Original Article

Attitudes toward the American nutrition guidelines for the critically ill patients of Chinese intensive care physicians

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Nutrition therapy is essential for the management of critically ill patients. Some guidelines have been published to standardize and optimize the nutrition therapy. However, there are still many controversies in nutrition practice and there is a gap between guidelines and clinical nutrition therapy for patients in intensive care units (ICUs). This study aimed to assess attitudes and beliefs toward nutrition therapy of Chinese intensive care physicians by using the American guidelines as a surrogate. A questionnaire was sent to 45 adult ICUs in China, in which surveyed physicians were asked to rate their attitudes toward the American guidelines. A total of 162 physicians from 45 ICUs returned the questionnaires. Physicians were categorized into groups according to their professional seniority, hospital levels and whether they were members of Chinese Society for Parenteral and Enteral Nutrition (CSPEN). Overall, 94% of the respondents thought that nutrition therapy for critically ill patients was very important, and 80% mentioned that they used the American guidelines. There was diversity of opinion on the recommendations pertaining to nutrition assessment, supplemental parenteral nutrition and cutoff values for gastric residual volume, negative or neutral attitudes about these recommendations were 43%, 59% and 41%, respectively. Members of CSPEN were more likely to select a greater strength of recommendation than non-members. In conclusion, the overall attitudes of Chinese intensive care physicians toward the American guidelines were positive. Nevertheless, given the great guideline-practice gap, nutrition-focused education is warranted for many intensive care physicians in China.

Key Words: nutrition therapy, clinical practice guidelines, intensive care units, survey, China

INTRODUCTION

Nutrition therapy has increasingly been recognized as an essential element in the management of critically ill patients, and it is associated with reduced infectious complications, decreased length of hospital stay and mortality.[1-3] Currently, controversies exist in many aspects such as the best administration route, the optimal initiation time, the appropriate number of calories, and type of nutrients.[2,4-6] Under this circumstance, several sets of clinical practice guidelines had been published in the past few years to standardize and optimize clinical nutrition therapy for critically ill patients.[7-10] Also, a number of studies have investigated the attitudes and practices about nutrition therapy of medical staff in diverse ways and demonstrated that the gap between guidelines and clinical practice was considerable.[11-15] The guidelines of Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (ASPEN) (the American guidelines) [7] are widely used among many Chinese intensive care physicians. Although nutrition therapy is generally provided in all Chinese intensive care units (ICUs),[16] there are few empirical data available as to the attitudes and beliefs toward nutrition therapy for critically ill patients amongst Chinese intensive care physicians.[17] Hence, we conducted a study to explore the nutrition therapy pattern of Chinese intensive care physicians by using the American guidelines as a surrogate.

The primary aim of this study was to assess current attitudes and beliefs pertaining to the American guidelines of Chinese intensive care physicians. Our secondary aim was to explore whether the perceptions and practice patterns differ among physicians of different backgrounds, so as to facilitate future education.

METHODS

This study was conducted in 45 adult ICUs in China, the

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participating ICUs were randomly selected from the directory of the 3rd Chinese National Critical Care Conference held in Hangzhou, and almost all ICUs in China sent representatives to attend that conference. A questionnaire was sent to 45 physicians from these ICUs by email or mail with postage-paid, pre-addressed envelopes. These 45 contact physicians were encouraged to distribute the questionnaire to colleagues. The study was approved by the ethics committee of Sir Run Run Shaw Hospital (SRRSH) with a waiver of consent form (Ethics Approval Number: 20110510). Non-respondents were sent a minimum of one reminder letter or email 2 weeks after the first mailing. The total survey period was from December 2011 to March 2012.

The survey was composed of 2 parts (Appendix 1). In part 1, there were 10 questions including demographics characteristics of the respondents, their beliefs regarding nutrition therapy and clinical practice guidelines, specifically about the American guidelines. Physicians were categorized into groups according to their professional seniority, hospital levels and whether they were members of the Chinese Society for Parenteral and Enteral Nutrition (CSPEN). Professional seniority was grouped into attending, fellow and resident physicians, respectively. Levels of hospital were categorized into "tertiary hospitals (level A)", "tertiary hospitals (level B)" and "secondary hospitals" according to Chinese hospital classification system.[18] While in part 2, physicians were asked to give their strength of agreement for 26 pre-selected items of nutrition practice. These 26 questions were excerpted from the American guidelines by intensive care physicians of SRRSH through a pilot test. The grade of the response options included five ranks: "strong agreement", "agreement", "don't know", "disagreement" or "strong disagreement", depending on a typical five-level Likert scale.

