

Effect of Bundle Management in the Reduction of EN Complications in Patients Receiving Enteral Nutrition (EN) in the ICU

Jiaoping Zhang
Pei Zhang

Jiaoping Zhang* Department of Nursing, Bengbu first people's Hospital, Bengbu City 233000, China, Pei Zhang Department of Intensive Care Unit, Bengbu first people's Hospital, Bengbu City 233000, China, * Corresponding author: Jiaoping Zhang, Email: 13966055877@163.com

To investigate the efficacy of bundle management in reducing EN complications in ICU enteral nutrition (EN) patients. **Methods:** In this study, 90 patients with enteral nutrition who were admitted to our hospital and ICU from January 2018 to January 2021 were randomly divided into two groups by random number method: control group (n = 45) treated with routine nursing management and study group (n = 45) treated with bundle management by random number method. The nursing outcomes of the two groups were compared. **Results:** The incidence rate of enteral nutrition complications in the study group was significantly lower than that in the control group ($P < 0.05$). The nutritional indexes after intervention in the study group were significantly better than those in the control group ($P < 0.05$). There was no significant difference in the relative ratio of nutritional indexes before intervention between the two groups ($P > 0.05$). The satisfaction degree of the patients' family members in the study group was significantly better than that of the patients' family members in the control group ($P < 0.05$). **Conclusion:** Bundle management measures for patients with enteral nutrition in ICU can effectively improve the nutritional index of patients and the satisfaction of their family members, and reduce the incidence of complications of enteral nutrition, which has obvious clinical value.

Keywords: Bundle management; ICU enteral nutrition; Nutritional indicators; Complications; Nursing satisfaction
Tob Regul Sci.™ 2021;7(5-1): 3063-3067
DOI: doi.org/10.18001/TRS.7.5.1.76

Enteral nutrition (EN) refers to the most common way of nutrition support at present, which is to provide the metabolic nutrients or other related nutrients needed by the human body through the gastrointestinal tract. Nutritional support is also one of the current treatment options for critically ill patients, and with clinical studies on nutrition, it has been found that the gastrointestinal tract functions as an immune organ in humans in addition to food digestion and absorption¹⁻². Enteral nutrition has important clinical value in many aspects, including the maintenance of intestinal mucosal barrier function, the maintenance of normal physiological function of gastrointestinal tract, and toxin translocation. The term of bundle management is a new clinical term in ICU in recent years. It refers to collecting evidences and guidelines on the basis of

evidence-based nursing, synthesizing various factors, and finally making a series of intervention plans for patients, mainly treating some patients who are suffering from cure. Patients receiving enteral nutrition in the ICU are more likely to experience complications such as diarrhea, aspiration, and regurgitation³. The aim of this study was to investigate the efficacy of bundle management in reducing EN complications in ICU enteral nutrition (EN) patients. Details are provided below:

DATA AND METHODS

General data

A total of 90 patients with enteral nutrition admitted to ICU of our hospital from January 2018 to January 2021 were randomly divided into study group (n = 45), male (n = 22) and female (n = 23),

with mean age of (68.26 ± 2.15) years. Control group ($n = 45$), male ($n = 24$) and female ($n = 21$), with mean age of (68.25 ± 2.34) years. Prior to participating in the study, patients were required to conduct basic data registration and data statistics. The study can only be started if the result is $P > 0.05$. The patient's family provided written informed consent for the study, as well as assent to participate.

Inclusion criteria were: 1) Patients had normal gastrointestinal function and received enteral nutrition; 2) Patients were treated with enteral nutrition via a gastric tube or via a nasoenteric tube⁴; 3) Patients had an APACHE score greater than 13; and 4) Patients had no non-medical reason for withdrawal.

Exclusion criteria were: 1) Patients received enteral nutrition in the form of gastrostomy or gastroenterostomy fistula; 2) Patients had other serious diseases⁵; 3) Patients had psychiatric disorders.

Study methods

45 patients in the control group received routine nursing intervention: closely monitor the patient's condition and vital signs, administer the drug to the patient according to the doctor's advice, and complete nursing record at the same time; record the change in the concentration of nutrient solution of the patient, avoiding high osmotic pressure; ensure that the infusion speed of nutrient solution is uniform, operate strictly according to clinical requirements, and use warm water to clean the pipeline before and after feeding.

