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Original Research Article

Nutrition Support in the Critically Ill Patients: Current Practice on the Nutrition in an Albanian Intensive Care Unit

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ABSTRACT

Despite knowledge for the benefits of providing nutrition support, the actual nutrition support received by patients in the intensive care unit (ICU) is not always optimal. The purpose of this study was to describe current nutrition support practice of the patients in the ICU of the University Hospital Center of Tirana "Mother Theresa" (QSUT).

Methods: We retrospectively studied 432 patients ≥ 18 years that stayed in the ICU for ≥ 4 days. Nutritional adequacy was calculated as the amount of calories received by the amount that should have been received by the requirements.

Results: 221 patients (51%) received some form of nutrition support. Nutrition support was initiated in 64.5% of patients that received nutritional support by the first 24-48 hours of ICU stay, in 27.7% by 3-5 days after admission, in 9.8% by 6-9 days after admission and in 5.1% after 10 days of admission. Patients that received nutrition support did not meet their energy or protein needs, while patients that didn't receive any form of nutrition support were at a higher risk for organs failure, infections and other complications.

Conclusion: The present study indicates that the gap between recommended nutrition care and practice regarding it in our clinic still exists. We find nutrition support as an area for improvement in ICU patient care.

Key words: malnutrition, nutrition support, enteral nutrition, parenteral nutrition.

INTRODUCTION

It has been estimated that up to 43% of ICU patients are malnourished [1] which in turn increases the risk of complications including muscle loss and weakness, increased infection and a prolonged period of mechanical ventilation. Even those who are not malnourished on admission are likely to develop some degree of malnutrition while in the ICU. Studies have shown that an appropriate nutritional support can improve outcomes and possibly even reduce mortality. [2] Nutritional support has become a routine part of the care of the critically ill patient and it is imperative to assure positive outcomes. Despite knowledge for the benefits of providing nutrition support, the actual nutrition support received by patients in the intensive care unit is not always optimal for various reasons.

Before we can efficiently improve practice related to nutrition support, it is important that we define what is actually being done. By aligning current practice with best practice (as defined by the literature) and guidelines, there is considerable opportunity to strategically intervene and improve quality of care and the outcomes of larger groups of critically ill patients. [3]

The purpose of this study was to describe current nutrition support practice in the critical care settings and to identify interventions to target for quality improvement initiatives.

MATERIALS AND METHODS

Data were collected on the 432 patients that stayed in the ICU for 4 days or more. The data were collected prospectively on diagnosis on admission to ICU, Acute Physiology and Chronic Health Evaluation (APACHE II) prognosis score [4] nutritional status when admitted [5] route of nutrition support, the volume of nutrition support received, day of start of the nutrition support (after ICU admission), days of mechanical ventilation, length of stay in the ICU, ICU survival. Nutritional status on admission was assessed according to Nutritional Risk Screening 2002. [5] It contains one scale to examine nutritional status (0-3 points) and one scale to assess potential changes in stress metabolism (0-3 points). A total score ≥ 3 indicates that nutrition support should be initiated.

Patients were divided into well-nourished and malnourished groups, according to their nutritional status (NRS 2002 < 3, and NRS 2002 ≥ 3, respectively).

Nutritional adequacy (success of nutrition support) was calculated as the amount of calories received by the amount that should have been received by the requirements. As in our clinic is not available indirect calorimetry, energy target was set at 25 kcal/kg/day, according to European Society of Clinical nutrition and Metabolism. [6]

Energy delivery: total delivery includes energy from enteral and parenteral feeds, from non-nutritional sources (glucose and gluco-saline infusions used for drug dilution and fluid support).

As nutrition support may only be relevant to critically ill patients who remain in the ICU for a prolonged period of time, we examined the use of nutrition support in patients who remained in the ICU more than 4 days.

Statistical analysis: Data are presented as the mean ± SD (standard deviation) for numerical variables, number (n) or percentage (%) for categorical variables. A multiple logistic regression was applied to examine the role of absence of nutrition support on the clinical outcomes and is calculated the odds ratio (OR) and its confidence interval (CI). Categorical data were analyzed using the Chi-Square test. Statistical significance was considered at the level of $p \leq 0.05$. All tests were two tailed. SPSS 15.0 statistical package used to analyze the data.

RESULTS

Characteristics of patients

Table 1 contains the data for characteristics of the patients.

