

SHORT COMMUNICATION**The impact of multidisciplinary nutritional team involvement on nutritional care and outcomes in a medical intensive care unit**HJ Jo¹, DB Shin¹, BK Koo¹, ES Ko¹, HJ Yeo² and WH Cho²

The aim of this study was to evaluate nutritional care and outcomes in a medical intensive care unit (ICU) following multidisciplinary nutritional team (MNT) involvement. The authors retrospectively reviewed the data of all patients admitted to a medical ICU from April to October 2013 (pre-MNT period) and from April to October 2014 (post-MNT period). In total, 140 patients were included and allocated to the pre-MNT group ($n=70$) or the post-MNT group ($n=70$). The post-MNT group was more likely to use enteral nutrition (61.4 vs 37.1%, $P=0.002$). In terms of total calories and protein provided, the number of nutritional goal-achieved days during stays in ICU was significantly greater in the post-MNT group than in the pre-MNT group (63.7% vs 47.6%, $P < 0.05$ and 44.3% vs 29.9%, respectively, $P < 0.05$). The MNT activities resulted in significant improvements in terms of nutritional provision and adequacy in a medical ICU.

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INTRODUCTION

Multidisciplinary intensive care unit (ICU) care to ensure proper nutrition provision is an emerging issue.^{1,2} In the present study, we investigated the impact of a multidisciplinary nutritional team (MNT) activity on nutrition provision, adequacy and outcomes in the medical ICU of a regional university hospital.

MATERIALS AND METHODS

This study was approved by the Institutional Review Board of our hospital (IRB no. 05-2016-002). The study population included all patients admitted to our medical ICU from April to October 2013 and from April to October 2014. Patients able to take food orally were excluded due to imprecise data about the actual nutritional intake.

From April to October 2013, attending physicians consulted with a clinical nutritionist to plan nutritional support as needed, but, from April to October 2014, MNT rounds, involving clinical nutritionists, nurses, pharmacists and intensivists, were conducted weekly to assess all patients in medical ICU irrespective of nutritional consultation. Clinical and nutritional data were retrospectively collected from medical records.

Nutritional data

Practical aspects of nutrition provision. We analyzed routes of provision, times to the initiation of nutrition provision after admission to ICU and total duration of nutrition provision.

Adequacy of nutrition provision. To evaluate the adequacy of nutrition provision, we reviewed the amount of nutrition provided. Target calorie and protein requirements were determined using the American Society for Parenteral and enteral nutrition guideline.³

Nutritional outcome. Nutritional outcome was expressed as a sum of the scores of three objective variables, that is, percentage of ideal body weight, serum albumin and total lymphocyte count, where a higher score indicated poorer nutritional state. To exclude the influence of clinical status on nutritional outcome, nutritional scores were calculated before and after stays in the ICU for ICU survivors.

Statistical analysis

Statistical analysis was performed using IBM SPSS Statistics Version 21.0 (Inc., Chicago, IL, USA). Student's *t*-test, the Mann–Whitney *U* test and paired *t*-test were used. All *P*-values were two-sided and *P*-values ≤ 0.05 were considered statistically significant.

RESULTS**Patient enrollment and patient's characteristics**

A total of 140 patients were included according to predefined criteria. Patients' mean age was 66.3 ± 12.7 years, 56.4% were male. For the baseline nutritional parameters mean body mass index was 22.7 ± 4.3 kg/m², mean percentage of ideal body weight was $105.4 \pm 20.7\%$, albumin was 2.9 ± 0.5 g/dl and total lymphocyte count was 1422.7 ± 3460.2 cells per mm³. Mean stay in the ICU was 14.3 ± 14.8 days; the mortalities in the ICU were 32.9% and 42.9% in the pre- and post-MNT groups, respectively ($P=0.223$).

