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Application strategy and effect analysis of nutritional support nursing for critically ill patients in intensive care units

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Abstract

We investigate nutritional support and nursing status of critical patients in intensive care units (ICUs) to understand the latest nutritional support guidelines' implementation by clinical medical staff; identify problems in nutritional support and nursing for these patients, analyze causes, and present suggestions; and provide a clinical/theoretical bases to improve nutritional support implementation and nursing strategies for them. Clinical case information of 304 critically ill ICU patients admitted from July 2017 to July 2021 was analyzed. They were divided into the experimental (nutritional support) and control (no nutritional support) groups to compare their laboratory indicators, 28-day case fatality rate, and infection incidence. Least significant difference was used for postanalysis of statistically significant items to obtain pairwise comparisons. Nutrition support strategies for ICU patients are consistent with guidelines but have an implementation gap. No statistically significant differences were found in hemoglobin (HB), total serum protein (TP), serum albumin (ALB), transferrin (TF), prealbumin (PA), and total lymphocyte count (TLC) in experimental group patients compared with the control group within 24 hours (before nutritional support, $P > .05$). No statistically significant differences were also found in HB, TP, TLC, and ALB between the enteral nutrition + parenteral nutrition (EN + PN), total EN (TEN), total PN (TPN), and control groups on admission day 7 (after nutritional support, $P > .05$), while statistically significant differences existed between PA and TF ($P < .05$). TF of patients supported by TEN was higher (statistically significant difference, $P < .05$). PA in patients receiving TEN and EN + PN support was higher than in control group patients (statistically significant difference, $P < .05$). Compared with the control group, in experimental group patients, infection incidence was significantly lower (40.2% vs 62.9%, $P < .05$); incidence of complications was lower, but not statistically significant (40.2% vs 57.1%, $P > .05$); and 28-day mortalities were significantly lower (26.7% vs 45.7%, $P < .05$). Nutritional support can reduce hospitalization complications and 28-day mortality in critical patients, but its implementation must be standardized. Especially for patients with gastrointestinal dysfunction, personalized/standardized nutrition strategies and nursing procedures are needed when PN support is applied, and training of clinical medical staff should be strengthened to improve nutrition support's efficiency.

Abbreviations: ALB = albumin, EN = eternal nutrition, ESPEN = European Society of Parenteral, GLN = glutamine, HB = hemoglobin, ICU = intensive care unit, PA = prealbumin, PN = parenteral nutrition, TEN = total eternal nutrition, TF = transferrin, TLC = total lymphocyte count, TP = total serum protein, TPN = total parenteral nutrition.

Keywords: complications, critically ill, enteral nutrition, nutritional support

1. Introduction

In recent years, an increasing amount of attention is paid to the role of nutritional support in critical patients. Various nutritional support guidelines and norms are continuously being developed and enriched to help clinical workers improve medical care practice, which are widely respected.[1–3] However, in actual clinical work, it remains difficult for nurses to achieve the target feeding amount for critical patients. This is because of the many clinical obstacles leading to insufficient nutritional intake in patients, including differences in doctors' nutritional support strategies, medical care operations leading to multiple

interruptions in nutritional support, nurses' lack of knowledge of nutritional support and nursing, unplanned extubation, and gastrointestinal intolerance of patients.[4,5]

Many countries have updated and issued their respective guidelines to standardize the implementation of nutrition support strategies. However, different hospitals and intensive care units (ICUs) have different nutrition support strategies for patients, and there are still bottlenecks in the promotion of guidelines. The location, level of the hospital, economic conditions, cultural customs, etc, can become obstacles to the dissemination of these guidelines.[6–8] Then, what is the current gap between the nutritional implementation status of critical

patients and the guidelines in clinical practice? How can this gap be addressed? These questions need to be answered and resolved.

Compared with other guides, the recommended plan of the 2019 edition of the European Society for Clinical Nutrition and Metabolism (ESPEN) guide is the latest and most complete, covering a wide range of nutrition support-related content and in-depth research.[9] Therefore, this study refers to the latest version of the ESPEN guidelines to investigate the current nutritional support status of clinical critical patients, examine the implementation of the latest nutritional support guidelines by clinical medical staff, understand the gap between clinical practice and the guidelines, and attract the attention of medical staff. This will help medical practitioners provide critically ill patients with more complete nutritional support to improve their prognosis and lay a good foundation.