Route of nutrition support

Of the 432 study patients 221 (51%) received some form of nutrition support. According to NRS 2002 the prevalence of malnutrition at the time of ICU admission was 63.6% (65.81% in the surgical patients and 57.98% in the medical patients, $p = 0.16$). Only 59.85% of the malnourished patients received nutritional support. The percentages of patients fed enterally and parenterally were 2% and 40%, respectively. Only 3% of the patients received mixed nutrition: enteral and parenteral nutrition,

and 6% received oral nutrition. Of the patients fed via the enteral route, 91% received gastric feedings and 9% received small-bowel feedings. Compared with patients fed via the enteral route only, a larger percentage of patients who received total parenteral nutrition alone or in combination with enteral feedings received a larger amount of calories and protein (table 2). Of the patients without nutrition support, the average length of stay in ICU was 6.09 ± 3.43 days

Table 1. Characteristics of the patients.

Characteristic	Result
Age, mean (SD), years	60.96 (16.20)
Sex Male (n, %) Female (n,%)	 244 (56.48%) 188 (43.51%)
APACHE II, mean (SD)	17.07 (5.54)
Patients malnourished at admission	63.6%
Diagnosis when admitted to the ICU, n (%) of patients within diagnosis category	
Non-operative conditions	
• Respiratory	9 (2.0%)
• Cardiovascular/vascular	24 (5.55%)
• Trauma	8 (1.85%)
• Metabolic	17 (3.93%)
• Renal	8 (1.85%)
• Multiorgan failure (6)	12 (2.77%)
• Other	8 (1.85%)
Postoperative conditions	
• Gastrointestinal	296 (68.5%)
• Renal	14 (3.2%)
Patients requiring mechanical ventilation	135 (31.3%)
Adequacy of energy intake* Below 25% Between 25% and 50% Between 50% and 75% Above 75%	 53.4% 16.4% 27% 3%

*Administered over prescribed energy. Results expressed as percent or mean ± standard deviation

***Timeliness of initiation of nutrition support* (figure 1)**

For those patients who received nutrition support, the median time from admission to start of any form of nutrition support was 3.03 ± 3.49 days. There were no differences about the day of start of nutrition between surgical or non-surgical patients (table 3).

Adequacy of nutrition support

Those that received nutrition support did not meet their energy or protein needs (they received an average of 50.74 ± 19.37% of their estimated caloric needs and 42.5 ± 13.24% of their estimated protein needs).

Those that did not receive nutrition support, received only 8.09 ± 7.13 % of their caloric requirements from non-nutritional infusions (5% glucose). Absence of nutrition support, as analyzed by a logistic regression model, is an independent risk factor for organs failure: OR = 2.86; 95% CI: 2.09 - 3.90; p < 0.0001, nosocomial infections OR = 3.53; 95% CI: 2.70 – 4.62; p < 0.001, and complications: OR = 2.82, 95% CI: 2.12 – 3.73, p < 0.0001.

Incidence of malnutrition was increased during ICU stay from 63.6% in admission in the ICU, to 85.2% at the end of second week, 84.3% at the and of third week and 77% at the end of forth week (figure 2).

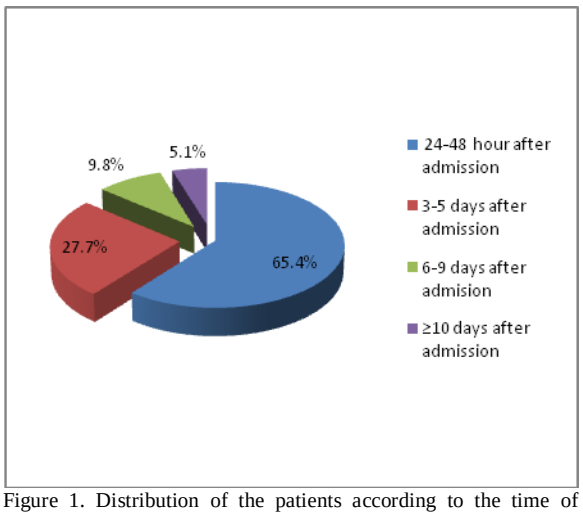

Figure 1. Distribution of the patients according to the time of initiation of nutrition support

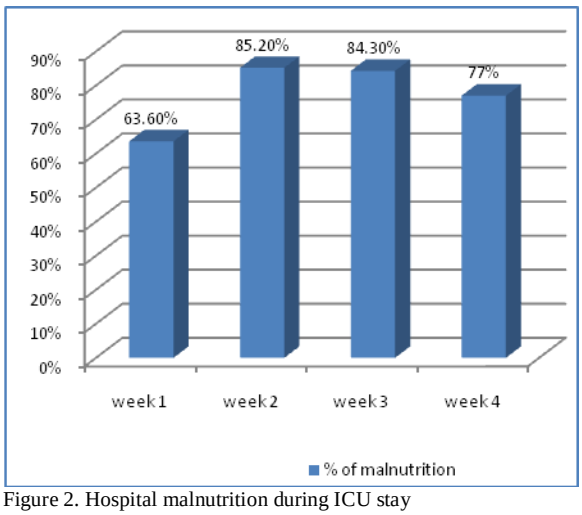

Figure 2. Hospital malnutrition during ICU stay

Table 2. Characteristics of patients according to the route of nutritional support.