On the basis of the control group, 45 patients in the study group received the bundle management intervention: 1) The bundle management group was established: The medical staff with rich experience was selected to form the bundle management group, the members in the group received the guidance training related to enteral nutrition in a unified manner, the concept of enteral nutrition of all the members was strengthened, the disease knowledge and operation level related to enteral nutrition of the members in the group were improved, and the examination was carried out, ensuring that each member is able to properly

address each unforeseen situation during the treatment period. 2) The changes of various clinical indicators of the patients during the treatment were evaluated in detail. Through clinical literature search and clinical observation, relevant factors causing complications during enteral nutrition were found, and graded, as well as intervention measures are managed in classification. After the patients awoke, the number of visit of nurses and the number of communications with patients were increased. In the process of communication, the recognition of nurses was gradually obtained, so as to instruct the patients to cooperate with the subsequent whole-body muscle movement training, so as to promote the synthesis of protein and the improvement of body condition. 3) The ward tour was strengthened, the communication with family members of patients was strengthened, and the importance of enteral nutrition was explained to the family members of patients to ensure the smooth progress of enteral nutrition. 4) For partially intolerant patients, it is necessary to timely make records and communicate with the doctor, so as to select the soft naso-intestinal tube for enteral nutrition treatment as much as possible. 5) Albumin supplementation and antibiotic medication were prescribed to the patient based on doctor's advice; the patient's daily changes in gastrointestinal function were assessed and, for some patients, an appropriate amount of gastrointestinal motility medication could be used to promote gastrointestinal motility and gastrointestinal absorption⁶. 6) Strengthen the monitoring of patient's blood glucose. Some patients' blood glucose values fluctuate greatly. It is feasible to select continuous insulin infusion method to control patient's blood glucose change, so as to maintain the patient's blood glucose value within the range of 6.0 - 10.0 mmol/L. 7) The patient's liver function and blood electrolytes, etc. were dynamically detected and recorded according to the clinical instructions²¹.

Study indicators

To observe the incidence of complications in the two groups, and measure the levels of serum prealbumin, serum albumin and serum total protein, so as to evaluate the application of the

patients; use the self-made nursing satisfaction questionnaire of our hospital to investigate the nursing satisfaction of the family members of the patients in the two groups, with a total score of 100, satisfied (80-100 points), basically satisfied (60-80 points), dissatisfied (<60 points), and the overall satisfaction rate = basic satisfaction rate + satisfaction rate⁷.

Statistical analysis

Statistical software SPSS 22.0 was used to analyze the experimental data. The non-parametric test, Wilcoxon paired signed rank test and

Spearman rank correlation coefficient were used for statistical evaluation. P<0.05 indicated that the difference had statistical significance.

RESULTS

Comparison of nutritional indexes between the two groups before and after intervention

The data in Table 1 showed that the nutritional indicators after intervention in the study group were significantly better than those in the control group (P<0.05); there was no significant difference in the relative ratio of nutritional indicators before intervention between the two groups (P>0.05).

Table 1.
Questionnaire of nutritional indicators of patients in the two groups before and after intervention (g/L $\bar{x}\pm s$)

Items	Serum prealbumin		Serum albumin		Serum total protein	
	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Study group (n = 45)	13.25±1.82	22.21±5.25	31.25±4.29	45.52±5.48	38.61±4.52	70.15±9.25
Control group (n = 45)	13.26±1.77	15.25±3.24	31.42±4.27	39.25±4.57	39.58±4.25	54.27±4.57
t value	0.026	7.568	0.188	5.895	1.049	10.325
P value	0.979	0.000	0.851	0.000	0.297	0.000

Comparison of rates of enteral nutrition-related complications between patients of the two groups

In the data of Table 2, the incidence rate of

complications of enteral nutrition in the study group patients was significantly lower than that in the control group patients (P<0.05).

Table 2.
Enteral nutrition-related complication rate questionnaire [n (%)]

Items	Abdominal discomfort	Gastrointestinal dysfunction	Lung infection	Incidence rate
Study group (n = 45)	0 (00.00)	2 (4.44)	1 (2.22)	3 (6.67)
Control group (n = 45)	4 (8.89)	3 (6.67)	3 (6.67)	10 (22.22)
χ^2	-	-	-	4.4056
P value	-	-	-	0.036

Comparison of nursing satisfaction of family members of patients after intervention between the two groups

The data in Table 3 showed that the satisfaction

of the patients' family members in the study group was significantly better than that of the patients' family members in the control group (P<0.05).

