



**Critical Care
Nutrition**

www.criticalcarenutrition.com

Final Site Report

Improving the Practice of Nutrition Therapy in the Critically ill: An International Quality Improvement Project

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Interpreting Your Site Report

The International Nutrition Survey is a period-prevalence survey of nutrition practices in Intensive Care Units (ICUs) throughout the World. Since September 2009, your ICU has been involved in collecting data for this survey. This site report summarizes your site's performance and will allow you to compare your nutrition practices to other ICUs within your own country or region ('Sister Sites') and all the ICUs in the database ('All Sites'). You will also be able to compare your performance to the recommendations of the Canadian Critical Care Nutrition Clinical Practice Guidelines (CPGs) (1).

The first few pages describe ICU and patient characteristics. This helps you to identify the similarities and differences in the structure and patient case-mix of your ICU compared to other ICUs and will help you to interpret your site report in the context in which you work.

Pages 8-12 outline the adequacy of nutrition therapy and enteral nutrition at your site and provides an overall assessment or summary of your performance in providing nutrition.

Subsequent pages outline the recommendations of the Canadian Critical Care Nutrition CPGs. After each recommendation is stated, a figure or table illustrates how your site performed for every nutrition practice related to that specific recommendation. The language of summary recommendations should be interpreted as follows:

"Strongly recommended"	If there was no reservations about endorsing an intervention.
"Recommended"	If evidence was supportive but there were minor uncertainties about the safety, feasibility, or costs of the intervention.
"Should be considered"	If the supportive evidence was weak and/or there were major uncertainties about the safety, feasibility, or costs of an intervention.

Glossary of terms

Your site:	this represents the mean or median of all the data from your site. This is often depicted in the figures by a clear block and --- dissecting the sister and all sites range bar.
Sister sites:	refers to the average of all the data from ICUs within your own country or region (see page 3).
All sites:	refers to the average of all the data from all the ICUs in the database.
Range:	refers to the highest and lowest site percentages or averages.
Q1:	refers to the first quartile point from either your / sister / all sites.
Q3:	refers to the third quartile point from either your / sister / all sites.
N:	number of ICU sites / patients / ICU days as indicated.
NA:	not applicable, no relevant data entered for this data point.
PCT:	percent.
n/N:	number of observations per total observations for your / sister / all sites.

(1) Heyland DK, Dhaliwal R, Drover JW, Gramlich L, Dodek P and the Canadian Critical Care Clinical Practice Guidelines Committee (2003) "Canadian Clinical Practice Guidelines for Nutrition Support in Mechanically Ventilated, Critically Ill Adult Patients". *J Parenter Enteral Nutr* 27;355-373. For current version of the Guidelines, see www.criticalcarenutrition.com

Participating ICUs

‘Sister sites’ refers to the average of all the data from hospitals within your country or region and are classified as follows:

Sister Sites	Countries	Number of ICUs
Canada	Canada	32
Australia and New Zealand	Australia	20
	New Zealand	2
USA	United States of America	63
Europe	Czech Republic	1
	Ireland	2
	Italy	2
	Norway	1
	Switzerland	1
	United Kingdom	7
Latin America	Brazil	1
	Colombia	5
	Mexico	2
	Peru	1
	Venezuela	1
Asia	China	1
	India	10
	Iran	1
	Japan	1
	Singapore	2
	Taiwan	1

‘All Sites’ refers to the average of all the data from all the ICUs in the database (n=157).

Table 1. Characteristics of Participating ICUs

Number of ICUs	Your Site n=1	Sister Sites n=22	All Sites n=157
Hospital Type			
Teaching	Yes	22 (100%)	116 (73.9%)
Non-teaching	-	0	41 (26.1%)
Size of Hospital (beds)			
mean (range)	300	524 (200-1000)	503 (50-1500)
Multiple ICUs in Hospital			
	No	7 (31.8%)	100 (63.7%)
ICU Type			
Open	-	1 (4.5%)	49 (31.2%)
Other	-	0	4 (2.5%)
Close	Yes	21 (95.5%)	104 (66.2%)
Case Types			
Medical	Yes	20 (90.9%)	150 (95.5%)
Surgical	Yes	19 (86.4%)	150 (95.5%)
Trauma	Yes	14 (63.6%)	98 (62.4%)
Pediatrics	No	7 (31.8%)	29 (18.5%)
Neurological	Yes	17 (77.3%)	113 (72.0%)
Neurosurgical	Yes	15 (68.2%)	100 (63.7%)
Cardiac Surgery	Yes	9 (40.9%)	62 (39.5%)
Burns	Yes	8 (36.4%)	31 (19.7%)
Other	No	4 (18.2%)	14 (8.9%)
Medical Director			
	Yes	22 (100%)	149 (94.9%)
Size of ICU (beds)			
mean (range)	40	18 (8-40)	19 (6-64)
Presence of Dietitian(s)			
	Yes	20 (90.9%)	145 (92.4%)
Full Time Equivalent Dietitian (per 10 beds)			
mean (range)	0.5	0.3 (0.1-0.6)	0.4 (0.0-1.7)

Legend

Type of Hospital: A teaching hospital is a hospital that provides training to medical students and residents. Hospitals that have only occasional medical students/residents are considered non-teaching hospitals.

ICU Structure: Open ICUs are sites where patients are under the care of an attending physician (e.g. internist, family physician, surgeon) with intensivists (i.e. physician with training in critical care) consulted as necessary. Closed ICUs are sites in which patients are under the care of an intensivist, or care is shared between the intensivist and another attending physician.

Full Time Equivalent Dietitian: This is a measure of the amount of time the dietitian is dedicated to the ICU relative to a full-time position e.g. a FTE of 1.0 refers to a dietitian working in a 10 bedded ICU full-time or four dietitians working half-time in a 20 bedded ICU. A FTE of 0.5 means that the dietitian is in a 10 bedded ICU half-time, or two and a half days a week.

Table 2. Patient Characteristics

Number of Patients	Your Site n=21	Sister Sites n=406	All Sites n=3032
Personal Information			
Age (years)			
median [Q1,Q3]	60 [52-69]	60.0 [45-71]	61.0 [48-73]
Sex			
Male	13 (61.9%)	244 (60.1%)	1815 (59.9%)
Female	8 (38.1%)	162 (39.9%)	1217 (40.1%)
Admission Information			
Admission Category			
Medical	13 (61.9%)	246 (60.6%)	1954 (64.4%)
Surgical: Elective	3 (14.3%)	70 (17.2%)	366 (12.1%)
Surgical: Emergency	5 (23.8%)	90 (22.2%)	712 (23.5%)
Admission Diagnosis			
Cardiovascular / vascular	6 (28.6%)	84 (20.7%)	449 (14.8%)
Respiratory	2 (9.5%)	87 (21.4%)	838 (27.6%)
Pancreatitis	0	6 (1.5%)	37 (1.2%)
Gastrointestinal	4 (19.0%)	56 (13.8%)	381 (12.6%)
Neurologic	2 (9.5%)	58 (14.3%)	420 (13.9%)
Sepsis	1 (4.8%)	30 (7.4%)	302 (10.0%)
Trauma	4 (19.0%)	52 (12.8%)	327 (10.8%)
Metabolic	0	8 (2.0%)	84 (2.8%)
Hematologic	0	3 (0.7%)	17 (0.6%)
Renal	0	1 (0.2%)	31 (1.0%)
Gynecologic	0	0	9 (0.3%)
Orthopedic	0	0	7 (0.2%)
Bariatric Surgery	0	0	2 (0.1%)
Burns	1 (4.8%)	7 (1.7%)	21 (0.7%)
Other	1 (4.8%)	14 (3.4%)	107 (3.5%)
Apache II Score			
median [Q1,Q3]	22 [16-25]	21.0 [17-26]	22.0 [17-28]
Presence of ARDS			
n/N (PCT)	0/21	47/406 (11.6%)	413/3032 (13.6%)
Outcome			
Days on Mechanical Ventilation (60-day censored)			
median [Q1,Q3]	10.4 [6.1-28.2]	6.2 [3.1-15.6]	7.2 [3.3-15.1]
Days in ICU (60-day censored)			
median [Q1,Q3]	15.3 [11.1-29.9]	9.4 [5.8-20.9]	10.3 [5.9-19.8]
Days in Hospital (60-day censored)			
median [Q1,Q3]	27.4 [15.3-51.7]	24.5 [13.1-43.2]	18.9 [10.4-36.7]
Patient Died (within 60 days)			
n/N (PCT)	4/21 (19.0%)	76/405 (18.8%)	741/2992 (24.8%)