2. Materials and Methods

2.1. General information

A total of 304 critical patients admitted to the ICU in one hospital from January 2017 to December 2021 were selected as research objects. Based on nutritional support, there were 134 patients in the experimental group supported by enteral nutrition (EN) + parenteral nutrition (PN; EN + PN group), 64 patients supported by total EN (TEN group), and 26 patients supported by total PN (TPN group). There were 70 patients without nutritional support (control group). The inclusion criteria were as follows: Age ≥ 18 years; patients were unable to eat on their own for various reasons when entering the ICU; interval between admission to the hospital and the ICU was no more than 24 hours, with the time spent in the ICU > 72 hours; selected patients or their family members were informed and voluntarily participated in the study. The exclusion criteria were as follows: Patients had abnormal secretion of other hormones, such as thyroid, parathyroid, adrenergic, or growth hormones, and other secretion disorders; Patients had severe edema or ascites; they were pregnant or lactating; patients did not agree to join this study. The study was approved by the ethics committee of the Second Affiliated Hospital of Hainan Medical University and carried out in accordance with the Helsinki Declaration.

2.2. Method

We collected data on the patients' gender, age, occupation, marital status, education level, admission time, discharge time, total hospital stay, ICU stay, admission diagnosis, height, weight, body-mass index, and other information.

To assess the severity of the patient's disease, Acute Physiology and Chronic Health Evaluation-II score, nutritional assessment tools and nutritional assessment results, acute gastrointestinal injury classification (and grading) were utilized, the score and rating were based on the worst value or the worst case of the day.

To assess the nutritional support and nursing implementation for patients in ICU, we examined whether nutritional support was provided, EN start time, whether the EN standard was met, whether the standard was met, main feeding route, feeding duration, infusion method, whether to carry out PN, PN feeding route and duration, gastro kinetic drugs, parenteral micronutrients and antioxidants, enteral/parenteral glutamine (GLN), use of extra vitamin D, whether to raise the head of the bed during nutritional support, and whether to judge the location of the feeding tube before each feeding.

To evaluate the patients' gastrointestinal tolerance, the measurement frequency, and upper and lower limits of gastric residual volume, whether feeding was interrupted, and frequency and reasons for feeding interruption were examined.

Finally, test results were obtained within 24 hours of admission and on day 7 of admission. These included tests for hemoglobin, total serum protein, serum albumin, transferrin, prealbumin, and total lymphocyte count (TLC). The prognostic indicators mainly include whether infection and complications occur, and the clinical outcomes on days 7 and 28.

2.3. Indicator definitions

EN refers to oral or tube feeding to provide patients with the nutrients they need, excluding oral or semiautonomous feeding. PN refers to intravenous provision of nutrients, including amino acids, fats, carbohydrates, vitamins, and minerals for patients who cannot meet their own metabolic needs because they cannot take nutrients through the gastrointestinal tract.[10]

The target calories were calculated as follows:

$$target\ calories = previous\ weight\,(\mathrm{kg}) \times 25\ \mathrm{kcal/kg/day}.$$

The nutrition/calorie compliance ratio refers to the ratio obtained by dividing the actual calorie intake of the patient by the target calories. In this study, the nutrition/calorie compliance ratio was ≥ 80%. When calories were calculated for PN, only nonprotein calories were considered, that is, calories provided by carbohydrates and fats.[11]

Moreover, serum total protein ≥ 65 g/L was normal, 60 to 64 g/L insufficient, and < 60 g/L deficient. Serum albumin of 35 to 55 g/L was normal, 30 to 35 g/L indicated mild malnutrition, 25 to 30 g/L indicated moderate malnutrition, and < 25 g/L indicated severe malnutrition.

Feeding interruption refers to the interruption of feeding for > 30 minutes due to various reasons during EN. The 28-day clinical outcome refers to the patient's survival status on day 28 after entering the ICU. Survival was recorded as "survival," death as "death," and untracked as "lost to follow-up."

