

Factors associated with change in prescription to a semi-elemental/elemental formula and clinical outcomes in a Pediatric Intensive Care Unit

Mayara D. Martins¹; Daniela B. Hauschild, RD, MSc²; Julia C. Ventura, RD, MSc²; Eliana Barbosa, RD, MSc³; Nilzete L. Bresolin, MD, MSc⁴; Yara M.F. Moreno, RD, PhD⁵.

¹ Undergraduate student, Nutrition Department, Federal University of Santa Catarina, Florianópolis, Brazil

² Doctorate student, Graduate Program in Nutrition, Federal University of Santa Catarina, Florianópolis, Brazil

³ Dietitian, Nutrition Division, Joana de Gusmão Children's Hospital, Florianópolis, Brazil

⁴ MD, Pediatric Intensive Care Unit, Joana de Gusmão Children's Hospital, Florianópolis, Brazil

⁵ Professor, Graduate Program in Nutrition, Federal University of Santa Catarina, Florianópolis, Brazil.

Background: There is no consensus in the literature regarding when the prescription of a standard polymeric enteral nutrition (EN) formula should change to a semi-elemental/elemental formula in critically ill children admitted in a Pediatric Intensive Care Unit (PICU). The aim of this study was to identify the factors associated with change in the prescription of EN to a semi-elemental/elemental formula in a PICU and, to evaluate the effect after the change in prescription of polymeric enteral nutrition formula to semi-elemental/elemental formula on clinical outcomes.

Methods: A prospective cohort study with critically ill children aged 1 month to 15 years of age, admitted to a PICU of a tertiary hospital, who received any EN (EN-only or EN+parenteral nutrition) ≥ 72 h. Demographics, clinical characteristics, nutritional status and nutrition therapy details, during the first 7 days, were recorded. The clinical outcomes evaluated were 28-days-mortality, duration of mechanical ventilation (MV), nosocomial infection, PICU and hospital length of stay (LOS). Categorical variables were described in absolute values and frequency and quantitative variables as median and interquartile range (IQR). Logistic regression, Mann-Whitney test and Chi-square were applied, using $p < 0.05$ as significant.

Results: We enrolled 151 patients, 62.9% male, with a median age of 15.6 (IQR 3.7; 87.5) months, Prognostic Index of Morality (PIM2) of 4.6% (IQR 1.4; 16.0) and 87.4% required MV. The EN was mainly postpyloric. The presence of abdominal distention was associated with change from a polymeric EN formula

to a semi-elemental/elemental (odds ratio [OR] 3.6; $p=0.016$). Stool frequency ≥ 3 defecations/day were observed in all patients that EN prescription changed to a semi-elemental/elemental formula. Age, PIM2, undernutrition, EN interruptions, protein and energy adequacy were not associated with the EN prescription change to a semi-elemental/elemental formula (Table 1). Patients that the prescription changed to a semi-elemental/elemental formula, showed higher odds to have abdominal distension (OR 3.15; $p= 0.037$) after the change (Table 2). The patients that the EN prescription changed to elemental/elemental formula required more time on VM (10.5 days, IQR 4; 19.5), compared to patients who the EN prescription did not changed (6 days, IQR 3; 10) ($p=0.016$). There were no difference regarding others clinical outcomes.

Conclusion: Presence of abdominal distension was associated with change in prescription from polymeric EN formula to semi-elemental/elemental formula. However, after the implementation of semi-elemental/elemental formula, these patients had higher odds to present abdominal distension. More studies should be conducted to evaluate the indication of semi-elemental/elemental formula in critically ill children.

Table 1 – Association between clinical and nutritional variables with change in prescription from polymeric enteral nutrition formula to semi-elemental/elemental formula.

Variables	OR	95CI%	p-value
Age (<12 months)	0.89	0.34; 2.30	0.804
PIM (>5%)	2.13	0.82; 5.54	0.122
Undernutrition (BMI/A < -2 z-score)	0.25	0.03; 2.03	0.196
Abdominal distension	3.60	1.26; 10.27	0.016
Stool frequency of ≥ 3 defecations/day	-	-	-
EN interruption	2.11	0.57; 7.79	0.261
Energy adequacy (%)	0.99	0.99; 1.00	0.723
Protein adequacy (%)	1.00	0.98; 1.01	0.988

OR: odds ratio; PIM: Prognostic Index of Mortality; BMI/A: body mass index-for-age; EN: enteral nutrition; IC: confidence interval

Table 2 – Association between semi-elemental/elemental formula prescription with clinical and nutritional variables after change in prescription of polymeric enteral nutrition formula to semi-elemental/elemental formula.

Variables	OR	95 CI%	p-value
BMI/A reduction	0.23	0.03; 1.63	0.141
Abdominal distension	3.15	1.07; 9.28	0.037
Stool frequency of ≥ 3 defecations/day	2.03	0.63; 6.53	0.237
EN interruption	2.11	0.57; 7.79	0.261
Energy adequacy <80%	2.01	0.76; 5.31	0.158
Protein adequacy <80%	1.93	0.60; 6.23	0.271

OR: odds ratio; BMI/A: body mass index-for-age; EN: enteral nutrition; IC: confidence interval