Statistical analysis was performed using SPSS for Windows (Version 16.0, SPSS Inc., Chicago, Ill). Descriptive statistics were used to describe physicians and their response options. Independent samples Student's t-test or one way analysis of variance was used to compare general attitudes toward the American guidelines. Fisher's exact test was used to compare differences toward specific nutrition recommendation. Profile analysis was conducted to compare general attitudes toward 26 recommendations among physicians in different groups. Profile analysis is a version of multivariate analysis of variance applied when several dependent variables are measured on the same scale (or on scales with the same properties). Profile plot and three hypotheses known as parallelism, level and flatness were accomplished using the repeated measures module under General Linear Model in SPSS.[19-21] Statistical significance was defined as $p<0.05$.

RESULTS

A total of 245 questionnaires were distributed and 162 physicians (66.1%) from 45 adult ICUs responded. Baseline characteristics of the respondents were shown in Table 1. As expected, the majority of the respondents (93.8%) agreed that nutrition therapy for critically ill patients was "very important" (Appendix 2). All respondents stated that they were currently using guidelines for nutrition therapy, and 70 (43.2%) referred to more than one set of clinical practice guidelines. Of which, 80.2% used the American guidelines, the next most commonly used guidelines were the Chinese Society of Intensive Care Medicine nutrition guidelines published in 2006 (37.0%), followed by the European Society for Clinical Nutrition and Metabolism guidelines (European guidelines) (29.6%), and the Canadian Critical Care Nutrition Clinical Practice Guidelines (1.2%).

Approximate 80% of physicians were either "very familiar" or "somewhat familiar" with the American guidelines, with the members of CSPEN being more familiar than the non-members (86.0% vs 75.6%, $p=0.010$). Eighty (49.4%) physicians stated that they believed the American guidelines represented "best practice" for nutrition therapy for critically ill patients, while 42 (25.9%) physicians thought it was not the "best practice", the members of CSPEN were more likely to be positive in this context than the non-members (67.4% vs 42.9%, $p<0.001$). When asked whether the American guidelines would improve the outcomes for critically ill patients, more than 80% of the respondents stated "yes", with the members of CSPEN (93.0% vs 79.0%, $p=0.025$) being more optimistic than the non-members.

The strength of agreement provided by physicians for each specific nutrition recommendation was conducted by profile analysis outlined in appendix 2. Overall, physicians endorsed the nutrition practices by responding "strong agreement" or "agreement". Profile analyses were performed with physician categorization as the grouping variables and Likert scores (Response scale to each item: "strong agreement"=1, "agreement"=2, "don't know"=3, "disagreement"=4 or "strong disagreement"=5) as dependent variables. For members and non-members, profiles were non-parallel (parallelism test, F (25, 136)=2.08, $p=0.004$), nor coincident (level test, F (1, 160)=29.9, $p<0.001$), nor flat (flatness test, F (25, 137)=43.4, $p<0.001$), indicating that a significant difference was found between members and non-members, thus members were more likely to select a greater strength of recommendation than non-members (Figure 1). For physicians of different hospital levels, profiles were parallel (parallelism test, F (25, 136)=1.14, $p=0.309$), but neither coincident (level test, F (1, 160)=4.38, $p=0.038$) nor flat (flatness test, F (25, 137)=43.4, $p<0.001$), indicating that general attitudes toward clinical practice guidelines were similar between physicians of different hospital levels (Figure 2). However, differences existed in the choices of

Table 1. Baseline characteristics of physicians (n=162)

Variables	n (%)
Professional seniority	
Attending physician	56 (34.6)
Fellow physician	62 (38.3)
Resident physician	44 (27.2)
Members of CSPEN or not	
Members	43 (26.6)
Non-members	119 (73.4)
Levels of hospital	
Tertiary hospitals (level A)	113 (69.8)
Tertiary hospitals (level B) and secondary hospitals	49 (30.2)

