

# Adequacy of Enteral Nutrition Delivery in ICU Patients Using 24 Hour Infusions

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## ABSTRACT

Malnutrition is common in critically ill patients and is associated with adverse outcomes. Enteral nutrition is the preferred choice for nutrition delivery. Enteral nutrition delivery practices vary widely with underfeeding being a common problem in critical care. A cross sectional study was conducted to determine the nutritional adequacy of enteral feeds in the ICU patients using 24hr infusion tube feed pump. Fourteen patients were evaluated for nutritional adequacy. Results showed that majority of patients (71%) were underfed, 21% were adequately fed and 7% were overfed with a mean calories received as 72.9%. The common reasons for interruptions of feeding can be attributed to tests, procedures and monitoring the tolerance of the feed.

## INTRODUCTION

- Adequate and appropriate nutrition is crucial in improving health outcomes in healthcare environment, especially in ICU setting.
- Enteral nutrition is the most preferred method of nutrition delivery in critically ill patients with a functional GI tract. However, patients are frequently underfed and less frequently overfed.
- Recent studies <sup>(1,2)</sup> showed that repeated interruptions of enteral tube feeding lead to significant underfeeding in critically ill patients. Adam and Batson<sup>(1)</sup> showed that ICU patients received only 76% of the patient's daily energy requirements with enteral tube feeding, chiefly because of gastrointestinal intolerance and elective withholding of feedings for procedures. In a similar study, McClave et al, <sup>(2)</sup> found that ICU patients received only 52% of energy requirements with enteral tube feeding and that 66% of the interruptions in tube feedings were avoidable.
- Therefore, it can be said that patients who are critically ill, there is no doubt that nutritional status and clinical outcome are linked <sup>(3)</sup>. There are various studies indicating association of inadequate feeding and poor clinical outcomes in ICU patients<sup>(4)</sup> such as increased risk of infections, development of pressure ulcers, impaired wound healing, prolonged hospital stays and increased morbidity and mortality <sup>(5)</sup>.
- Several feeding strategies have been proposed recently such as shift from an hourly-rate feeding goal to a 24-hour volume goal, allowing nurses to 'make-up' for interruptions and meet feeding targets <sup>(6)</sup>.
- A functional nutrition support system is essential which requires RDs to work with a team based care approach <sup>(7)</sup> for managing complex cases and improving quality of care in ICU.

## RESEARCH QUESTION / OBJECTIVE

To determine nutritional adequacy in ICU patients who are fed enterally using 24hr infusions.

## METHODOLOGY

- Cross sectional, prospective study on 14 patients in an open 28-bed intensive care unit (ICU) at Virginia Hospital center for a period of 2 months.
- **Inclusion Criteria:**
  - Patients above 18 years of age
  - Length of stay of three days and on tube feed
  - Patients receiving propofol infusions
  - Data on date of initiation of formula, type of enteral formula, goal rate, actual rate on the infusion pump at time of observation, intended goal volume in 24 hours, actual volume fed within 24hrs and calorie deficit
  - Infusion pump for each patient in the study was checked for 3 consecutive days between 3:45pm to 4:30pm
- Patients were categorized into three 'Adequacy categories' according to the percentage of their energy requirement they actually received <sup>(8,9)</sup>.
  - Group 1: Underfed (<90% of requirements received)
  - Group 2: Adequately fed ( $\pm 10\%$  of requirements received)
  - Group 3: Overfed (>110% of requirements received)
- Approval from Virginia Hospital Center (VHC) was provided for this study.

## RESULTS

Distribution of patients according to the adequacy of their nutritional intake is represented in Figure 1 (right)

### Results:

- Patients received 72.90%  $\pm$  28.8% of calories with a mean calorie deficit of approximately 560kcal
- Among fourteen patients, a total of 10 patients (71%) were underfed, 3 patients (21%) were adequately fed and 1 patient (7%) was overfed.

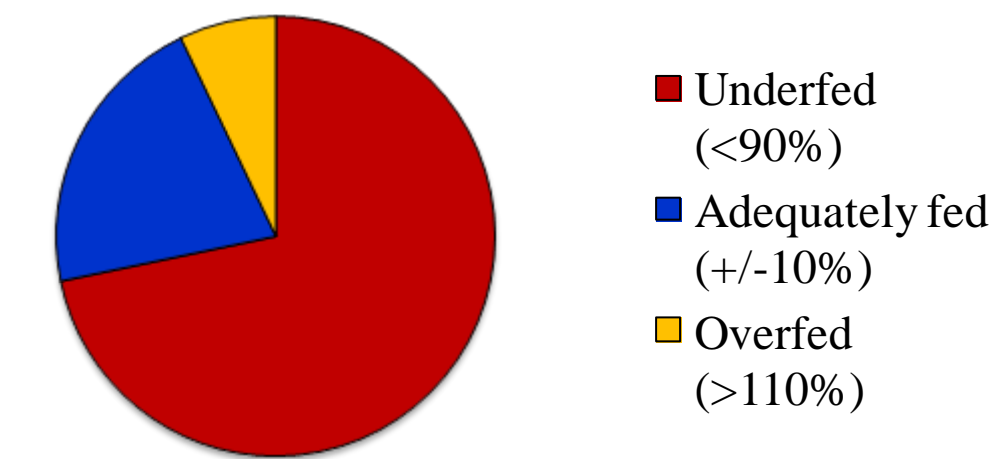
## DISCUSSION

- Research findings indicate majority of the patients (71%) were underfed and only 21% patients were adequately fed and 7% was overfed likely due to being on propofol in addition to the enteral formula with a mean energy received as 72.9%
- Multiple interruptions of enteral tube feedings limit the adequacy of enteral intake in ICU patients.

### Limitations:

- Inability to record tube feed volume of all patients at the same time
- Unable to know the reasons for tube feed interruptions for all the patients
- Unavailability of a dietitian on weekend to record the tube feed volume for consecutive days or to calibrate the tube feed pump to zero
- Very low sample size due to average length of ICU patients as 2.7 days in contrast to the requirement of data collection for 3 consecutive days.

Categories of Nutritional Adequacy



## CONCLUSION

- Study demonstrates that majority of critically ill patients were underfed.
- Adequate nutritional support is a key for prevention and treatment of malnutrition in critically ill patients
- Despite the known advantages of enteral feeding, ICU patients may not always receive adequate enteral feeding due to frequent interruptions of their tube feedings
- Adopting a PEP-up protocol i.e. implementing a volume based feeding, a multidisciplinary approach to nutritional support (including a dietitian and nurse), regular training of nursing staff involved in nutrition support delivery, and routine review of practice in ICUs might help to achieve optimal nutrition care for critically ill patients.

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