2.4. Statistical processing

Counting data are described by frequency and percentage, and measurement data are described by mean ± standard deviation. The measurement data among multiple groups were compared using one-way analysis of variance. If the Levene test of variance was uniform, 1-way analysis of variance was used to compare the total mean, and the least significant difference method was used for pairwise comparison. If the Levene test showed uneven variance, we used Welch t test for overall means comparison and Dunnett T3 test for pairwise comparison. Chi-square or Fisher exact test was used to compare categorical variables between the 2 groups. All statistical analyses were performed using SPSS version 24 (Chicago, IL) with 2-sided $P < .05$ as statistically significant.

3. Results

3.1. Demographic characteristics

According to the inclusion criteria, 304 patients were finally included, including 80 females (26.3%) and 224 males (73.7%). There were 68 cases (22.4%) under the age of 60 years, and 236 cases (77.6%) over the age of 60 years (Table 1).

3.2. Assessment of nutritional risk

The 304 patients in this study were all assessed for nutritional risk, and the assessment tools were all m NUTRIC score (modified Nutric score). Eighty-six patients (56.7%) were patients with high nutritional risk (5–9 points), and 66 patients (43.4%) were patients with low nutritional risk (0–4 points). See Figure 1 for details.

Table 1

Baseline data of critically ill patients in ICU/EICU.

Variable	Group	Cases	Percentage (%)
Gender	Male	224	73.7
	Female	80	26.3
Age	<60 yr	68	22.4
	≥60 yr	236	77.6
Admission diagnosis	Cerebrovascular disease	66	12.1
	Respiratory failure	62	11.4
	Traumatic cerebral hemorrhage	52	9.6
	Myocardial infarction	38	7.0
	COPD	36	6.6
	Renal failure	34	6.2
	Malignant tumor	24	4.4
	Atherosclerosis	18	3.3
	Epilepsy	18	3.3
	Acute severe pancreatitis	16	3.0
	Other	180	33.1
28-d outcome	Survival	208	68.4
	Death	94	30.9
	Lost to follow-up	2	0.7
	<20 min	44	14.5
APACHE-II	20–30 min	150	49.3
	>30 min	110	36.2

Admission diagnosis: the frequency of individual admission diagnoses divided by the total number of admission diagnoses is not the total number of patients.

APACHE-II = Acute Physiology and Chronic Health Evaluation-II, COPD = chronic obstructive pulmonary disease, EICU = electronic ICU, ICU = intensive care unit.

Figure 1. The nutritional assessment of patients. EN = eternal nutrition, PN = parenteral nutrition, TEN = total EN, TPN = total parenteral nutrition.

3.3. Assessment of gastrointestinal function

Among the 152 patients in this survey, 141 (93%) patients underwent gastrointestinal function assessment, and 11 patients (7%) did not have gastrointestinal function assessment (Fig. 2).

3.4. Condition of nutrition implementation

Among the 152 patients in this survey, the nutritional support rate was 77%. See the Figure 3 below for details.

3.5. EN start time and compliance status

Among the 234 patients who received nutritional support, a total of 208 patients received EN support, including 74 patients

with TEN support and 134 patients with EN + PN combined support. Patients who received nutritional support within 48 hours significantly outnumbered patients after 48 hours ($P <$ .01). There was no statistical difference between TEN and EN + PN in the total nutrient intake within 72 hours or after 72 hours ($P >$ .05), and there was no statistical difference between TEN and EN + PN in the main feeding route ($P >$ .05). See the Table 2 below for details.

