

What Is “Best Achievable” Practice in Implementing the Enhanced Protein-Energy Provision via the Enteral Route Feeding Protocol in Intensive Care Units in the United States?

Results of a Multicenter, Quality Improvement Collaborative

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Objectives:

The purpose of this multicenter, observational study was to evaluate the success of the PEPuP protocol in meeting calorie and protein requirements of critically ill, mechanically ventilated patients, when a very high protein safe-start formula was used, as compared to success experienced in facilities where a standard protocol was used.

Materials and Methods:

This was a prospective, multicenter quality improvement collaborative with an evaluation component that was limited to the United States. The study group consisted of 7 distinct ICUs that were provided with implementation tools, training, and a supply of a very high protein (37% protein) safe-start semi-elemental tube feeding. Data collection began in the fall of 2014. Patient inclusion criteria consisted of adult patients mechanically ventilated within 48 hours of ICU admission, who stayed on mechanical ventilation for at least 72 hours. Data collected included patient characteristics, ICU admission information, baseline nutrition assessment, daily nutrition data, including prescribed/delivered total calories and protein over the first five days of ICU feeding, method of feeding and 60-day patient outcomes. The control group met the same patient inclusion criteria, however could not be using volume-based feedings (VBF) or the PEP uP protocol. NUTRIC, Nutrition Risk in the Critically Ill Score, was calculated on every patient.

Results:

Study participants participated in the International Nutrition Survey and included 50 ICUs in the U.S., 7 of which were the PEP uP study group (n=126) and 43 the control group (n=982). Patients in the PEP uP group were more likely to have a medical admission diagnosis and higher mortality rate (22% vs 13%, p=0.01). Approximately one fourth of all patients had high NUTRIC scores, defined as ≥ 5 .

- Most patients were fed via enteral route. (p=0.05)
- Enteral nutrition (EN) was started faster in the PEP uP group (34 vs 51 hours after ICU admission, p=0.08)
- Average prescription was 23 kcal/kg/day and 1.4g pro/kg/day.
- **The total amount of calories and protein received over the first 5 ICU days was higher in the PEP uP study group.**
 - Total prescribed calories received for the first 5 ICU days averaged 43% in the PEP uP group and 31.8% in the control group. (p=0.01)
 - Total prescribed protein received for the first 5 ICU days averaged 42% in the PEP uP group versus 27% in the control group. (p=0.001).
- Most elements of the PEP uP protocol were considered acceptable by clinicians and given a rating of 9 on a 10-point scale, where 1=totally unacceptable and 10=totally acceptable.

Discussion:

In this study, PEP uP was designed to optimize EN delivery through earlier introduction of EN, VBF, relaxed gastric residual volume (GRV), use of motility agents and a very high protein peptide-based feeding. It was demonstrated that the PEP uP protocol is acceptable to ICU dietitians. Barriers to implementation were cultural (devaluation of nutrition in the ICU) and systematic (lack of nutrition education) and included the following:

- Hesitancy to feed the patient with hemodynamic instability, GI bleed, intra-abdominal hypertension, intolerance or risk of intolerance (high gastric residual volume, vomiting), renal insufficiency and post-surgery with questionable bowel function.
- Misunderstanding of trophic feeding rationale and options for transitioning to VBFs.
- Lack of education regarding importance of early EN and VBF calculations.
- Use of motility agents.
- Education and re-education on aspects of PEP uP protocol.

Suggestions for improving the PEP uP protocol included the following:

- Provide option for rate-based feeding until goal rate achieved and then transition to VBF.
- Provide VBF rate calculator for nurses.
- Use 12-hour VBF orders versus 24-hour orders; provide option for bolus feedings.
- Implement tools for achieving optimal blood sugar control with EN feeding rate changes.
- Omit routine use of motility agents and/or provide education on use of motility agents.

Use of a very high protein-containing formula (37% of calories from protein) may help optimize protein delivery, and it is suggested that practitioners continue to use high protein containing solutions as well as supplements to optimize protein delivery.

Conclusions:

The PEP uP protocol was found to be safe and effective. Work is required to reduce barriers to EN delivery. Introducing practice changes and protocols into an ICU requires considerable resources to educate staff.