Table 3. Patient Nutrition Assessment Information

Number of Patients	Your Site n=21	Sister Sites n=406	All Sites n=3032
Height (meters)			
median [Q1,Q3]	1.7 [1.6-1.8]	1.7 [1.6-1.8]	1.7 [1.6-1.8]
Weight (kg)			
median [Q1,Q3]	70.0 [67.0-80.0]	75.0 [65.0-90.0]	75.0 [64.0-90.0]
BMI (kg m2)			
median [Q1,Q3]	24.9 [22.6-27.5]	25.7 [22.5-30.1]	26.0 [22.8-30.8]
Weight Used in Calculate of Nutrition Prescription			
Acutal (ABW) (Measured or Estimated)	1 (4.8%)	71 (17.5%)	1459 (48.1%)
Ideal (IBW) based on Hamwi formula	18 (85.7%)	172 (42.4%)	553 (18.2%)
Ideal (IBW) based on BMI 20-25 Kg/m2	0	1 (0.2%)	156 (5.1%)
Adjusted by 25% (ABW x 0.25 + IBW)	2 (9.5%)	69 (17.0%)	285 (9.4%)
Adjusted by 40% (ABW x 0.4 + IBW)	0	9 (2.2%)	302 (10.0%)
Adjusted average ((ABW + IBW) x 0.5)	0	0	5 (0.2%)
No weight used in calculation	0	26 (6.4%)	51 (1.7%)
No assessment completed	0	0	30 (1.0%)
Other, please specify	0	8 (2.0%)	49 (1.6%)
		50 (12.3%)	142 (4.7%)
Method used to calculate Energy Requirements			
Harris Benedict Equation	0	3 (0.7%)	353 (11.6%)
Schofield Equation with no adjustment for stress and activity	0	0	12 (0.4%)
Schofield Equation with adjustment for stress and/or activity	21 (100%)	196 (48.3%)	339 (11.2%)
Mifflin-St. Jeor Equation	0	0	77 (2.5%)
Ireton-Jones Equation	0	29 (7.1%)	349 (11.5%)
Penn State Equation	0	0	199 (6.6%)
Weight based: <20 Kcal/Kg	0	2 (0.5%)	195 (6.4%)
Weight based: 20-24 Kcal/Kg	0	69 (17.0%)	503 (16.6%)
Weight based: 25-29 Kcals/Kg	0	87 (21.4%)	1049 (34.6%)
Weight based: 30-35 Kcal/Kg	0	19 (4.7%)	233 (7.7%)
Provide 1200 – 1499 Kcal as standard	0	0	20 (0.7%)
Provide 1500-2000 Kcal as standard	0	3 (0.7%)	24 (0.8%)
Indirect calorimetry	0	1 (0.2%)	31 (1.0%)
No assessment completed	0	1 (0.2%)	25 (0.8%)
Other, please specify	0	23 (5.7%)	126 (4.2%)

Prescribed Energy Intake (kcal) median [Q1,Q3]	2067 [1747-2476]	1900.0 [1690-2160]	1800.0 [1545-2017]
Prescribed Protein Intake (g) median [Q1,Q3]	90 [82-97.5]	84.0 [75-97.5]	90.0 [75-104]
Prescribed Energy Intake by Weight (kcal/kg) median [Q1,Q3]	29.1 [25.8-31.2]	25.0 [22.1-28.8]	24.4 [20.0-27.0]
Prescribed Protein Intake by Weight (g/kg) median [Q1,Q3]	1.3 [1.2-1.3]	1.1 [1.0-1.3]	1.2 [1.0-1.4]

Legend

BMI: Body Mass Index.

Prescribed energy/protein intake: kilocalories / grams provided by the goal regimen (i.e. maximum rate/volume determined at the initial assessment) for EN/PN according to the dietitians or physicians recommendation.

Overall Performance at Your Site

Nutritional adequacy, defined as the amount of calories or protein received divided by the maximum amount prescribed at the initial assessment, expressed as a percentage, is a summary measure of your site's performance. As the recommendations of the Canadian Critical Care Nutrition CPGs focus on use of EN in preference to PN and on strategies to optimize delivery and minimize the risks of EN, adequacy of appropriate nutrition therapy and adequacy of EN are the primary measures of your success in following the Canadian Critical Care Nutrition CPGs. (See legend for full definition of nutritional adequacy).

Figures 1.1 – 1.4 summarizes your overall performance in providing nutrition (EN + Appropriate PN + Propofol) by day in the ICU compared to other ICUs. Figure 1.5 summarizes the mean adequacy over the first 12 days of ICU stay compared to other ICUs. For benchmarking purposes, the numbers above the bars in Figure 1.5 tell you where you ranked or were placed out of your sister and all sites (i.e. 1/157 corresponds to the best performing site*). Appropriate PN is defined as PN received when a true contraindication to EN was specified (see page 23 for more information). Table 4 provides additional information about your practices by providing data on adequacy of total nutrition (EN+PN+propofol) and adequacy of EN in patients who only received EN. *This ranking is not the same as the site ranking for the Best of the Best Award (See page 27).

Legend

Figure 1.1 Adequacy of Calories from Appropriate Nutrition:

The amount of calories received by EN, appropriate PN (i.e presence of contraindication to EN), and propofol as a percentage of the maximum calories prescribed at baseline assessment in ALL patients.

- Days without EN / appropriate PN are included and are counted as 0% adequacy, regardless of presence of prescription.
- Only days that follow permanent progression to exclusive oral intake are excluded.

Figure 1.2 Adequacy of Protein from Appropriate Nutrition

The amount of protein received by EN and appropriate PN (i.e presence of contraindication to EN) as a percentage of the maximum calories prescribed at baseline assessment in ALL patients.

- Days without EN / appropriate PN are included and are counted as 0% adequacy, regardless of presence of prescription
- Only days that follow permanent progression to exclusive oral intake are excluded.

Figure 1.3 Adequacy of Calories from EN

The amount of calories received by EN as a percentage of the maximum calories prescribed at baseline assessment in ALL patients.

- Days without EN are included and are counted as 0% adequacy, regardless of presence of prescription
- Only days that follow permanent progression to exclusive oral intake are excluded.

Figure 1.4 Adequacy of Protein from EN

The amount of protein received by EN as a percentage of the maximum calories prescribed at baseline assessment in ALL patients.

- Days without EN are included and are counted as 0% adequacy, regardless of presence of prescription
- Only days that follow permanent progression to exclusive oral intake are excluded.