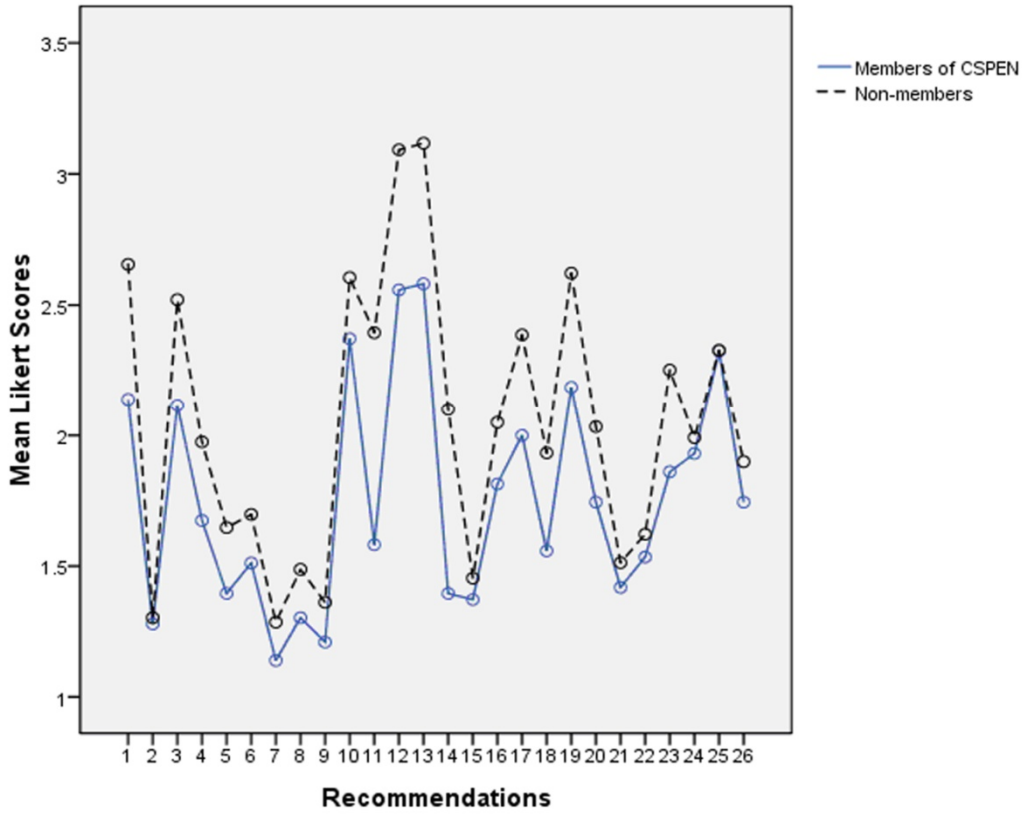

Figure 1. Mean Likert scores for members of Chinese Society for Parenteral and Enteral Nutrition (CSPEN) and non-members