	EN n=7	PN n=175	EN+P N n=13	No NS n=211	ON n=26
Age, years					
• Mean	75.57	61.61	55.61	60.09	66.0
• (SD)	4.39	17.22	19.45	14.66	19.60
APACHE II score					
• Mean	20.85	16.78	20.23	16.99	17.0
• (SD)	5.49	5.54	4.98	5.6	4.79
Length of ICU stay (days)					
• Mean	8.57	11.98	24.23	6.09	10.73
• (SD)	2.50	9.34	19.0	3.43	5.59
Length of MV stay (days)					
• Mean	5.14	3.44	8.76	0.78	0.92
• (SD)	3.62	5.26	7.85	2.25	1.76
Admission diagnosis (% of patients)					
• Medical	0	31.09	10.9	47.05	10.9
• Surgical	2.23	44.08	0	49.52	4.15
Adequacy of energy intake (%)*					
• Mean					
• SD	29.71	51.47	82	8.9	35.88
• Range	14.53	16.17	13.86	7.13	21.79
	6-44	5-82	60-99	0-60	9-78
Time of initiation of NS (days)					
• Mean					
• SD	5.33	2.59	3.3	0	6.05
• Range	0.81	3.34	3.14	0	3.80
	5-7	1-23	1-9	0	1-13

*Administered over prescribed energy. EN: enteral nutrition; PN: parenteral nutrition; NS: nutrition support; ON: oral nutrition; MV: mechanical ventilation.

Table 3. Data for the adequacy of nutrition support for surgical and medical patients

	Time from admission to start of any form of NS (days)	No NS n/%	PN n/%	EN n/%	PN+EN n/%	ON n/%
Postoperative conditions (n = 313)	3.039 ± 3.776	155 49.5%	138 44%	7 2.2%	0 0%	13 4.1%
Non-operative conditions (n = 119)	3.034 ± 2.569	56 47%	37 31%	0 0%	13 11%	13 11%

EN: enteral nutrition; PN: parenteral nutrition; NS: nutrition support; ON: oral nutrition

DISCUSSIONS

In this prospective observational study, we have described current nutrition support in critically ill adult patients. In contrary with the best evidence [7,8] we have shown that in our ICU, the enteral route isn't the main route of administering nutrition support. Overfeeding was not a finding in our study. However, underfeeding seemed to be a significant problem. 49% of patients who stayed more than 4 days in the ICU did not receive any nutrition support. Furthermore, of those who received nutrition support, on average, they received only 50.74 ± 19.37% and 42.5 ± 13.24% of their estimated caloric and protein needs during their stay in the ICU.

Several investigators [9-12] have studied practices related to enteral feeding in the ICU and found that inadequate nutrition support is common. Goals for critically ill patients are commonly set at 25 kcal/kg body weights for energy intake and 1.2 to 1.5 g/kg body weight for protein intake. [6] Underfeeding may reduce function of skeletal muscle, preservation of the integrity of the gastrointestinal tract, and maintenance of immunity and the stress response to injury. [12]

In clinical practice in the intensive care unit, patients commonly fail to receive adequate calories to meet prescribed targets, with studies reporting average energy intakes of 49% to 70% of calculated requirements. [10,12,13-17] Our study, as in other observational studies, [10,18] documented low rates of "optimal" use of nutrition support in the critical care setting.

Some factors that contributed in the inappropriate nutrition practice in our ICU were underestimation of energy requirements, delay in starting nutrition support and interruptions in parenteral or enteral feeding, [13,19,20] resulted in increasing the incidence of hospital malnutrition. We did not routinely use post-pyloric feeding, prokinetic drugs administration or measurement of gastric residual volumes to manage poor gastric emptying. [13,21,22] Patients that didn't receive nutrition support were at a higher risk for organs failure, infections and other complications.

The present study indicates that the gap between recommended nutrition care and practice regarding it still exists, and it results from lack of knowledge and interest of the importance of nutritional assessment by nurses and doctors.[23,24] They often underestimate energy requirements in ICU. [25] Importantly, no qualified dietitian was present in our ICU, while recent surveys emphasized that a clinical dietitian in the ICU team will improve the practice of nutrition support. [26]

CONCLUSION

In summary, we have shown that in critical care setting the overall adequacy of nutrition support is suboptimal. A significant number of critically ill patients did not receive any form of nutrition support, and those that received nutrition support did not meet their energy target during ICU stay. Systematic under-feeding of ICU patients may be used as a marker of suboptimal care. [18] We find nutrition support as an area for improvement in ICU patient care. Our results provide multiple opportunities for implementation of quality improvement measures by the healthcare team to enhance the provision of nutrition support to critically ill patients.

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