Figure 1.1 Adequacy of Calories from Appropriate Nutrition

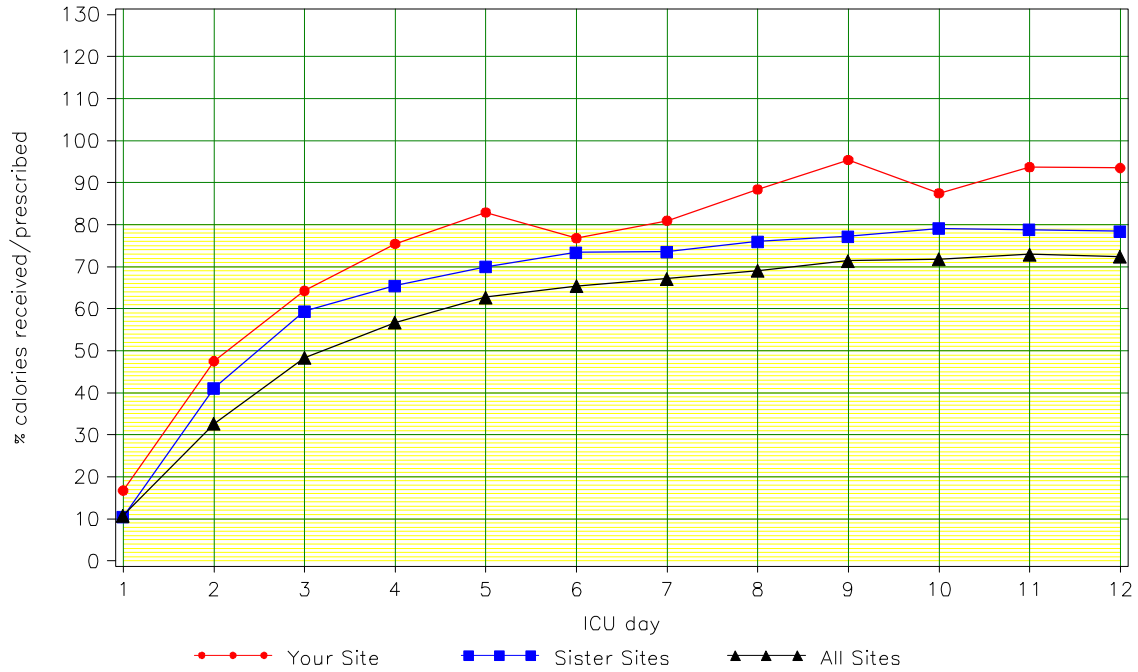


Figure 1.2 Adequacy of Protein from Appropriate Nutrition

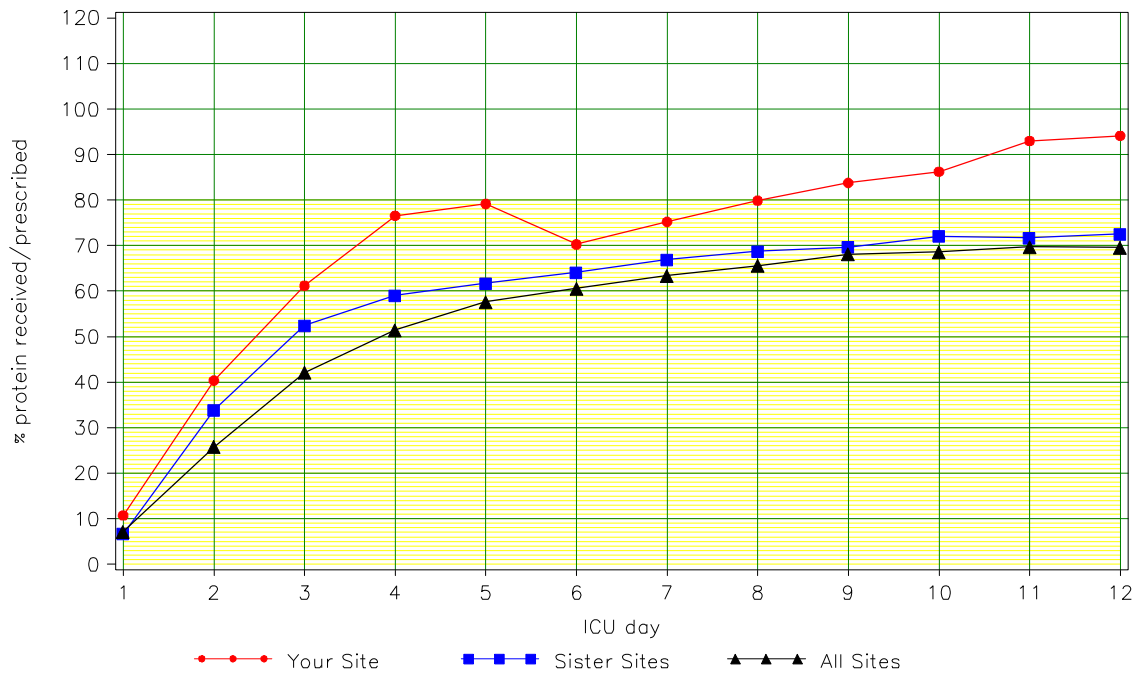


Figure 1.3 Adequacy of Calories from EN

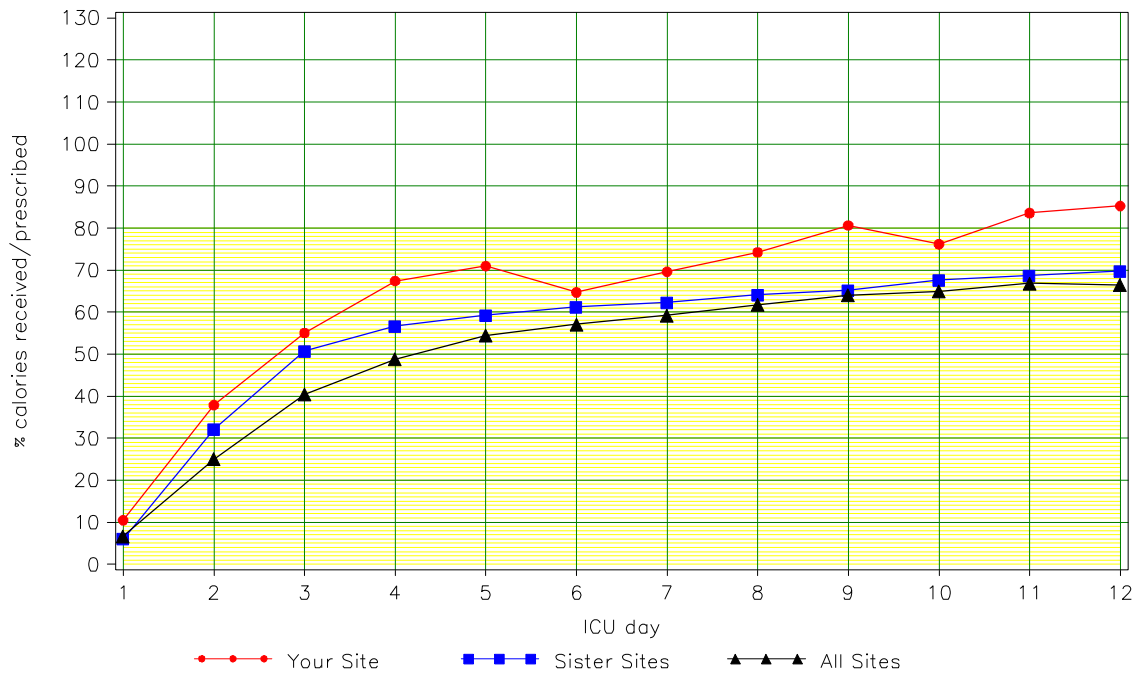
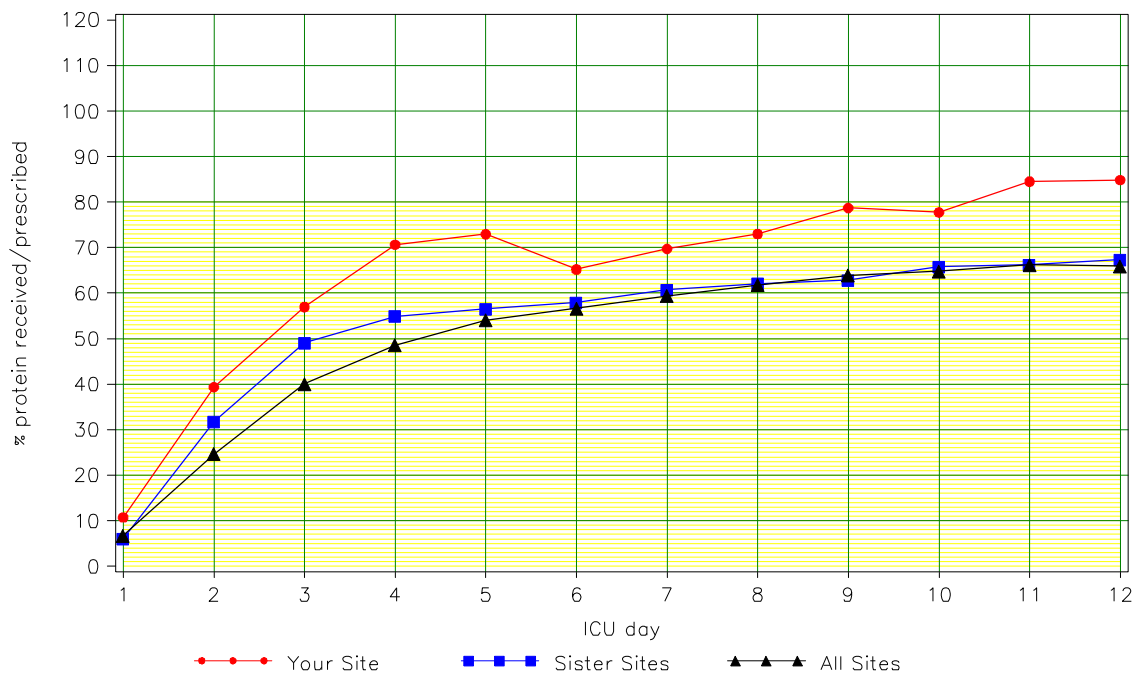


Figure 1.4 Adequacy of Protein from EN



Legend

'n/N': the ranking of your site performance compared to sister or all sites. (i.e. 1/157 corresponds to the best performing site).
'-----': mean of your site, the "error bar" indicates the highest and lowest site averages.

