

Early and Adequate Feeding in the Critically Ill Brain Injured Patient



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Introduction/Background

- Advances in feeding the ICU patient to ensure nutrient delivery include:
 - Early Initiation
 - Utilization of volume based feeding protocols
 - Correctly starting specialty formulas within the STICU
- TBI patients are at higher risk for developing malnutrition:
 - Specific metabolic function
 - Increased nutrient demand
- Improved outcomes for TBI patients occur when:
 - Enteral feeds started within 48 hours of hemodynamic stability
 - Nutrient delivered are maintained throughout their ICU stay
 - Patients started on immune modulating formulas
- More research is needed to assess the effect and adequacy of a volume based feeding protocol on TBI patients in the surgical trauma intensive care unit (STICU)

Table 1: Immune Modulating Formulation

Kcal/ml	1.5 kcal
Caloric Distribution	25% Calories from Protein 37% Calories from Carbohydrate 38% Calories from Fat
Protein Source	Hydrolyzed casein (milk) L-arginine
Supplemental L-arginine	18.7 g/L
L-glutamine	8.1 g/L
Dietary Nucleotides	1.8 g/L
NPC:N Ratio	63:1
MCT:LCT Ratio	50:50
EPA+ DHA	4.9 g/L
Amount needed to meet 100% RDI Micronutrients	1000 ml
Osmolality	510 mosm/kg
% Water	77%

Methods

Study Design

This was a single-center, retrospective review studying patients diagnosed with a TBI, and started on a volume based feeding protocol with an immune modulating formula (See Table 1; IMPACT Peptide 1.5, Florham Park, NJ) from January 2014-July 2016.

Primary Objective

- To examine the association between categories of volume feeding and overall hospital outcomes between three groups:
 - Fed early (within 24 to 48 hours of stability) and maintained 80% of nutrition throughout their ICU stay
 - Fed early and maintained < 80% of nutrition throughout their ICU stay
 - Fed late (fed > 48 hours of stability)

Patient Population

- Inclusion Criteria:
 - Adult patients ≥ 18 years old
 - Admitted to the Surgery Trauma Intensive Care Unit (STICU) diagnosed with traumatic brain injury
 - Required enteral nutrition for 48 hours
- Exclusion Criteria:
 - ICU Length of stay < 72 hours
 - Did not require enteral nutrition > 48 hours
 - Prisoners and pregnant patients
 - Patients transferred from outside facility or ICU already on nutrition support.

Results

- 50 patients were included in analyses. Patients who were fed early were started in enteral feeds on day 2, while those who were fed late were started on day 4.
- Chart 1 demonstrates the day goal enteral feeds were achieved within the ICU after starting the volume based feeding protocol.
- Most patients were able to tolerate the feeding protocol. Gastrointestinal intolerance was reported in 14 (28%) of patients.
 - Fed early and maintained > 80%: 0 of 19 patients
 - Fed early and maintained < 80%: 6 of 20 patients (30%)
 - Fed late: 8 of 11 patients (72.7%)

Chart 1: Average Day Goal Enteral Feeds Were Met



- Early, met 80% of goal
- Early, did not meet 80% goal
- Late Feeds

Results

Table 2: Sample Characteristics According to Onset (within 48 hours) and Adequacy of Enteral Feeding

Variables	Total N=50	Late feeding N=11	Early feeding but did not meet 80% N=20	Early feeding and met 80% N=19	P-value ^a
Age, mean (SD)	47.9 (19.5)	52.8 (18.9)	40.2 (17.5)	53.4 (19.9)	0.07 *
Gender, no (%)					0.750
Female	10 (20)	3 (27.3)	4 (20.0)	3 (15.8)	
Male	40 (80)	8 (72.7)	16 (80.0)	16 (84.2)	
Ethnicity, no (%)					0.840
White	30 (60)	7 (63.6)	11 (55.0)	12 (63.2)	
Nonwhite	20 (20)	4 (36.4)	9 (45.0)	7 (36.8)	
BMI, mean (SD)	27.6 (6.0)	25.0 (4.8)	31 (6.2)	25.6 (4.7)	0.003
Vasopressor use, no (%)					0.096*
Yes	37 (74)	6 (55.6)	14 (70.0)	17 (89.5)	
No	13 (26)	5 (45.4)	6 (30.0)	2 (11.5)	
Hospital Dispo					0.951
0=home,	21(42)	5 (45.5)	7 (35.0)	9 (47.4)	
1= rehab	15 (30)	3 (27.3)	7 (35.0)	5 (26.3)	
2 = nursing	6 (12)	1 (9.1)	2 (10.0)	3 (15.8)	
home/LTAC	8 (16)	2 (18.2)	4 (20.0)	2 (10.5)	
3 = death					
Calorie, mean (SD)	1575.9 (280.9)	1539.0 (298.7)	1471.2 (272.6)	1707.6 (235.6)	0.025
% Calorie met	77.7 (11.5)	79.5 (6.9)	68.0 (10.1)	86.8 (5.8)	<0.001
% Protein Met	78.1 (11.5)	79.9 (6.5)	68.4 (10.3)	87.3 (5.2)	<0.001
Mechanical ventilation duration	10.9 (8.4)	13.6 (6.07)	12.0 (10.0)	8.31 (7.3)	0.197

^aStatistical Significance set at p <0.05

*Borderline significance: p<0.1

Conclusion

- Those who were started earlier on volume based feeding program with a semi-elemental immune modulating formula were more likely to maintain 80% of nutrient needs compared to those started later at our institution
- Patients who were not started early or did not maintain 80% was attributed to gastrointestinal intolerance or healthcare team adherence to protocol.
- Further research is needed at our institution for the overall hospital outcomes associated with early feeding of traumatic brain injured patients on a semi-elemental, immune modulating formula.

References

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