3.7. Nutrition support energy supply in application

Among the 74 patients supported by TEN, the nutrition/calorie compliance ratios on the first, third, and seventh days after EN started were $32.1 \pm 6.8\%$, $39.8 \pm 16.7\%$, and $61.5 \pm 19.4\%$ of the target calories, respectively. Among the 26 patients supported by TPN, the nutrition/calorie compliance ratios on the first 1, 3, and 7 days after starting PN were $62.4 \pm 14.5\%$, $81.2 \pm 15.7\%$, and $87.6 \pm 18.4\%$ of the target calories, respectively. Among the 134 patients supported by EN + PN, the nutrition/calorie compliance ratios on the first, third, and seventh days of nutritional support were $33.1 \pm 11.2\%$, $53.7 \pm 11.3\%$, and 71.5 ± 12.4 of the target calorie% ($P <$ .01). See Table 3.
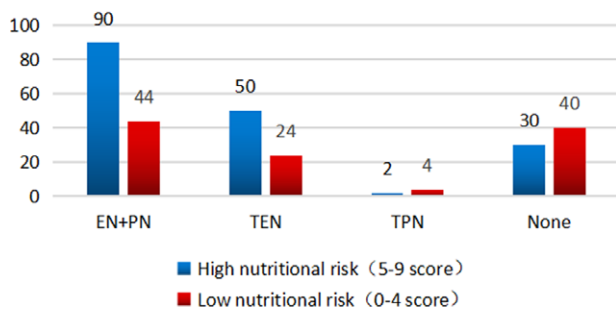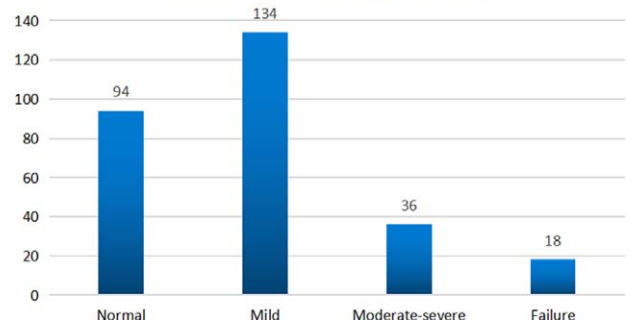
3.8. Application of gastric motility drugs

Among the 208 patients supported by EN this time, 67 (64.4%) patients used gastro dynamic drugs, and 37 (35.6%) patients did not use gastro dynamic drugs.

3.9. Nutrition support care

Application of bedside elevation among the 208 EN support patients in this investigation, all the bedside elevations are performed during EN feeding. Among them, 16 patients (8%)

Figure 2. The gastrointestinal function assessment of 282 patients.
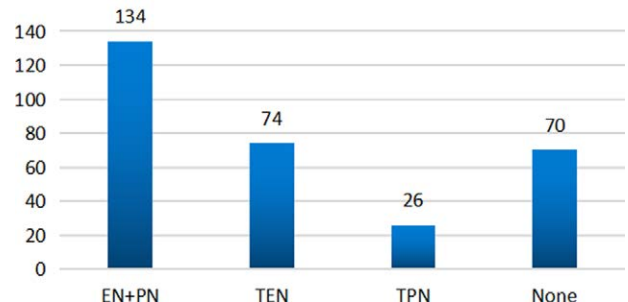
Figure 3. The nutritional support of 304 patients. EN = eternal nutrition, PN = parenteral nutrition, TEN = total EN, TPN = total parenteral nutrition.

Table 2

Starting time and compliance status of EN for 208 patients receiving.

Variable		Total (n = 208)	TEN (n = 74)	EN + PN (134)	P
Starting time	≤48 h	146 (70.2)	34 (16.3)	116 (53.8)	.000
	>48 h	62 (29.8)	40 (19.2)	22 (10.6)	
Compliance status	≤72 h	76 (36.6)	48 (23.1)	28 (13.5)	.763
Has reached the standard	>72 h	50 (24.0)	10 (4.8)	40 (19.2)	
Substandard		82 (39.4)	36 (16.7)	46 (22.1)	
Main feeding route	Intragastric feeding	192 (92.3)	68 (32.7)	124 (59.6)	.141
	Feeding after pylorus	2 (0.9)	2 (0.9)	0 (0)	
	Jejunostomy tube	14 (6.7)	4 (1.9)	10 (4.8)	

EN = eternal nutrition, PN = parenteral nutrition, TEN = total EN.

Table 3

Nutritional support energy supply table.

	TEN (kcal/d)	TPN (kcal/d)	EN + PN (kcal/d)	P
Day 1	521.7 ± 118.9	1052.2 ± 368.7	538.9 ± 158.1	
Target calories		1652.9 ± 221.1		
Nutrition/calorie compliance ratio (%)	32.1 ± 6.8	62.4 ± 14.5	33.1 ± 11.2	.001
Day 3	681.2 ± 305.8	1329.9 ± 436.6	882.1 ± 272.1	
Target calories		1691.5 ± 248.2		
Nutrition/calorie compliance ratio (%)	39.8 ± 16.7	81.2 ± 15.7	53.7 ± 11.3	.0012
Day 7	1042.1 ± 382.2	1510.1 ± 391.9	1141.9 ± 235.6	
Target calories		1635.3 ± 278.1		
Nutrition/calorie compliance ratio (%)	61.5 ± 19.4	87.6 ± 18.4	71.5 ± 12.4	.015