Figure 1.5 Overall Performance at Your Site

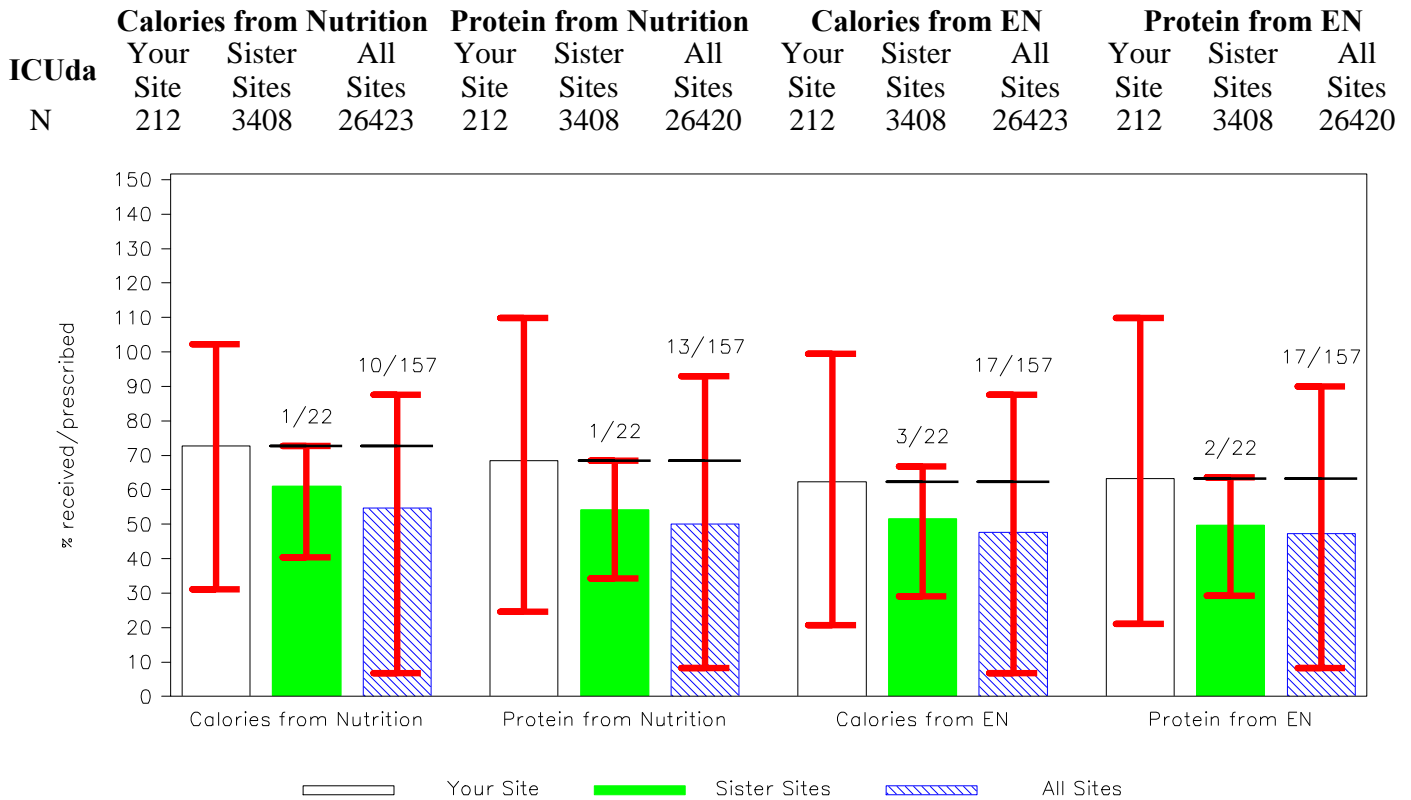


Table 4. Overall Performance

	Your Site	Sister Sites	All Sites
Adequacy of Calories from Total Nutrition (EN+PN+propofol)			
mean (range)	78.5%	67.1% (46.7%-81.1%)	61.1% (20.2%-96.7%)
Adequacy of Protein from Total Nutrition (EN+PN)			
mean (range)	74.9%	59.8% (40.9%-74.9%)	56.7% (16.5%-96.2%)
Adequacy of Calories from EN in EN Only Patients			
mean (range)	62.3%	54.4% (39.7%-70.3%)	51.4% (9.7%-90.3%)
Adequacy of Protein from EN in EN Only Patients			
mean (range)	63.2%	52.6% (38.8%-63.7%)	51.2% (11.7%-90.0%)
Received Calories from Total Nutrition(EN+PN+propofol)			
mean (range)	1731	1430 (1135-1761)	1298 (657-1947)

Received Protein from Total Nutrition (EN+PN)			
mean (range)	74	61 (48-74)	64 (29-108)
Received Calories from EN in EN only Patients			
mean (range)	1535	1304 (984-1535)	1185 (491-1727)
Received Protein from EN in EN only Patients			
mean (range)	67	57 (46-70)	60 (21-104)

Type of Nutrition Support

EN vs. PN

Recommendation:

When considering nutrition support for critically ill patients, we strongly recommend the use of enteral nutrition over parenteral nutrition.

Table 5. Type of Nutrition (By Patient)

Number of Patients	Your Site n=21	Sister Sites n=406	All Sites n=3032
Type of Nutrition			
EN Only	14 (66.7%)	280 (69.0%)	2189 (72.2%)
PN Only	0	19 (4.7%)	165 (5.4%)
EN+PN	7 (33.3%)	68 (16.7%)	377 (12.4%)
None	0	39 (9.6%)	301 (9.9%)

Legend

'None' refers to number of patients with neither EN nor PN, regardless of oral intake.

Legend

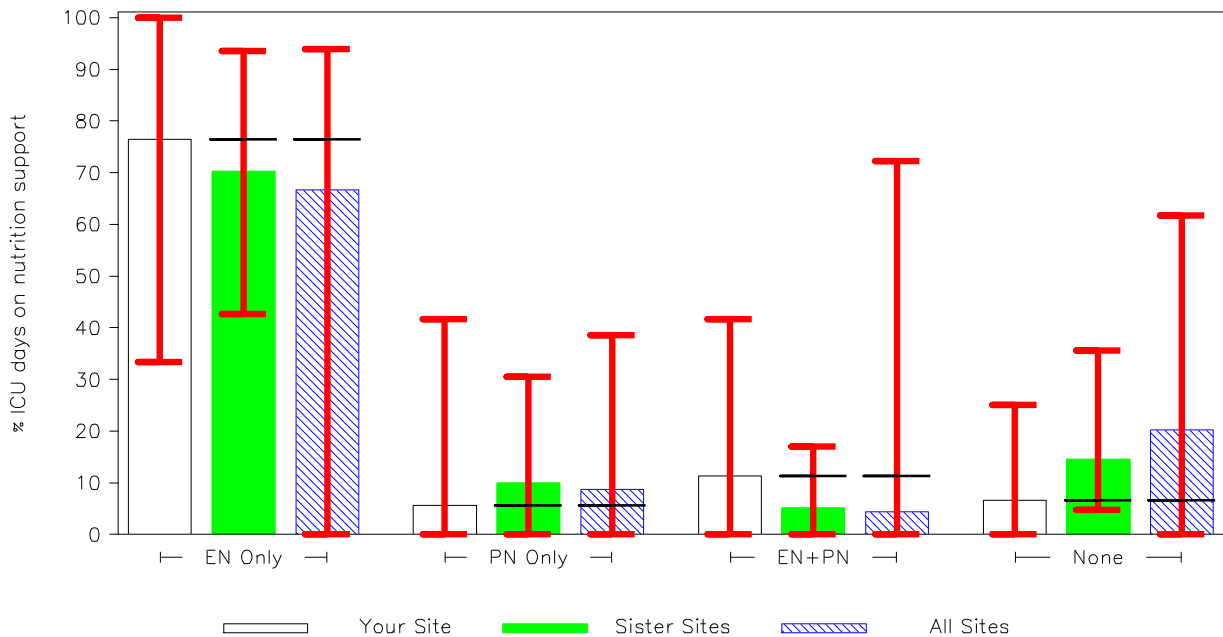
Figure 2. Type of Nutrition

Of all the patient days, the % on EN alone, PN alone, EN + PN and No nutrition

- Days on oral intake+EN are counted as EN, oral intake+PN as PN & EN+PN+oral as EN+PN
- Days on oral intake alone are excluded

Figure 2. Type of Nutrition Support (by ICU day)

ICU days N	EN Only			PN Only			EN+PN			None		
	Your Site	Sister Sites	All Sites	Your Site	Sister Sites	All Sites	Your Site	Sister Sites	All Sites	Your Site	Sister Sites	All Sites
	162	2394	17574	12	341	2295	24	176	1158	14	496	5320



Early vs. Delayed EN

Recommendation:

We recommend early enteral nutrition (within 24-48 hrs following admission) in critically ill patients.

Table 6. Initiation of EN

Number of Patients on EN	Your Site n=21	Sister Sites n=348	All Sites n=2566
Initiation of EN			
Prior to ICU admission	2 (9.5%)	17 (4.9%)	169 (6.6%)
0-24	13 (61.9%)	197 (56.6%)	1055 (41.1%)
>24-48	4 (19.0%)	75 (21.6%)	692 (27.0%)
>48-72	0	31 (8.9%)	276 (10.8%)
>72	2 (9.5%)	28 (8.0%)	374 (14.6%)

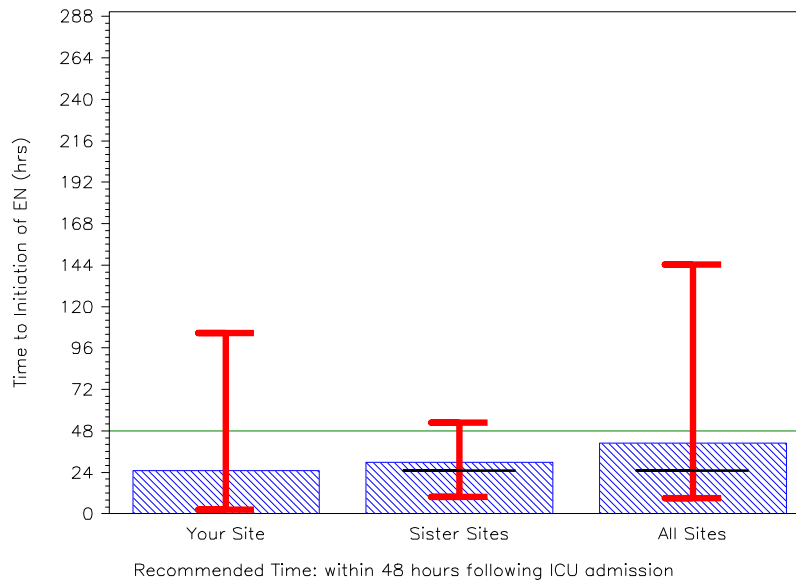
Legend

Figure 3. Timing of Initiation of EN

The timing of start of EN from admission to ICU (in hours) in patients on EN

- Patients that were started on EN before admission to ICU are excluded.