Practical aspects of nutrition provision

No significant intergroup difference was found for total duration of nutrition provision or time to the initiation of nutrition provision. Nutrition provision durations were $89.7 \pm 18.2\%$ and $93.9 \pm 16.5\%$ of overall stay in the ICU in the pre- and post-MNT groups, respectively ($P=0.152$). Mean times to the initiation of

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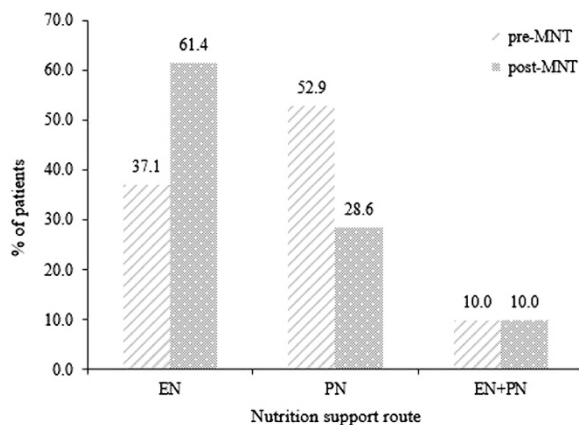


Figure 1. Nutritional provision route was recorded. Patients in the pre-MNT group were more likely to receive PN than EN (52.9 vs 28.6%, $P=0.004$), whereas patients in the post-MNT group were more likely to receive EN (61.4 vs 37.1%, $P=0.002$). PN, parenteral nutrition.

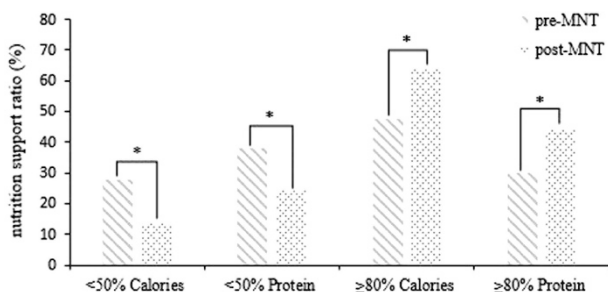


Figure 2. Adequacy of provision was presented by expressing nutritional goal-achieved days as a percentage of total stay in the ICU. A goal-achieved day was defined as a day when actual amount provided was $\geq 80\%$ of the targeted amount in terms of total calories or protein supplied. A below-goal day was defined as a day when the actual amount provided was $\leq 50\%$ of the target provision amount. The percentage of goal-achieved days was significantly higher in the post-MNT group than in the pre-MNT group ($P < 0.05$).

nutrition provision were 1.4 ± 0.6 days and 1.2 ± 0.6 days in the pre- and post-MNT groups, respectively ($P=0.059$). In all study subjects, nutritional support was provided by enteral nutrition (EN) in 49.3%, by parenteral nutrition in 40.7% and by combined nutrition in 10%. EN was preferred than parenteral nutrition in the post-MNT group and vice versa in the pre-MNT group (Figure 1).

Nutritional adequacy

During stays in the ICU, nutritional goals were more commonly achieved in the post-MNT group (Figure 2). In terms of total calories and protein provided, the percentage of goal-achieved day was significantly higher in the post-MNT group than in the pre-MNT group (63.7 vs 47.6%, $P < 0.05$ and 44.3 vs 29.9%, $P < 0.05$). Conversely, the percentage of below-goal days was significantly higher in the pre-MNT group (27.9 vs 13.5%, $P < 0.05$ and 38.1 vs 24.4%, $P < 0.05$).

Nutritional outcomes

To evaluate the impact of MNT involvement on nutritional outcomes, serial changes in the nutritional scores of survivor were compared. Among survivors in the pre-MNT group,

nutritional scores at baseline and at the time of discharge from the ICU did not differ (3.3 vs 3.0; $P=0.419$). However, among survivors in the post-MNT group, nutritional scores at the time of discharge from the ICU were significantly lower than those at baseline (4.1. vs 3.4; $P=0.04$).