Table 3.
Questionnaire of nursing satisfaction of patients' family members after intervention in the two groups ($\bar{x}\pm s$)

Items	Satisfied	Basically	Dissatisfied	Nursing satisfaction degree
Study group (n = 45)	23 (51.11)	20 (44.44)	2 (4.44)	43 (95.56)
Control group (n = 45)	19 (42.22)	17 (37.78)	9 (20.00)	36 (80.00)
χ^2	-	-	-	5.075
P value	-	-	-	0.024

DISCUSSION

ICU patients are seriously ill, and enteral nutritio

n is an important way to provide enteral nutrition support for ICU patients. It can not only ensure the patients' physical nutrition intake, but also provide

a certain nutritional basis for treatment. Enteral nutrition can restore the patients' gastrointestinal function and promote intestinal peristalsis and blood circulation⁸. However, the possibility of complications during enteral nutrition treatment was also significantly higher, especially the presence of multiple influencing factors. This possibility was further improved, which reduced the achieved therapeutic effect. Currently, there are lots of clinical studies on this kind of problems⁹. The results of this study indicate that the factors that contribute to the complications associated with enteral nutrition include the patient's own condition, composition of the nutrient solution, and nursing measures. Therefore, some scholars put forward the importance of nursing measures to enteral nutrition, and bundle management measures are based on clinical evidence-based treatment, providing patients with comprehensive and targeted management intervention measures, so as to improve the clinical effect of enteral nutrition¹⁰.

In this study, the incidence rate of enteral nutrition complications of the patients in the study group was significantly lower than that of the patients in the control group ($P < 0.05$); the nutritional indicators of the patients in the study group were significantly better than that of the patients in the control group after intervention ($P < 0.05$); there was no significant difference in the relative ratio of nutritional indicators before intervention between the two groups ($P > 0.05$); the core of bundle management was based on the clinical evidence-based, therapeutic measures for ICU, a mode of intervention in which nursing measures are integrated and are more complete and sustained than conventional care measures. Different from previous routine nursing measures, the starting point of bundle management is to take the patient's physical condition as the basis, comprehensively consider various indexes of the patient as well as the change of the disease condition, make dynamic detection and targeted management plan, so as to improve the nursing quality and ensure the treatment effect of the patient¹¹⁻¹². In the clinical part of the study, it is indicated that during enteral nutrition therapy for ICU

patients, bundle management intervention is adopted, which shows the effect, not only for prevention of related complications, but also for the treatment of critically ill patients with basal nutrition¹³⁻¹⁴: for patients with clear consciousness during enteral nutrition therapy, it is necessary to strengthen the psychological care for patients, so as to ensure that enteral nutrition therapy can be safely and smoothly implemented, some patients in the clinic lack a correct understanding of the enteral nutrition used clinically, question the composition of enteral nutrition preparations, and even question the significance of enteral nutrition therapy¹⁵⁻¹⁶. Bundle management requires the nursing staff to provide regular health guidance to patients and family members, describe the treatment methods and significance of enteral nutrition as well as the composition of nutrient solution used, obtain the approval and acceptance from patients and family members, and timely provide the patients with questions and answers during subsequent treatment¹⁷⁻¹⁸. In this study, the satisfaction of the patients' family members in the study group was significantly better than that of the patients' family members in the control group ($P < 0.05$). In bundle management, emphasis is placed on assessing the patient's psychological mood upon awakening and increasing the number of room visits and communicating with the patient's family members to gain the trust of the patient's family members¹⁹⁻²⁰.

On the basis of comprehensive analysis of the above study results, it is found that using bundle management measures for enteral nutrition patients in ICU can effectively improve the nutritional indexes of patients and the satisfaction of family members, and reduce the incidence rate of complications of enteral nutrition, with obvious clinical value.

REFERENCES

1. Liu Yaping. Effect of Bundle Management in ICU Patients with Multi-drug Resistant Bacteria[J]. *China Emergency Medicine*, 2018, 038 (02): 259.
2. Wang Chao, Wang Jun, Wang Bin, et al. Impact of standardized process management of enteral nutrition tolerance assessment on nosocomial infection and prognosis of patients undergoing long-term mechanical ventilation for tracheotomy in ICU[J]. *Chinese Journal of Critical Care Medicine*, 2018, 30 (012): 1173-1177.