Patients started EN in ICU	Your Site	Sister Sites	All Sites
N	19	331	2397



Composition of EN: Immune enhancing Diets: Arginine, Fish oils/borage oil, and Glutamine Containing Diets

Recommendation:

- a) We recommend that diets supplemented with arginine and other selected nutrients NOT BE USED for critically ill patients.
- b) We recommend the use of an enteral formula with fish oils, borage oils, and antioxidants in patients with acute respiratory distress syndrome (ARDS).
- c) When initiating enteral feeds, we recommend the use of whole protein formula (polymeric) in critically ill patients.

Table 7.1. Composition of Enteral Formulas

Enteral Formulas	Your Site	Sister Sites	All Sites
Arginine enriched formula	0	1.2% (0.0%-17.6%)	8.2% (0.0%-94.7%)
Fish oil enriched formula (all patients)	0	0	6.6% (0.0%-65.0%)
Fish oil enriched formula (ARDS patients)	NA	0	18.9% (0.0%-100%)
Glutamine enriched formula (all patients)	0	0.3% (0.0%-9.1%)	1.0% (0.0%-28.6%)
Polymeric formulas	21/21 (100%)	98.8% (92.3%-100%)	85.9% (0.0%-100%)

Legend

Of the patients EVER on EN (or EN+PN), the average number (or %) of patients EVER receiving these formulas

- Arginine enriched formulas in all patients.
- Fish oil and borage oil and antioxidant enriched formula in all patients
- Fish oil and borage oil and antioxidant enriched formula in ARDS patients
- Glutamine enriched formulas in all patients
- Polymeric formulas in all patients

Glutamine Supplementation

Recommendation:

- a) Enteral glutamine should be considered in burn and trauma patients. There are insufficient data to support the routine use of enteral glutamine in other critically ill patients.
- b) When parenteral nutrition is prescribed to critically ill patients, parenteral supplementation with glutamine, where available, is strongly recommended. There are insufficient data to generate recommendations for intravenous glutamine in critically ill patients who are receiving enteral nutrition.

Table 7.2. Glutamine Supplementation

Glutamine supplementation	Your Site	Sister Sites	All Sites
All glutamine supplementation	4/21 (19.0%)	2.0% (0.0%-19.0%)	5.9% (0.0%-95.0%)
EN glutamine supplementation	0	0	3.4% (0.0%-85.0%)
IV/PN glutamine supplementation	4/21 (19.0%)	2.0% (0.0%-19.0%)	2.9% (0.0%-95.0%)
EN Patients			
All glutamine supplementation	4/21 (19.0%)	2.0% (0.0%-19.0%)	6.3% (0.0%-94.4%)
EN glutamine supplementation	0	0	4.0% (0.0%-85.0%)
IV/PN glutamine supplementation	4/21 (19.0%)	2.0% (0.0%-19.0%)	2.7% (0.0%-92.9%)
PN Patients			
All glutamine supplementation	4/7 (57.1%)	9.2% (0.0%-57.1%)	18.6% (0.0%-100%)
EN glutamine supplementation	0	0	5.4% (0.0%-100%)
IV/PN glutamine supplementation	4/7 (57.1%)	9.2% (0.0%-57.1%)	14.9% (0.0%-100%)
Burn Patients			
All glutamine supplementation	0	14.3% (0.0%-25.0%)	66.7% (0.0%-100%)
Trauma Patients			
All glutamine supplementation	1/4 (25.0%)	1.9% (0.0%-25.0%)	13.8% (0.0%-100%)

Legend

Of ALL the patients, the average number (or %) of patients EVER receiving glutamine supplementation.

Of ALL the patients, the average number (or %) of patients EVER receiving EN glutamine supplementation.

Of ALL the patients, the average number (or %) of patients EVER receiving IV/PN glutamine supplementation.

EN PATIENTS

Of ALL the patients EVER on EN (or EN+PN), the average number (or %) of patients EVER receiving glutamine

Of ALL the patients EVER on EN (or EN+PN), the average number (or %) of patients EVER receiving EN glutamine supplementation.

Of ALL the patients EVER on EN (or EN+PN), the average number (or %) of patients EVER receiving IV/PN glutamine supplementation.

PN PATIENTS

Of ALL the patients EVER on PN (or EN+PN), the average number (or %) of patients EVER receiving glutamine

Of ALL the patients EVER on PN (or EN+PN), the average number (or %) of patients EVER receiving EN glutamine supplementation.

Of ALL the patients EVER on PN (or EN+PN), the average number (or %) of patients EVER receiving IV/PN glutamine supplementation.

BURN PATIENTS

Of ALL the BURNS patients the average number (or %) of patients EVER receiving glutamine supplementation.

TRAUMA PATIENTS

Of ALL the TRAUMA patients, the average number (or %) of patients EVER receiving glutamine supplementation.

Selenium Supplementation

Recommendation:

- a) *The use of supplemental combined vitamins and trace elements should be considered in critically ill patients.*
 b) *There are insufficient data to make a recommendation regarding IV/PN selenium supplementation alone or in combination with other antioxidants in critically ill patients.*

Table 7.3. Selenium Supplementation

Selenium supplementation	Your Site	Sister Sites	All Sites
All selenium supplementation	0	2.2% (0.0%-20.0%)	3.1% (0.0%-100%)
EN selenium supplementation	0	0.2% (0.0%-5.0%)	1.7% (0.0%-100%)
IV/PN selenium supplementation	0	2.0% (0.0%-20.0%)	1.5% (0.0%-55.6%)
EN Patients			
All selenium supplementation	0	1.1% (0.0%-11.8%)	3.0% (0.0%-100%)
EN selenium supplementation	0	0.3% (0.0%-6.3%)	2.1% (0.0%-100%)
IV/PN selenium supplementation	0	0.9% (0.0%-11.8%)	1.1% (0.0%-55.6%)
PN Patients			
All selenium supplementation	0	9.2% (0.0%-100%)	7.0% (0.0%-100%)
EN selenium supplementation	0	0	0.4% (0.0%-25.0%)
IV/PN selenium supplementation	0	9.2% (0.0%-100%)	6.6% (0.0%-100%)

Legend

Of ALL the patients, the average number (or %) of patients EVER receiving selenium supplementation.

Of ALL the patients, the average number (or %) of patients EVER receiving EN selenium supplementation.

Of ALL the patients, the average number (or %) of patients EVER receiving IV/PN selenium supplementation.

EN PATIENTS

Of ALL the patients EVER on EN (or EN+PN), the average number (or %) of patients EVER receiving selenium supplementation.

Of ALL the patients EVER on EN (or EN+PN), the average number (or %) of patients EVER receiving EN selenium supplementation.

Of ALL the patients EVER on EN (or EN+PN), the average number (or %) of patients EVER receiving IV/PN selenium supplementation.

PN PATIENTS

Of ALL the patients EVER on PN (or EN+PN), the average number (or %) of patients EVER receiving selenium supplementation.

Of ALL the patients EVER on PN (or EN+PN), the average number (or %) of patients EVER receiving EN selenium supplementation.

Of ALL the patients EVER on PN (or EN+PN), the average number (or %) of patients EVER receiving IV/PN selenium supplementation.

Strategies to optimize delivery and minimize risks of EN

Recommendation:

An evidence-based feeding protocol that incorporates prokinetics at initiation and a higher gastric residual volume (250mls) and the use of post-pyloric feeding tubes should be considered as a strategy to optimize delivery of enteral nutrition in critically ill adult patients.

Table 8. Feeding Protocols

Number of ICUs	Your Site n=1	Sister Sites n=22	All Sites n=157
Feeding Protocol	Yes	22 (100%)	129 (82.2%)
Gastric Residual Volume Tolerated in Protocol			
mean (range)	200	230 (150-400)	240 (50-500)
Algorithms included in Protocol			
Motility agents	Yes	20 (95.2%)	90 (72.6%)
Small bowel feeding	Yes	13 (61.9%)	69 (55.6%)
Withholding for procedures	Yes	12 (57.1%)	69 (55.6%)
HOB Elevation	No	10 (47.6%)	117 (94.4%)
Other	No	2 (9.5%)	19 (15.3%)

Legend

HOB: Head of Bed.