DISCUSSION

Nutritional issues are often not prioritized due to the presence of critical conditions during the stay in the ICU. However, adequate nutritional support is one of the main goals of routine care in the ICU. For this reason, we analyzed the nutritional issues in a medical ICU with respect to timing, route, adequacy and outcome. This study shows that MNT involvement was associated with a higher percentage of EN provision and better nutritional goal achievement. In addition, in survivors, nutritional statuses were improved at the time of discharge from the ICU. These findings indicate that a specialized team approach to patients in the medical ICU improves nutritional care and nutritional outcomes.

The current guideline is that EN is initially preferred over parenteral nutrition in patients in the ICU.³ In this study, only 37% of patients in the pre-MNT group were primarily fed through the enteral route. After MNT intervention, interruption of EN due to intolerance was systematically managed by clinical nutritionists, who recommended alternative formulations, routes and amounts of nutrition. As a result, the EN proportion increased to 67%.

Adequacies of calories and protein supplied were also improved by MNT involvement. In previous reports, ~95% of patients in the ICU experienced nutritional shortages versus nutritional guideline energy requirements and 30% were exposed to serious nutritional risk due to extreme nutritional shortages.^{4,5} In the present study, overall amounts of nutrition provided were higher than those in the previous reports on ICU nutrition,⁶ and MNT involvement increased the percentage that met daily nutritional goals during stays in the ICU. These results concur with those of previous reports regarding the effects of multidisciplinary intervention on nutritional outcome in an ICU setting.^{7,8}

In conclusion, MNT involvement improved nutritional adequacies and nutritional outcomes of patients in medical ICU by changing the manner in which nutrition was provided. Finally, we suggest further studies be undertaken to evaluate the effect of MNT involvement on clinical outcomes of patients in medical ICU.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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REFERENCES

- Epstein NE. Multidisciplinary in-hospital teams improve patient outcomes: A review. *Surg Neurol Int* 2014; **5** (Suppl 7): S295–S303.
- Kim MM, Barnato AE, Angus DC, Fleisher LA, Kahn JM. The effect of multidisciplinary care teams on intensive care unit mortality. *Arch Intern Med* 2010; **170**: 369–376.
- McClave SA, Taylor BE, Martindale RG, Warren MM, Johnson DR, Braunschweig C *et al*. Guidelines for the provision and assessment of nutrition support therapy in the adult critically ill patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.). *JPEN J Parenter Enteral Nutr* 2016; **40**: 159–211.
- Lee SM, Kim SH, Kim Y, Kim E, Baek HJ, Lee S *et al*. Nutrition support in the intensive care unit of 6 Korean tertiary teaching hospitals: a national multicenter observational study. *Korean J Crit Care Med* 2012; **27**: 157–164.
- Schindler K, Pernicka E, Laviano A, Howard P, Schutz T, Bauer P *et al*. How nutritional risk is assessed and managed in European hospitals: a survey of 21,007

- patients findings from the 2007-2008 cross-sectional nutrition day survey. *Clin Nutr* 2010; **29**: 552–559.
- 6 Drover JW, Cahill NE, Kutsogiannis J, Pagliarello G, Wischmeyer P, Wang M *et al*. Nutrition therapy for the critically ill surgical patient: we need to do better!. *JPEN J Parenter Enteral Nutr* 2010; **34**: 644–652.
- 7 Mo YH, Rhee J, Lee EK. Effects of nutrition support team services on outcomes in ICU patients. *Yakugaku Zasshi* 2011; **131**: 1827–1833.
- 8 Jeong E, Jung YH, Shin SH, Kim MJ, Bae HJ, Cho YS *et al*. The successful accomplishment of nutritional and clinical outcomes via the implementation of a multidisciplinary nutrition support team in the neonatal intensive care unit. *BMC Pediatr* 2016; **16**: 113.

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