3. Pulido M V, Sanchez S V, Vera A, et al. 4CPS-054 Early levels of vancomycin in intensive care unit (icu) protocol depending on icu patients' characteristics[J]. *European Journal of Hospital Pharmacy Science & Practice*, 2018, 25(01):66-67.
4. Luo Yanni, Wang Chunya, Li Jinna, et al. Application of Cluster Intervention in Patients Undergoing Mechanical Ventilation with Ventilator in ICU Ward[J]. *China Medical Journal*, 2019, 16 (10): 173-176.
5. Li Ping, Chen Cui, Li Ruiling, et al. The effect of optimized nursing on feeding intolerance in ICU patients receiving enteral nutrition[J]. *Chinese Journal of Emergency Medicine*, 2018, 038 (02): 233.
6. Chenxi, Xie, Jinzhou, et al. Synergistic effect of enteral nutrition on remission induction in a patient with penetrating Crohn disease: A case report. [J]. *Medicine*, 2019, 98(32):167-166.
7. He Li, Huang Xiangdong, Ma Jingjing, et al. Meta-analysis of risk factors for diarrhea associated with enteral nutrition support in ICU patients[J]. *Chinese Journal of Modern Nursing*, 2020, 26 (35): 4861-4868.
8. Xu Liquan, Li Huiyan, Han Yuxiang. Efficacy analysis of bundle management strategy in the transfer safety management of ICU patients in the hospital[J]. *Chinese Journal of Practical Nursing*, 2018, 034 (015): 1154-1159.
9. Li P F, Wang Y L, Fang Y L, et al. Effect of early enteral nutrition on postoperative complications trauma patients requiring intensive care[J]. *Chinese Journal of Traumatology (English Edition)*, 2020, 23(3):125-126.
10. Kong Yu. Application of intensive nursing intervention in enteral nutrition-related diarrhea nursing of severe stroke[J]. *Chinese General Practice*, 2019, 22 (2): 197-199.
11. Ding Q, Chen W, Gu Y, et al. Accelerated rehabilitation combined with enteral nutrition in the management of lung cancer surgery patients[J]. *Asia Pacific Journal of Clinical Nutrition*, 2020, 29(02):274-279.
12. Liu Hua, Tan Jiping, Lei Wei, et al. Meta-analysis on the effect of intensive nursing intervention in ICU patients[J]. *Chinese Journal of Practical Nursing*, 2018, 18 (2): 1596-1600.
13. Yamamoto T, Nakahigashi M, Shimoyama T, et al. Does Preoperative Enteral Nutrition Reduce the Incidence of Surgical Complications in Patients with Crohn's Disease? A Case matched Study[J]. *Colorectal Disease*, 2019, 22(5):15-17.
14. Wang Longzhen, Zhao Yan, Qian Yehong, et al. Observation on the effect of modified nasal feeding on enteral nutrition in ICU patients[J]. *China Food and Nutrition*, 2020, 245 (01): 88-90.
15. Wang Wei. Effect analysis of bundle care on prevention of ventilator-associated pneumonia in intensive care unit[J]. *Chinese Remedies & Clinics*, 2020, 20 (4): 685-687.
16. Dannyu, Jun, Fei, et al. [Value of early enteral nutrition in patients with severe heart failure undergoing mechanical ventilation]. [J]. *Zhonghua wei zhong bing ji jiu yi xue*, 2019, 31(7):903-905.
17. Mia o Xinyu. Comparison of incidence and related indexes of VAP with enteral nutrition support in mechanically ventilated patients fed with nasogastric tube and nasogastric tube[J]. *Journal of Preventive Medicine of Chinese People's Liberation Army*, 2020, 233 (08): 71-73.
18. Luo Y, Qian Y. Effect of combined parenteral and enteral nutrition for patients with a critical illness: A meta-analysis of randomized controlled trials[J]. *Medicine*, 2020, 99(3):187-188.
19. Cheng Xinxin, Sun Guizhi. Influence of Cluster Nursing Strategy on Complications of Cardiac Postoperative Resuscitation Patients[J]. *Chinese Journal of Clinical Research*, 2018, 31 (002): 280-282.
20. Wang X, Xu J, Li J, et al. Effect of regional arterial infusion combined with early enteral nutrition on severe acute pancreatitis[J]. *The Journal of international medical research*, 2019, 47(12):178-179.
21. Matiichuk, Y., Horak, Y., Chaban, T., Ogurtsov, V., Kostyshyn, L., & Matiychuk, V. Synthesis, Molecular Docking And Anti-Inflammatory Activity 2, 4-Dimethyl-N-(2-Aryl)-3-Furamides. *European Chemical Bulletin*, 2020, 9(12), 410-415. <http://dx.doi.org/10.17628/ecb.2020.9.410-415>