Motility Agents

Recommendation:

In critically ill patients who experience feed intolerance (high gastric residuals, emesis), the use of a motility agent is recommended. Given the safety concerns associated with erythromycin, the recommendation is made for metoclopramide. There are insufficient data to make a recommendation about the combined use of metoclopramide and erythromycin.

Small Bowel Feeding

Recommendation:

Small bowel feeding compared to gastric feeding may be associated with a reduction in pneumonia in critically ill patients. In units where obtaining small bowel access is feasible, we recommend the routine use of small bowel feedings. In units where obtaining access involves more logistical difficulties, small bowel feedings should be considered for patients at high risk for intolerance to EN (on inotropes, continuous infusion of sedatives, or paralytic agents, or patients with high nasogastric drainage) or at high risk for regurgitation and aspiration (nursed in supine position). Finally, in units where obtaining small bowel access is not feasible (no access to fluoroscopy or endoscopy and blind techniques not reliable), small bowel feedings should be considered for those select patients who repeatedly demonstrate high gastric residual volumes and are not tolerating adequate amounts of EN delivered into the stomach.

Body Position

Recommendation:

We recommend that critically ill patients receiving enteral nutrition have the head of the bed elevated to 45 degrees. Where this is not possible, attempts to raise the head of the bed as much as possible should be considered.

Legend

Motility Agents in Those on EN with Feeds Interrupted Due to High Gastric Residual Volumes

Of ALL the patients that were EVER on EN (or EN + PN), and EVER had feeds interrupted due to high gastric residual volumes during the study period, the percentage that received motility agents.

Small Bowel Feeding in Those on EN with Feeds Interrupted Due to High Gastric Residual Volumes

Of ALL the patients that were EVER on EN (or EN + PN), and EVER had feeds interrupted due to high gastric residual volumes during the study period, the percentage that received small bowel feeding.

Body Position in Patients Receiving EN

Of ALL the patients that were EVER on EN (or EN + PN), the mean of all the head of the bed elevation measurements.

Figure 4. Strategies to optimize delivery and minimize risks of EN

Patients N	Motility Agents			Small Bowel Feeding			HOB Elevation (degrees)		
	Your Site	Sister Sites	All Sites	Your Site	Sister Sites	All Sites	Your Site	Sister Sites	All Sites
	12	66	463	12	66	463	21	348	2566

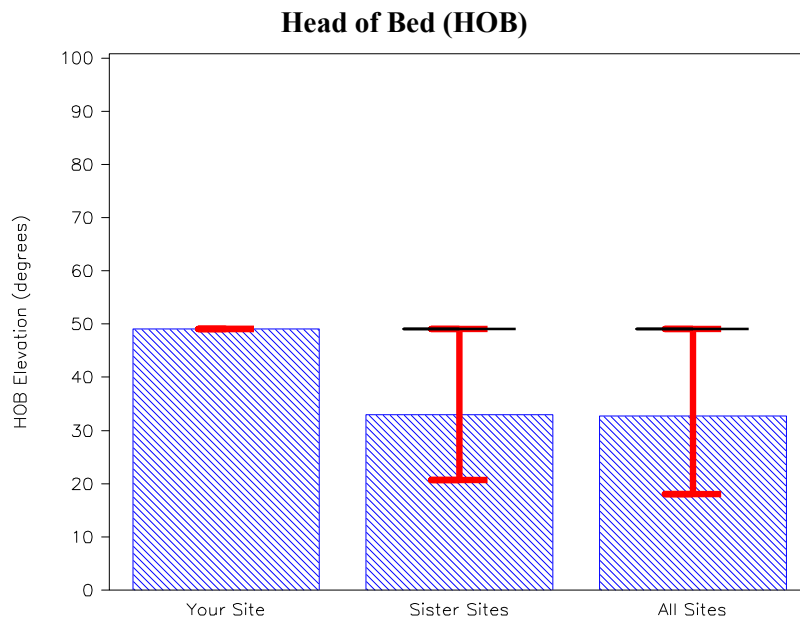
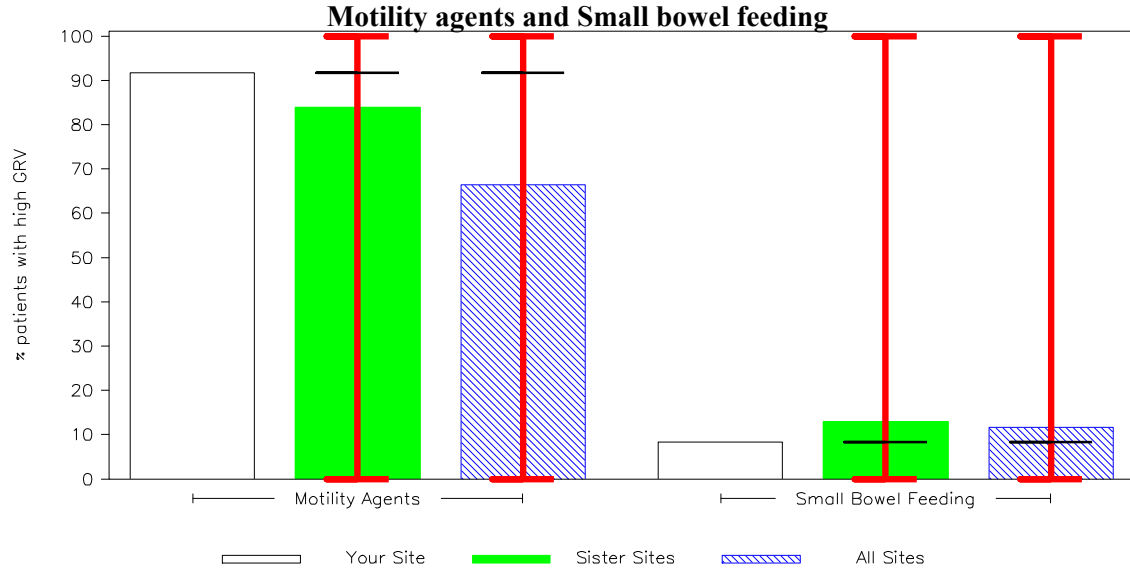


Table 9. EN Feeds Interrupted

Number of Patient-days on EN	Your Site n=186	Sister Sites n=2570	All Sites n=18732
EN Feeds Interrupted n/N (PCT)	84/186 (45.2%)	992/2570 (38.6%)	6040/18732 (32.2%)
Total duration of feed interruption (hours) median [Q1,Q3]	8.0 [4.0-14.0]	6.0 [3.0-11.0]	6.0 [3.0-11.0]
Reason EN feeds interrupted			
Fasting for endotracheal extubation or intubation	23 (26.7%)	272 (27.3%)	1124 (18.4%)
Fasting for other bedside procedure	7 (8.1%)	131 (13.2%)	949 (15.5%)
Fasting for operating room procedure	13 (15.1%)	133 (13.4%)	768 (12.6%)
Fasting for radiology suite procedure	4 (4.7%)	78 (7.8%)	490 (8.0%)
Intolerance to enteral feeding – high gastric residuals	28 (32.6%)	110 (11.1%)	850 (13.9%)
Intolerance to enteral feeding – increased abdominal girth or abdominal distension	0	34 (3.4%)	182 (3.0%)
Intolerance to enteral feeding – vomiting / emesis or diarrhea	1 (1.2%)	52 (5.2%)	359 (5.9%)
Intolerance to enteral feeding –subjective discomfort	0	2 (0.2%)	72 (1.2%)
No enteral access available / enteral access lost, displaced or malfunctioning	6 (7.0%)	80 (8.0%)	533 (8.7%)
Inotropes, vasopressor requirement	0	1 (0.1%)	60 (1.0%)
Subject deemed too sick to continue enteral feeding	1 (1.2%)	25 (2.5%)	194 (3.2%)
Enteral feeding formula not available	0	5 (0.5%)	22 (0.4%)
Reason for EN interruption not known	5 (5.8%)	120 (12.1%)	850 (13.9%)

EN in combination with PN

Recommendation:

For critically ill patients starting on enteral nutrition, we recommend that parenteral nutrition not be started at the same time as enteral nutrition. In the patient who is not tolerating adequate enteral nutrition, there are insufficient data to put forward a recommendation about when parenteral nutrition should be initiated. Practitioners will have to weigh the safety and benefits of initiating PN in patients not tolerating EN on an individual case-by-case basis. We recommend that PN not be started in critically ill patients until all strategies to maximize EN delivery (such as small bowel feeding tubes, motility agents) have been attempted.