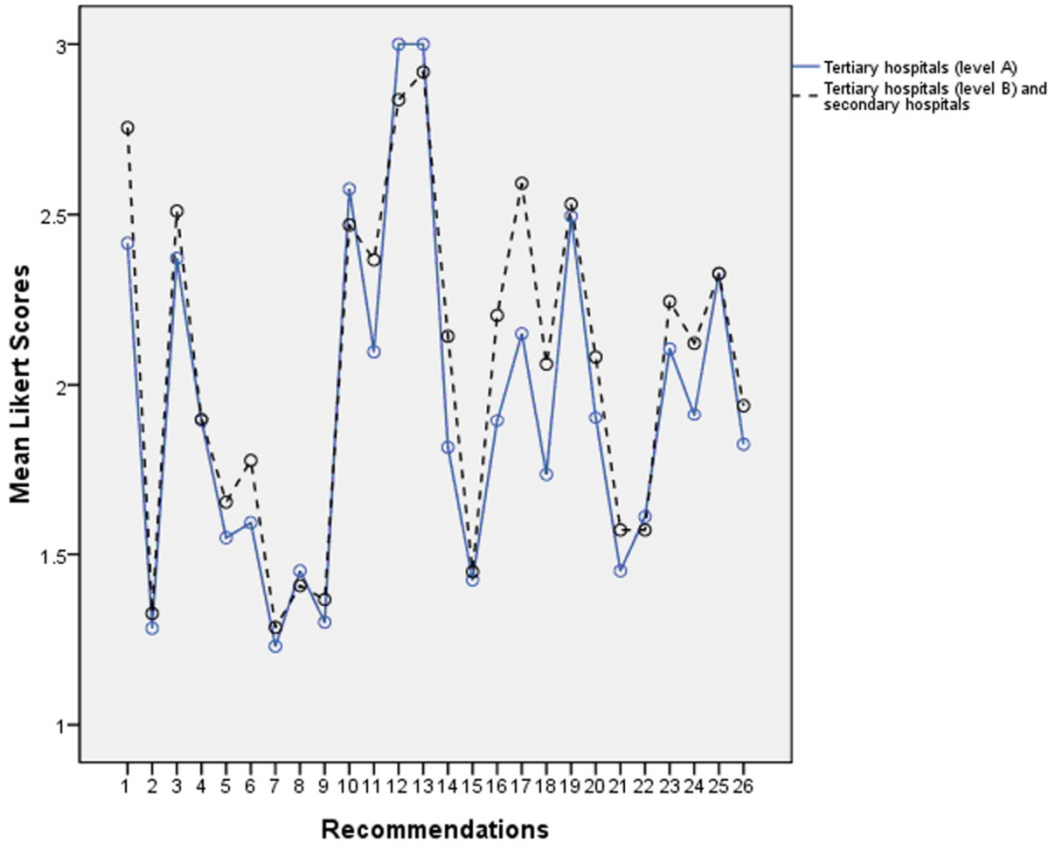

Figure 2. Mean Likert scores for physician from "tertiary hospitals (level A)" and "tertiary hospitals (level B) and secondary hospitals"

