



Better GI Tolerance and Glycemic Control associated with use of 100% Whey Protein Peptide-Based diet in Mechanically Ventilated, Enterally Fed Critically Ill Patients

BACKGROUND

- An estimated > 5 million patients are admitted to US intensive care units (ICUs) annually and 38.9% require mechanical ventilation (MV).^{1,2}
- Critical Care Guidelines suggest either tropic or full enteral tube feeding (ETF) if duration of MV is \geq 72 hours.³
- Gastrointestinal (GI) intolerance or dysfunction is frequently observed in ICU patients on MV and is associated with lower ETF delivery and worsened clinical outcomes.⁴
- The whey peptide-based ETF (WPBD) studied contains 100% whey protein, hydrolyzed for more efficient absorption, and medium chain triglycerides have been added for enhanced digestibility and tolerance. The WPBD is nutritionally complete.
- More research is needed on use of specialized ETF formula for patients in the ICU on MV and the prevalence of GI and glucose intolerance.

OBJECTIVE

- The primary objective of this retrospective, cross-sectional real-world observational analysis was to compare characteristics and associations of ETF with clinical outcomes of GI and glucose intolerance in ICU adults on MV who required ETF. Cohorts received WPBD, other peptide-based ETF without 100% whey protein (OPBD) or intact-protein standard ETF (SETF).

METHODS

- The PINC AI™ Healthcare Database, representative of hospitals in the United States, was utilized for this study.
- The study included adult ICU patients (\geq 18 years) on MV, who received WPBD, OPBD or SETF during acute hospitalization from 2017 to 2021.
- Patients who received WPBD (Peptamen® Family of formulas), OPBD or SETF for \geq 3 consecutive days or 3 of 5 consecutive days were identified. Patients on more than one ETF product or parenteral nutrition billed during the same inpatient stay were excluded.
- Primary outcomes examined were GI and glucose intolerance rates.
- Patient characteristics were evaluated using descriptive statistics (count and percentages, mean and standard deviations, median and interquartile range) and pair-wise comparisons to WPBD (chi-square, t-test) at the alpha=0.05 level of significance.
- Adjusted analyses were conducted using multivariable logistic regression models controlling for demographics, medications, hospital, and clinical characteristics.

REFERENCES

[1] Critical Care Statistics sccm.org/Communications/Critical-Care-Statistics. [2] Wunsch H, et al. Crit Care Med 2013;41(12):2712-2719. [3] McClave S, et al. JPEN 2016;40(2):159-211. [4] Heyland D, et al. Crit Care Med 2021;49(1)49-59.

RESULTS

- Overall, 12,887 patients across 53 US hospitals, mean age 61.8 (SD=16) years, 42.3% female, were included in this study. (Table 1)
- Number of patients included in each group were WPBD (3,004); OPBD (3,514); SETF (6,369).
- Across groups, patients received ETF for a mean of 8.3 (SD=7.8) / median 6 (IQR: 5) days.
- ICU stay was mean of 14.7 (SD=12.4) / median 12 (IQR: 11) days across ETF groups.
- The WPBD group had significantly lower prevalence of GI and glucose intolerance and mortality, as compared to the OPBD group. (Table 2)
- After controlling for confounders, the odds of GI intolerance were 25% lower, glucose intolerance 47% lower and mortality 24% lower for the WPBD group compared to OPBD (each p<0.001). (Table 2)
- The WPBD group had significantly lower prevalence of GI and glucose intolerance as compared to SETF: Odds of GI intolerance were 20% lower (p=0.001) and glucose intolerance 15% lower (p=0.06) for the WPBD group compared to SETF. (Table 2)
- APR-DRG Severity of illness-Extreme was higher among both specialized peptide-based formula groups as compared to SETF. (Table 1)
- Mortality was higher among both specialized peptide-based formula groups compared to SETF. (Table 2)

CONCLUSIONS

- Clinical outcomes of better GI tolerance and glycemic control were associated with WPBD relative to OPBD and SETF usage in ICU patients on MV.
- Adequate and optimal delivery of ETF using 100% whey peptide-based formulas is a strategy to help minimize GI and glucose intolerance and may clinically benefit patients mechanically ventilated in the ICU.

Table 1. Patient Characteristics

	WPBD (N=3,004) %	OPBD (N=3,514) %	SETF (N=6,369) %
Age, in years, Mean (SD)	61.5 (15.3)	60.7 (15.5)*	62.6 (16.5)†
Female	43.8%	42.3%	41.6%
White race	83.4%	69.1%*	80.2%†
APR-DRG Severity of illness – Extreme	89.1%	90.9%*	86.8%†
Elixhauser Index, continuous, Mean (SD)	6.2 (2.5)	6.7 (2.8)*	5.9 (2.5)†
Mechanical ventilation invasive	96.8%	96.8%	90.9%†
Obesity	34.8%	31.3%*	14.8%†
Malnutrition	26.6%	29.3%*	35.4%†
ETF initiation 1 st week	87.8%	84.1%*	85.1%†
Any GI medications	89.6%	87.8%*	89.5%

Abbreviations: enteral tube feeding (ETF); 100% whey, peptide-based (WPBD); other peptide-based diets (OPBD); intact-protein standard ETF formulas (SETF); standard deviation (SD); *WPBD vs OPBD, p<.05; †WPBD vs SETF, p<.05

Table 2. Clinical outcomes overall and by ETF group

Results	GI Intolerance	Glucose Intolerance	Mortality
Prevalence (%)	WPBD: 12.9% OPBD: 18.0%* SETF: 14.7%†	WPBD: 8.7% OPBD: 15.9%* SETF: 10.3%†	WPBD: 29.5% OPBD: 35.0%* SETF: 19.8%†
Unadjusted OR (95% CI)	WPBD vs (ref OPBD): 0.68 (0.59 – 0.77)* WPBD vs (ref SETF): 0.86 (0.76 – 0.98)†	WPBD vs (ref OPBD): 0.50 (0.43 – 0.59)* WPBD vs (ref SETF): 0.82 (0.71 – 0.96)†	WPBD vs (ref OPBD): 0.78 (0.70 – 0.86)* WPBD vs (ref SETF): 1.70 (1.54 – 1.88)†
Adjusted OR (95% CI) ††	WPBD vs (ref OPBD) ¹ : 0.75 (0.65 – 0.87)* WPBD vs (ref SETF) ² : 0.80 (0.70 – 0.91)†	WPBD vs (ref OPBD) ¹ : 0.53 (0.44 – 0.63)* WPBD vs (ref SETF) ² : 0.85 (0.72 – 1.01)	WPBD vs (ref OPBD) ¹ : 0.76 (0.68 – 0.85)* WPBD vs (ref SETF) ² : 1.60 (1.43 – 1.78)†

Abbreviations: Enteral tube feeding (ETF); 100% whey, peptide-based (WPBD); other peptide-based diets (OPBD); intact-protein standard ETF formulas (SETF); gastrointestinal (GI); odds ratio (OR); confidence interval (CI); *WPBD vs OPBD, p<.05; †WPBD vs SETF, p<.05; ††Adjusted for demographics, medications, hospital and clinical characteristics; ¹Adjusted OR from regressions including all 3 ETF cohorts in which OPBD is used as the reference group; ²Adjusted OR from regressions including all 3 ETF cohorts in which SETF is used as the reference group.