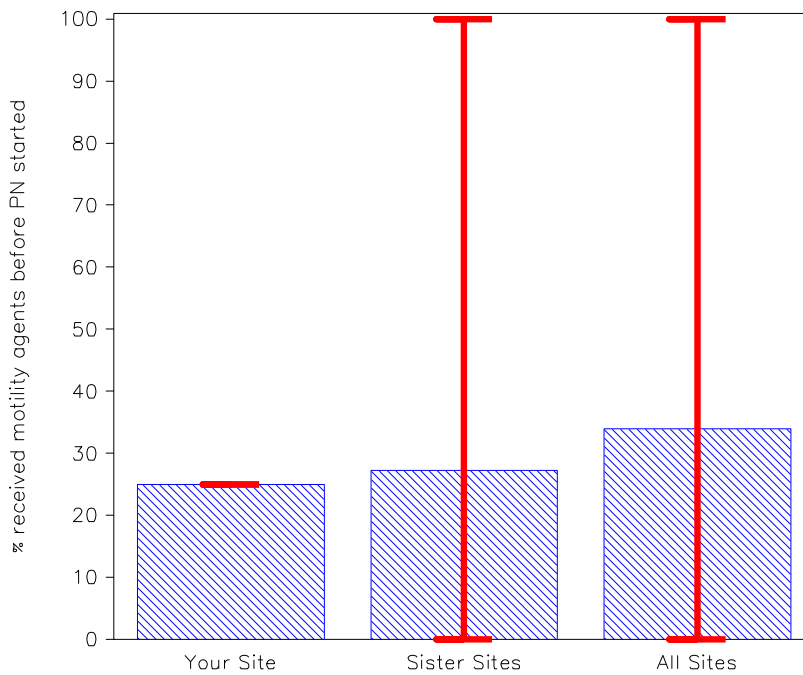
Legend

Figure 5.1. Percentage of patients received motility agents before PN started

Of all the patients that EVER received combination EN+PN and had EN started prior to PN, and had feeds interrupted due to high gastric residual volumes, the percentage that received small bowel feeding before PN started.

Figure 5.1. % of patients received motility agents before PN started

Patients with EN+PN and HGRV	Your Site	Sister Sites	All Sites
N	4	22	106



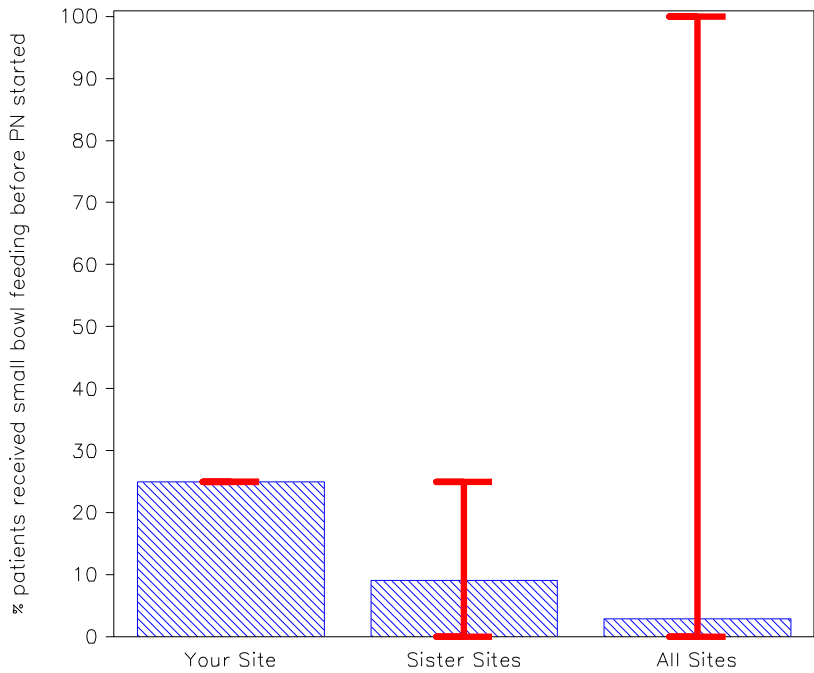
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Figure 5.2. Percentage of patients received small bowel feeding before PN started

Of all the patients that EVER received combination EN+PN and had EN started prior to PN, and had feeds interrupted due to high gastric residual volumes, the percentage that received small bowel feeding before PN started.

Figure 5.2. % of patients received small bowel feeding before PN started

Patients with EN+PN and HGRV	Your Site	Sister Sites	All Sites
N	4	22	106



PN vs. Standard Care

Recommendation:

In critically ill patients with an intact gastrointestinal tract, we recommend that parenteral nutrition not be used routinely.

Table 10. Reason EN not Provided

Number of Patients on PN	Your Site n=7	Sister Sites n=87	All Sites n=542
Reason EN not provided			
No Clinical Reason	0	4 (5.6%)	22 (5.6%)
Mechanical bowel obstruction*	0	6 (8.5%)	22 (5.6%)
Bowel ischemia*	0	3 (4.2%)	13 (3.3%)
Small bowel ileus*	0	6 (8.5%)	38 (9.7%)
Small bowel fistulae*	0	1 (1.4%)	4 (1.0%)
Gastrointestinal perforation*	2 (28.6%)	6 (8.5%)	33 (8.4%)
Short Gut Syndrome*	0	0	2 (0.5%)
Hemodynamic instability	0	3 (4.2%)	24 (6.1%)
Proximal bowel anastomosis / anastomotic leak	0	2 (2.8%)	11 (2.8%)
Not tolerating enteral feeding	2 (28.6%)	15 (21.1%)	49 (12.5%)
No access to gastrointestinal tract	0	1 (1.4%)	12 (3.1%)
Pancreatitis	0	3 (4.2%)	17 (4.3%)
Gastrointestinal bleed	0	3 (4.2%)	15 (3.8%)
Gastrointestinal surgery	1 (14.3%)	8 (11.3%)	85 (21.6%)
Other: specify	2 (28.6%)	10 (14.1%)	46 (11.7%)

Legend

Of all the patients that ever received PN (or EN+PN), the reason EN was not provided on the first day PN was received.

*Considered as true contraindication to EN for assessment of appropriate PN in nutritional adequacy calculation (see page 8).

Strategies to optimize benefits and minimize risks of PN

Dose of PN

Recommendation:

In critically ill patients who are not malnourished, are tolerating some EN, or when parenteral nutrition is indicated for short term use (< 10 days), low dose parenteral nutrition should be considered. There are insufficient data to make recommendations about the use of low dose parenteral nutrition or withholding lipids in the following patients: those requiring PN for long term (> 10 days), obese critically ill patients, and malnourished critically ill patients. Practitioners will have to weigh the safety and benefits of low dose PN on an individual case-by-case basis in these latter patient populations.

Legend

Calories Received from PN (Kcal/kg/day)

In those patients that were EVER on PN (or EN + PN), the average Kcals received from PN per kilogram per day.

Patients on PN

N

Figure 6. Calories Received from PN (Kcal|Kg|Day)

Your Site

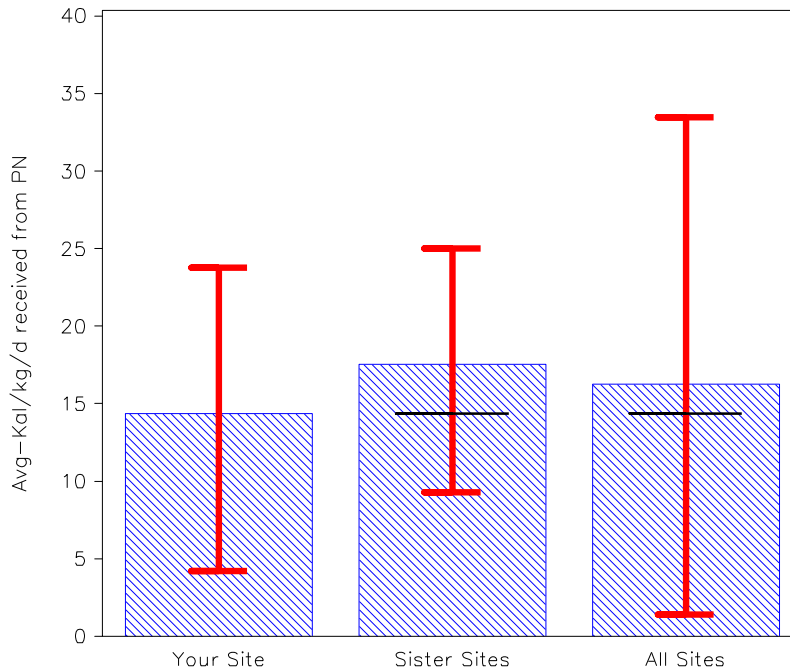
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Sister Sites

87

All Sites

542



Use of Lipids

Recommendation:

In critically ill patients who are not malnourished, are tolerating some EN, or when parenteral nutrition is indicated for short-term use (<10 days), withholding lipids high in soybean oil should be considered. There are insufficient data to make a recommendation about withholding lipids high in soybean oil in critically ill patients who are malnourished or those requiring PN for long term (>10 days). Practitioners will have to weigh the safety and benefits of withholding lipids on an individual case-by-case basis in these latter patient populations.