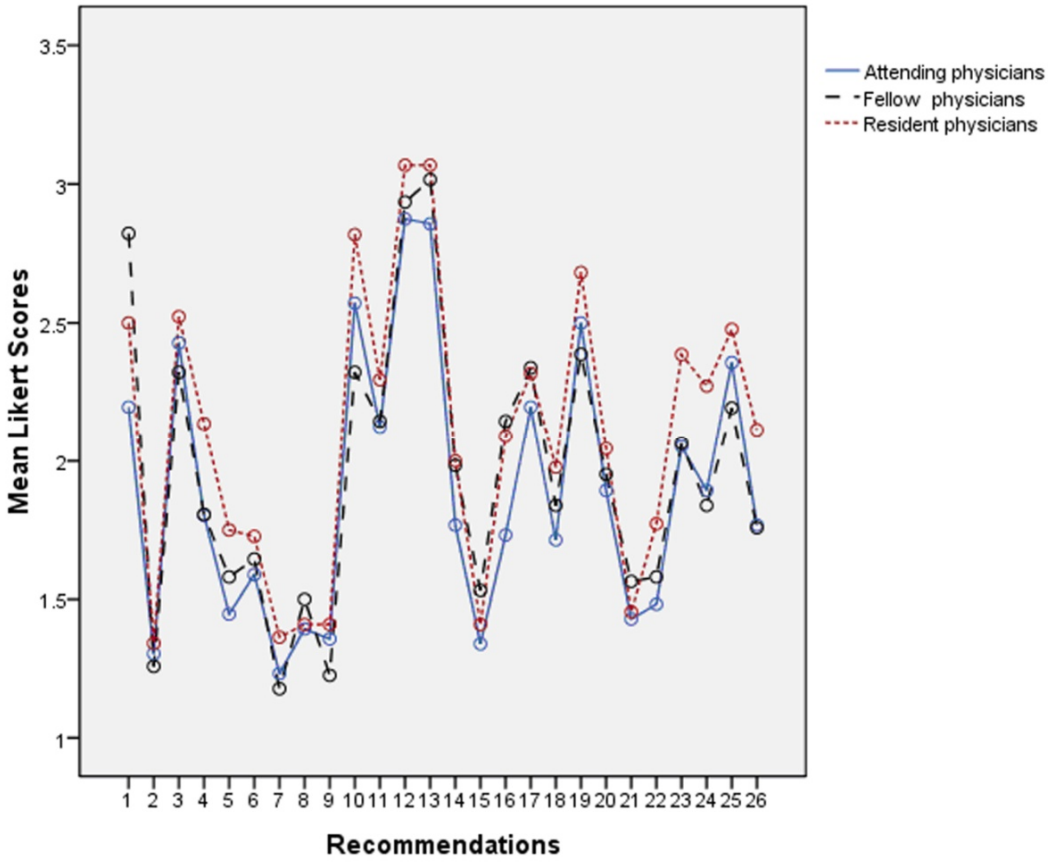

Figure 3. Mean Likert scores for attending, fellow and resident physicians

specific recommendation, profile analysis of data from physicians of different professional seniority received similar conclusions (parallelism test, F (25, 136)=1.53, p=0.064; level test, F (1, 159)=4.79, p=0.010; flatness test, F (25, 137)=43.412, p<0.001) (Figure 3).

DISCUSSION

In this study, we conducted a nationwide survey to explore discordance in the nutrition-related perceptions and practice patterns of Chinese intensive care physicians by using the American guidelines as a surrogate. Overall, attitudes toward these guidelines were positive. The majority of physicians thought nutrition therapy was very important and the use of guidelines would improve clinical outcomes. There was discordance between the utility and the familiarity of the American guidelines, 80.2% of the respondents stated they used the guidelines, but the proportion of "very familiar" was 19.1%, this disparity may be explained by the fact that systemic learning has been organized in only a few ICUs although the American guidelines and other guidelines such as the European guidelines were also widely used among Chinese intensive care physicians.

Some guidelines were often contradictory with practice at individual institutions.[22] First, the American guidelines depreciated the value of traditional nutrition assessment tools (albumin, prealbumin, and anthropometry) in critical care. Overall, only 56.8% of the respondents agreed with the recommendation. For critically ill patients, traditional nutrition assessment tools are of little utility once the patient's nutritional status has been altered by the acute process and its treatment.[23] Second, the guidelines indicated late initiation of supplemental parenteral nutrition (PN). In our study, 41.4% of the respondents agreed with recommendations. The recommended time to start supplemental PN by the American guidelines is greatly different from the European guidelines. There seems to be no consistent answer based on the available literature.[22] However, a recent large study provided valuable data to support later initiation of supplemental PN.[4,24] Third, the American guidelines recommended a higher cutoff value for gastric residual volume (GRV) of 500 mL. Forty-two of the respondents had negative opinions of this recommendation, indicating that their acceptable cutoff was lower than 500 mL. GRV is regarded as an important indicator of monitoring the gastrointestinal intolerance in patients with enteral nutrition (EN), since elevated GRV represents the most common reason for interrupting EN and not reaching target enteral feeding rates.[5] However, recent data demonstrated GRV was not correlated well with the measurements of gastrointestinal intolerance or the incidence of ventilator-associated pneumonia.[25] Nevertheless, physicians who disagreed with guidelines might have a high level of knowledge and be familiar with the evidence, and thus may disagree with the recommendations in the guidelines. Moreover, it is well-recognized that guidelines were based on the best available evidence at the time they were published. Hence, few of them were perfect on the time of publication of this paper. Nevertheless, with the newer evidence, some recommendations

would be updated.