EN = eternal nutrition, PN = parenteral nutrition, TEN = total EN, TPN = total parenteral nutrition.

raised the bedhead by < 30° during EN support, 172 patients (83%) raised the bedhead by 30° to 45° during EN support, and 20 patients (9%) The degree of elevation of the bed head of the patient during EN support was > 45. Among the 208 EN support patients in this investigation, all patients judged and recorded the position of the feeding tube before feeding.

Feeding interruption the reason for the highest frequency of feeding interruption was medical care operations, a total of 512 times (62%), followed by EN intolerance, a total of 308 times (37%), and finally other reasons, a total of 12 times (1%), of which 6 times of abdominal hypertension, 6 times of difficulties in inserting the tube.
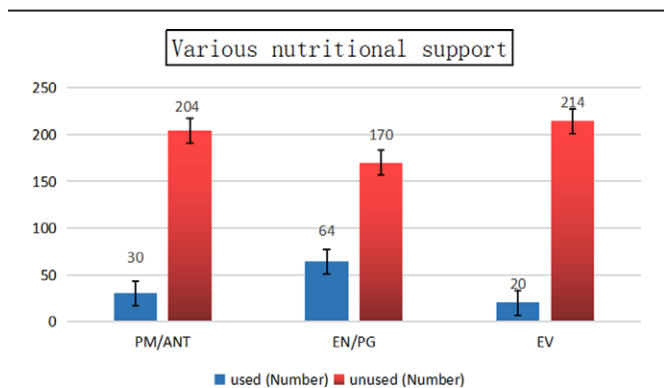
3.10. Nutritional support and adjuvant therapy

For the use of parenteral micronutrients and/or antioxidants and enteral/parenteral glutamine, the use of additional vitamin D is shown in the Figure 4 below.

Figure 4. Various nutritional support including parenteral micronutrients and/or antioxidants, enteral/parenteral glutamine, extra vitamins. EN/PG = enteral/parenteral glutamine; EV = extravitamins, PM/ANT = parenteral micronutrients and/or antioxidants.

3.11. Nutritional support effect

Measure the patient's nutritional indicators within 24 hours of admission (before nutritional support), and use one-way analysis of variance to compare whether there are differences in the patient's nutritional indicators within 24 hours of admission, the results showed that there was no statistically significant difference between hemoglobin (HB), total serum protein (TP), serum albumin (ALB), transferrin (TF), prealbumin (PA), and TLC ($P > .05$) in patients with TEN, TPN, EN + PN, and no nutritional support within 24 hours of admission (Table 4).

Measure the patient's nutritional indicators on the seventh day of admission (after nutritional support), and use 1-way analysis of variance to compare whether there are differences

in the patient's nutritional indicators on the seventh day of admission. The results showed that the differences in HB, TP, TLC, and ALB of patients with TEN, TPN, EN + PN, and no nutritional support on the seventh day of admission was not statistical significant ($P > .05$), the difference between PA and TF is statistically significant ($P<.05$), use the least significant difference method to perform postmortem analysis on items with statistical significance, and obtain the result of pairwise comparison. The TF level of patients receiving EN support was higher than that of other patients, and the difference was statistically significant ($P < .05$). The PA of patients receiving TEN and EN + PN support was higher than that of patients without nutritional support, and the difference was statistically significant ($P<.05$), See Table 5.

Nutritional indicators measured within 24 h of admission (before nutritional support).