Table 11. Use of Lipids

Number of Patient-days on PN	Your Site n=36	Sister Sites n=509	All Sites n=3372
Lipids received			
Lipid free	0	36 (7.1%)	774 (23.0%)
Olive oil based	0	319 (62.7%)	487 (14.4%)
Soybean oil based	4 (11.1%)	72 (14.1%)	1668 (49.5%)
MCT/LCT Physical mixture	0	0	205 (6.1%)
MCT/LCT Structured Form	0	0	29 (0.9%)
Mixture of soy oil, MCTs, olive oil, and fish oil (SMOF)	32 (88.9%)	32 (6.3%)	65 (1.9%)
Fish oil based	0	0	19 (0.6%)
Other/Unknown	0	58 (11.4%)	145 (4.3%)

Legend

Type of PN: in those patients ever on PN (or EN+PN) the days on PN receiving specific type of lipids.

Intensive insulin therapy

Recommendation:

We recommend that hyperglycemia (blood sugars > 10 mmol/L) be avoided in all critically ill patients. We recommend a blood glucose target of around 8.0mmol/L (or 7-9 mmol/L), rather than a more stringent target range (4.4 to 6.1 mmol/L) or a more liberal target range (10 to 11.1 mmol/L).

Table 12. Glycemic Control Protocol

Number of Patient-days	Your Site n=202	Sister Sites n=3341	All Sites n=25452
Glycemic Control Protocol	Yes	20 (90.9%)	144 (91.7%)
Target of Blood Glucose: Lower (mmol/l)			
median [Q1,Q3]	4.0	4.6 [4.0-5.6]	4.6 [4.0-5.5]
Target of Blood Glucose: Upper (mmol/l)			
median [Q1,Q3]	10.0	10.0 [8.5-10.0]	8.3 [7.8-10.0]
Morning Blood Glucose (mmol/l)			
median [Q1,Q3]	7.4 [6.4-8.5]	7.6 [6.5-8.9]	7.3 [6.2-8.8]
Insulin Received (units)			
median [Q1,Q3]	29.0 [17.3-71.0]	45.0 [22.0-84.0]	28.5 [12.0-64.0]
Total Hypoglycemic Days			
n/N (PCT)	0/202	25/3341 (0.7%)	491/25452 (1.9%)

Legend

Day 1 after admission to the ICU is excluded.

Total days with Hypoglycemic events: Study day with at least one hypoglycemic event (i.e. blood glucose <3.5 mmol/l).

Figure 7 Patient-days with blood glucose>10 mmol/l

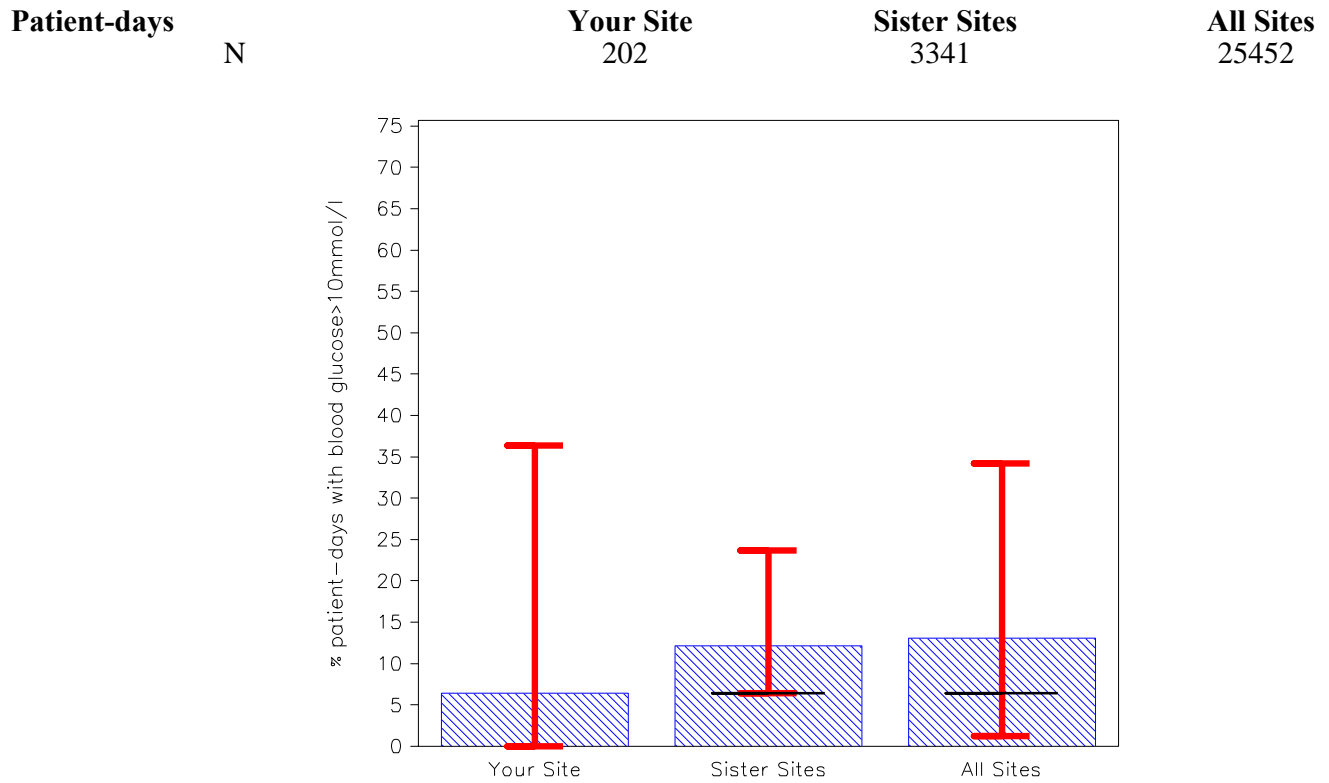


Figure 7.: Blood glucose levels (patient days with blood glucose > 10 mmol/l)

Of ALL patients the % of patient days with blood glucose > 10 mmol/l EXCLUDING Day 1 after admission to the ICU.

Best of the Best 2009

Although the hard work and dedication of all ICUs who participate in the international nutrition survey is appreciated, in 2009, we wish to recognize the ICU that achieved the highest nutritional adequacy for their submitted patients and adheres to the recommendations of the Canadian Critical Care Nutrition CPGs, through the Best of the Best Award.

To be eligible for this award, participating ICUs must meet the following criteria:

1. Entered data on a total of 20 critically ill patients.
2. Completion of a baseline nutrition assessment (i.e. nutrition prescription).
3. Must have implemented a feeding protocol.
4. No missing data or outstanding queries.
5. Prepared to permit CCN to source verify the entered data.

The Best of the Best ICU is selected according to the following criteria:

Determinant	Weighting*
Overall Adequacy of EN plus appropriate PN	10
% patients receiving EN	5
% of patients with EN initiated within 48 hours	3
% of patients with high gastric residual volumes (HGRV) receiving motility agents	1
% of patients with HGRV receiving small bowel feeding	1
% of patient glucose measurements greater than 10 mmol/L (excluding day 1; fewest is best)	3

In 2009, there are 98 eligible ICUs. For each of the above determinants, all eligible sites are ranked and the top performing site awarded 97 points, the next top site 96 points, the third performing site, 95 points etc. For each determinant, the ranking points are multiplied by the weights and summed up to generate the total points per site.

The top performing ICUs, and recipients of this year's Best of the Best Award are:

- Instituto Neurologico de Antioquia , Medellin, Colombia
- Royal Prince Alfred Hospital, Sydney NSICU, Camperdown, Australia
- The Alfred , Melbourne, Australia

Congratulations!

* The relative weightings reflect the importance of the overall findings (adequacy) and the strength of clinical recommendations: “strongly recommend”=5, “recommend”=3, “should consider”=1

Disseminating the Results of Your Site Report

Your ICU has committed a significant amount of time to participate in the International Survey. We have committed a significant amount of time and resources to produce these site reports. We encourage you to use your site report as a unique benchmarking opportunity to highlight your strengths and weaknesses, and inform quality improvement initiatives.

The following are a few suggestions of useful forums from which to disseminate the site reports:

- Print off and copy the site report and distribute to key stakeholders.
- Meet with ICU management and/or Hospital administration.
- Lead a small group interactive workshop with local doctors and nurses to strategize on ways to improve your performance.
- Produce and post a poster outlining your main strengths and weaknesses and suggested changes.

Various resources designed to assist you in local dissemination of the site report are available under 'Quality Improvement Tools' on the Critical Care Nutrition website (www.criticalcarenutrition.com).

Thank you for your support with the International Nutrition Survey. The next opportunity to audit your nutrition practice is scheduled for early 2011. We look forward to working with you again.

Critical Care Nutrition Team
January 2010