

Healthcare Resource Utilization and Cost Comparisons of High-Protein Enteral Nutrition Formulas Used in Critically Ill Patients

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Objective:

To compare healthcare resource utilization (HCRU) and hospital costs associated with use of different peptide-based immunonutrition enteral formulas (PBIM) and standard high-protein enteral formulas (StdHP) in adult patients with an ICU stay.

Methods:

Data was retrospectively extracted from the PINC AI™ Healthcare Database from 27 US hospitals between 2015-2019. IMPACT® Peptide 1.5 (IP) was compared with Pivot® 1.5 Cal (PC), and REPLETE®/Promote® (StdHP). A descriptive analysis characterized patients, and multivariable regression followed to assess total hospital cost/day associated with each enteral nutrition cohort.

Results:

- Median volume and days of formula billed were 7 liters over 7 days per median patient stay and ICU stay of 16-days and 10-days, respectively.
- By cohort, select demographic, visit and hospital characteristics are shown in **Table 1**, and clinical diagnoses and comorbidities in **Fig. 1**. The IP group had the highest percentage of surgeries.

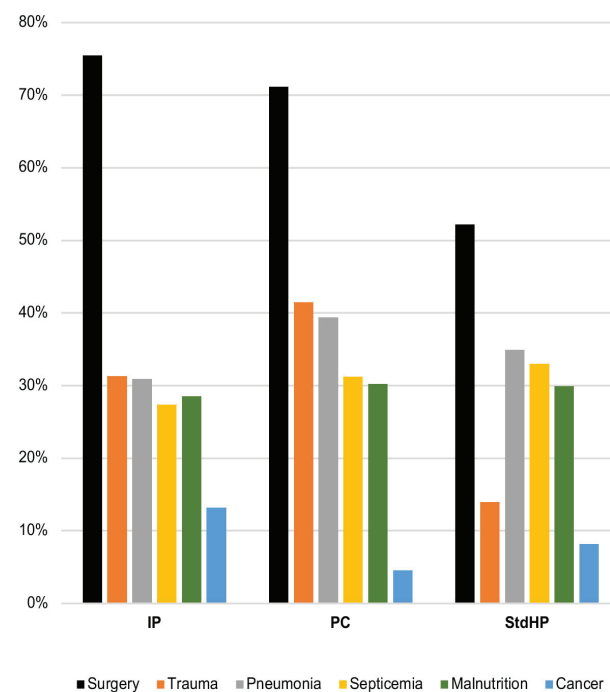
Table 1. Demographic, Visit, and Hospital Characteristics (n=5,752)

Measure	IP	PC	StdHP
Age, median (years)	59	58	65**
Male (%)	66	73**	50**
Race, Black (%)	6	12**	10**
Hispanic or Latino ethnicity (%)	3	2**	10**
Health Care Coverage, Medicare (%)	39	36**	61**
APR-DRG severity of illness, Extreme (%)	71	78**	77**
Mechanical ventilation (%)	76	85***	78
ECMO or tracheostomy (%)	25	25	9.5**
C. difficile infection (%)	5	6	4
Rectal catheterization (%)	9	19**	4**
ICU LOS (days)	13	15***	11
Inpatient mortality (%)	19	20	17**
Discharge to home / home health (%)	25	15**	20**
30-d readmissions (%)	9	12*	21***

ECMO = Extracorporeal membrane oxygenation

*p<0.05, **p<0.01, ***p<0.001 compared to IP. Values are median or mean for continuous factors and % for categorical factors. Adapted from Tables 2 & 3

Figure 1. Clinical Diagnoses and Comorbidities by EN Cohort



p<0.05 for IP vs. PC and IP vs. StdHP, except malnutrition. Adapted from Figure 1.

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Results (continued):

- Unadjusted cost per day was lowest for the StdHP group (**Fig. 2**), however, after controlling for multiple variables (i.e., mortality risk, surgery, discharge disposition etc.), average total hospital cost/day associated with IP use was 24% lower than PC and 12% lower than StdHP ($p < 0.001$) (**Fig. 3**).

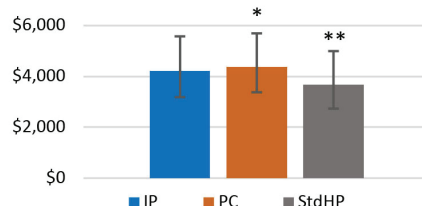
- Translated into approximate dollar values, use of IP in ICU patients was found associated with an estimated adjusted hospital cost/day that was \$1,285 dollars lower vs. PC, and \$566 lower vs. StdHP ($p < 0.001$) (**Fig. 4**).

