1.8 (n=5). The average number of times residuals were checked per day was 3.4 times  $\pm$  1.6. The daily average residual volume by patients was 14 ml  $\pm$  17 ml (median = 7 ml), with the highest daily average for any one patient of 92.5 ml  $\pm$  55 ml. On average, feedings were held 1.2 times per day  $\pm$  1 time, and the average duration of a hold was 5.2 hours  $\pm$  3.0 hours. Documented reasons for holding feedings were as follows: pressure support trials (n= 7 times); tests (n=7 times); high residuals (n=3 times); vomiting (n=1 time); extubation (n=1 time); unknown reason (n=1 time). Forty-seven percent of patients had tube feedings held for pressure support trials. Exclusive of day one, average calories as per physician order was 1376 kilocalories/day  $\pm$  626.9 (median=1392 kilocalories/day); as compared to average calories actually delivered which were 814 kilocalories/day  $\pm$  641.5 (median = 712.0 kilocalories/day). The difference between calories ordered and calories delivered averaged, exclusive of day one, 561 kilocalories/day  $\pm$  353.2 (median=534 kilocalories/day). Therefore, on average, patients received 40.8% fewer calories than ordered.

**Conclusions:** The degree to which patients' nutritional needs are not met due to holding of tube feedings is likely underestimated in practice. In addition, holds for pressure support trials, which are typically unnecessary, play a key role in limiting delivery of calories and nutrients. Based on this information, the following practical applications should be considered when implementing enteral feedings: 1) writing enteral feeding orders to be delivered over 18 to 20 hour cycles; 2) including directions for catch-up feeding to ensure volume of feeding ordered is delivered each day, with maximum infusion rate specified; and 3) consider feeding through pressure support trials.