Index	With nutritional support			Without nutritional support (n = 70)	F	P
	TEN (n = 74)	TPN (26)	EN + PN (n = 134)			
HB (g/L)	115.9 ± 25.1	119.7 ± 21.5	121.2 ± 25.3	113.9 ± 23.9	2.621	.057
TP (g/L)	62.2 ± 14.1	63.1 ± 12.5	60.9 ± 12.4	62.3 ± 12.8	0.654	.612
ALB (g/L)	34.9 ± 5.7	33.8 ± 6.7	34.8 ± 7.2	36.2 ± 11.2	0.258	.869
TF (g/L)	2.5 ± 0.8	2.5 ± 0.9	2.5 ± 0.7	2.3 ± 0.9	0.413	.769
PA (g/L)	176.9 ± 44.7	186.7 ± 46.5	178.9 ± 59.8	174.8 ± 85.2	0.213	.946
TLC (10e9/L)	12.8 ± 8.9	11.6 ± 12.7	9.5 ± 7.9	11.2 ± 10.9	0.956	.463

ALB = albumin, EN = eternal nutrition, HB = hemoglobin, PA = prealbumin, PN = parenteral nutrition, TEN = total EN, TF = transferrin, TLC = total lymphocyte count, TP = total serum protein, TPN = total parenteral nutrition.

3.12. The complications, infections, and 28-day mortality

The incidence of infection in patients with nutritional support was 40.2%, and the incidence of infection in patients without nutritional support was 62.9%; the complication rate of patients with nutritional support was 40.2%, and the complication rate of patients without nutritional support was 57.1%. The 28-day mortality rate of patients with nutritional support was 26.7%, and the 28-day mortality rate of patients without nutritional support was 45.7%. There was no significant difference in the incidence of complications between patients with nutritional support and patients without nutritional support, $P > .05$; the 28-day mortalities and the infection rate of patients with nutritional support were lower than those without nutritional support; and the difference has academic significance, $P < .05$. See Table 6.

4. Discussion

Our research results show that giving nutritional support to critical patients in the ICU can reduce complications and 28-day mortality during hospitalization, but the implementation process needs to be standardized. Especially for patients with gastrointestinal dysfunction, there is a need to develop personal nutritional strategies and standardized nutrition care procedures when providing PN support. Moreover, training of clinical medical staff must be strengthened to improve nutritional support efficiency.

A previous survey of high nutritional risk patients in the ICU found that a small number of patients had still not received nutritional support. This indicated that timely clinical nutritional support may not have been provided. For patients who cannot eat by mouth, the guidelines recommend that EN is the

Nutritional indicators measured 7 d after admission (after nutritional support).

Index	With nutritional support			Without nutritional support (n = 70)	F	P
	TEN (n = 74)	TPN (26)	EN + PN (n = 134)			
HB (g/L)	111.2 ± 22.9	111.3 ± 26.8	115.2 ± 25.7	110.2 ± 25.8	0.130	.863
TP (g/L)	56.2 ± 8.6	54.1 ± 11.4	56.9 ± 11.2	58.3 ± 9.8	0.874	.468
ALB (g/L)	31.9 ± 5.3	33.8 ± 6.9	33.8 ± 6.2	34.2 ± 8.4	0.552	.649
TF (g/L)	2.6 ± 1.2*†‡	2.2 ± 0.3	2.2 ± 0.6	2.3 ± 0.5	3.113	.039
PA (g/L)	172.9 ± 54.7‡	162.2 ± 35.5	176.2 ± 50.8‡	144.9 ± 35.8	3.213	.032
TLC (10e9/L)	9.8 ± 6.8	9.6 ± 6.7	9.8 ± 5.9	7.2 ± 6.9	0.656	.663

ALB = albumin, EN = eternal nutrition, HB = hemoglobin, PA = prealbumin, PN = parenteral nutrition, TEN = total EN, TF = transferrin, TLC = total lymphocyte count, TP = total serum protein, TPN = total parenteral nutrition.
*Compared with the TPN group, $P < .05$.
†Compare with the EN + PN group, $P < .05$.
‡Compare with the no nutritional support group, $P < .05$.

The complications, infections, and 28-d mortality.

	Category	With nutritional support	Without nutritional support	Statistical value	P
Complications	Yes	94 (40.2)	40 (40.2)	4.250	.119
	None	140 (59.8)	30 (57.1)		
Infection	Yes	94 (40.2)	44 (62.9)	6.580	.037
	None	140 (59.8)	26 (37.1)		
Death in 28 d	Yes	62 (26.7)	32 (45.7)	4.523	.029
	None	170 (73.3)	38 (54.3)		

first choice when choosing nutritional support. Among the 304 patients in this survey, 234 received nutritional support (77%), which was the same as the results of previous studies. In terms of nutritional support, in this study, EN + PN joint support accounted for 44%, and TEN support accounted for 37%. The proportion of TPN support was 9%. Neither EN nor PN was provided for 23% of patients. This may be related to the difficulty in providing early EN support to meet the energy consumption needs of patients, and so the clinic often chose to use extra PN.