- 30-day readmissions (unadjusted data) were less frequent for patients receiving IP vs. PC and StdHP; 11.6% vs. 15.3% ($p < 0.02$) and 11.6% vs. 25.6% ($p < 0.001$), respectively.

Conclusions:

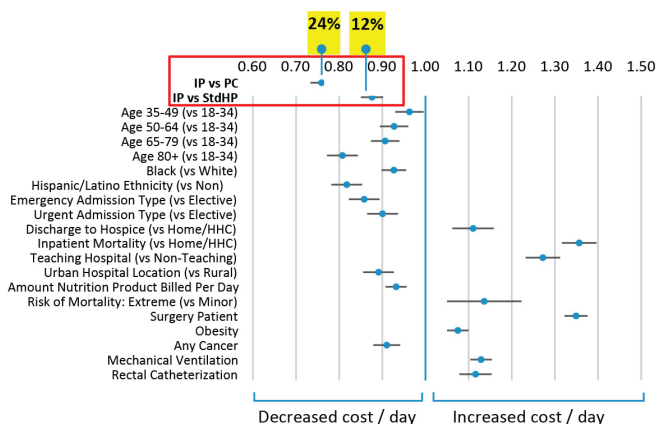
- Of the PIBM and StdHP formulas studied, IP was associated with the highest cost-savings, having lower adjusted hospital costs per day than PC or StdHP.
- Consider HCRU and daily hospital costs when comparing high-protein formula ingredients and per-unit costs for critically ill patients.

Figure 2. Unadjusted Cost/Day by EN Formula Group



* $p < 0.05$, ** $p < 0.001$; Adapted from Figure 2

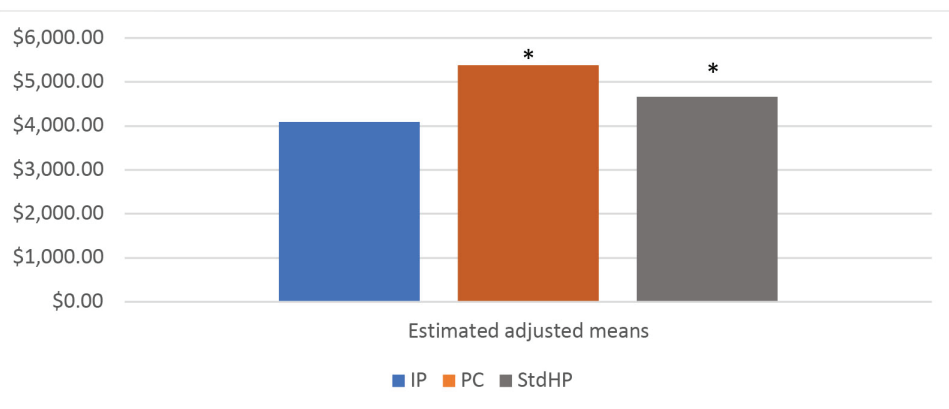
Figure 3. GLM Regression with Log Link, Associations with Cost per Day



IP vs. PC (EC: 0.76, CI: 0.73-0.79, $p < 0.001$). IP vs. StdHP (EC: 0.88, CI: 0.86-0.90, $p < 0.001$)

EC=exponentiated coefficient, CI= confidence interval. Model included all categorical options for each variable. Malnutrition, septicemia, pneumonia, diabetes, trauma diagnosis, APR-DRG severity of illness, days billed of antibiotic and antidiarrheal medications, hospital region and urban location, sex, and admission place of origin also included in model. Adapted from Figure 3

Figure 4. Adjusted Cost/Day by EN Formula Group



*IP vs. PC: \$4096 (95% CI: \$3967, \$4230) vs. \$5381 (95% CI: 5159, \$5612, $p < 0.001$). IP vs. StdHP: \$4096 (95% CI: \$3967, \$4230) vs. \$4662 (95% CI: \$4506, \$4824, $p < 0.001$). Translated into approximated dollar values using least-square means in the generalized linear model.

The paper is Open Access and may be downloaded at:

<https://jheor.org/article/36287-healthcare-resource-utilization-and-cost-comparisons-of-high-protein-enteral-nutrition-formulas-used-in-critically-ill-patients>

Summary prepared by Nestlé Health Science

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