Some studies on patients with severe mechanical ventilation showed that EN + PN support was more effective than TEN and TPN support to improve patients' lung function, shorten mechanical ventilation time, reduce inflammation, and reduce the risk of complications.[12,13] The current guidelines are more inclined to this view.[14,15] However, in actual clinical practice, when EN intake is insufficient or gastrointestinal dysfunction exists, PN is utilized without a personalized assessment. Therefore, compared with the guidelines, the clinical indication for PN support is too loose, and sometimes EN and PN are provided at the same time during nutritional support.

The guidelines recommend that critical patients use low-calorie nutrition (≤70% energy expenditure) within 1 week of entering the ICU. After day 3, this can gradually increase to 80% to 100% of energy expenditure. Relevant studies also found that providing 50% to 65% of the target calories through EN can better maintain the immune barrier function of the intestine.[16,17] According to the results of this study, some ICU patients failed to achieve the optimal feeding amount in the early stage of EN, which may be because of frequent feeding interruptions caused by EN intolerance or gastrointestinal dysfunction in the early feeding stage, medical care operations, etc. Some studies indicated that the use of prokinetic drugs during EN implementation in patients can adjust the gastrointestinal migratory compound movement, effectively reduce the incidence of EN intolerance, and reduce the risk of aspiration.[18] In this study, most patients used gastrodynamic drugs during EN support, consistent with the guidelines' recommendation.

The nutrition support process involves all aspects of nursing operations. Irregular operations increase the probability of complications. At present, many nursing experts have also formulated relevant operating specifications for nursing operations involved in the nutrition support process, especially the EN support process. Numerous studies at home and abroad confirmed that feeding interruption is a main reason for reducing the EN standard rate of patients, leading to insufficient nutritional intake by patients.[19–21] For critical patients supported by EN, the guidelines recommend maintaining a continuous infusion and to not interrupt feeding at will. In this study, the most common reason for feeding interruptions in the 208 patients who received EN support was medical care operations (a total of 512 times, 62%), followed by EN intolerance (a total of 308 times, 37%), and other reasons (a total of 12 times [1%], including 6 times of abdominal hypertension and 6 times of difficulty in catheterization].

In recent years, the clinical role of immune nutrition, such as GLN and arginine, in critical patients has received widespread attention. The clinical outcome indicators are not statistically significant and can even increase the mortality of critical patients.[22,23] Therefore, the guidelines also recommend that ICU critical patients, except those with burns and trauma, should not be given additional GLN.[24,25] Therefore, in our study, only a small number of patients received vitamin D supplements via gavage, intramuscular injection, or intravenous administration.

The patients' nutritional indicators were recorded within 24 hours after and on day 7 day of admission. The results showed that the nutritional and prognostic indicators of patients who received nutritional support were significantly better than those

of patients who did not. For critical patients, adequate nutritional support is necessary for the prognosis. Our research results suggest that reevaluation should be conducted in time based on changes in the patients' condition. Especially for patients with high nutritional risk, the frequency of reevaluation can be appropriately increased, and patients with a sharp decline should also be reevaluated in time. Regarding nutritional support, it is recommended to form a multidisciplinary nutritional support team to make clinical decisions on the time, approach, and management plan of nutritional support, and to conduct regular education and training for all medical staff involved in nutritional support. In addition, it is recommended to adopt a centralized management model for which specialists are responsible; develop a standardized evaluation and treatment process for early EN intolerance, gastrointestinal dysfunction, and other complications; and regularly organize department education and training to ensure early detection and correct handling during the nutritional support process.

5. Conclusion

Nutritional support for critical patients in ICU can reduce complications and 28-day mortality during hospitalization, but the implementation process needs to be standardized. Especially for patients with gastrointestinal dysfunction, personalized nutrition strategies and standardized nutrition nursing process should be formulated when applying PN support. Moreover, training for clinical medical staff must be strengthened to improve the efficiency of nutritional support.

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