Members of CSPEN would be more likely to receive training materials from CSPEN and had more opportunity to participate in conferences about nutrition therapy with peers from other countries. Our survey consistently demonstrated that members were more likely to choose a greater strength of recommendation, and found significant differences between members and non-members, indicating members tended to follow more evidence-based practice in nutrition therapy. It was also probable that the more skilled physicians in the nutrition therapy would be more prone to answer to the questions. Unexpectedly, junior physicians had a similar familiarity and awareness with guidelines compared with their senior counterparts. It is possible that residents in training may be taught about evidence-based practice while older physicians had less information on this new approach. This was consistent with other studies that fellow physicians tended to be more evidence-based than attending or resident physicians.[14]

Evidence-based clinical practice guidelines provide a comprehensive way to assist physicians in making treatment decisions, and have been recognized as a useful method of translating evidence into practice.[26-28] However, evidence-practice gaps are common in clinical practice, with 30% of hospitalized patients receiving care inconsistent with current best evidence.[2] Theoretically, physicians' attitudes and beliefs toward the guidelines was a mirror of their actual clinical practice. Nevertheless, we found that physician's actual clinical practice patterns did not seem to be influenced by the grade of specific nutrition recommendation, and this was consistent with previous studies that self-reported practice might not represent the actual practice.[29] Studies have also shown that despite inadequate knowledge, professionals feel confident to make decisions regarding nutrition therapy.[15,30] In addition, the level of nutrition recommendations were generally on the low side of the American guidelines. Future studies involving randomized controlled trials research is likely to, increase the evidence base for scientific nutrition therapy.

The lack of a national accredited critical care training programs and the shortage of dietitians are believed to be major obstacles for improving education for nutrition therapy in China.[17] In contrast to other international surveys,[11-15] we found that nutrition-related training for Chinese intensive care physicians was incomplete and the degree of knowledge on nutrition for the critically ill patients was insufficient.

Our study had several limitations. First, we could not avoid the selection bias because it was based on an e-mail combined postal questionnaire and distributed in each respondent's department, and the survey did not involve all potential respondents. Second, our survey did not including other intensive care staff such as dieticians, nurses, and clinical pharmacists; the awareness among these staff about nutrition therapy is also of paramount importance for the overall management of patients in ICU. The third limitation is the excerpt of provisions from the American guidelines was completed in our ICU only, and we believe that a selection bias is probable. In addition, we cannot be certain the reported attitudes of the respondents were a true reflection of their daily nutrition practice.

In summary, the study demonstrated that attitudes among Chinese intensive care physicians toward the American guidelines were positive, and that the majority used guidelines in clinical practice. However, evidence-practice gaps were common in clinical nutrition practice. The degree of knowledge on nutrition for the critically ill is insufficient, and thus nutrition-focused training is warranted.

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AUTHOR DISCLOSURES

The authors declared no conflict of interest.

REFERENCES

1. Alberda C, Gramlich L, Jones N, Jeejeebhoy K, Day AG, Dhaliwal R, Heyland DK. The relationship between nutritional intake and clinical outcomes in critically ill patients: results of an international multicenter observational study. Intensive Care Med. 2009;35:1728-37. doi: 10.1007/s00134-009-1567-4.
2. Doig GS, Simpson F, Finfer S, Delaney A, Davies AR, Mitchell I, Dobb G, Nutrition Guidelines Investigators of the ANZICS Clinical Trials Group. Effect of evidence-based feeding guidelines on mortality of critically ill adults: a cluster randomized controlled trial. JAMA. 2008;300:2731-41. doi: 10.1001/jama.2008.826.
3. Cahill NE, Dhaliwal R, Day AG, Jiang X, Heyland DK. Nutrition therapy in the critical care setting: what is "best achievable" practice? An international multicenter observational study. Crit Care Med. 2010;38:395-401. doi: 10.1097/CCM.0b013e3181c0263d.
4. Casaer MP, Mesotten D, Hermans G, Wouters PJ, Schetz M, Meyfroidt G et al. Early versus late parenteral nutrition in critically ill adults. N Engl J Med. 2011;365:506-17. doi: 10.1056/NEJMoa1102662.
5. Barr J, Hecht M, Flavin KE, Khorana A, Gould MK. Outcomes in critically ill patients before and after the implementation of an evidence-based nutritional management protocol. Chest. 2004;125:1446-57. doi: 10.1378/chest.125.4.1446.
6. National Heart, Lung, and Blood Institute Acute Respiratory Distress Syndrome (ARDS) Clinical Trials Network, Rice TW, Wheeler AP. Initial trophic vs. full enteral feeding in patients with acute lung injury: the EDEN randomized trial. JAMA. 2012;307:795-803. doi: 10.1001/jama.2012.137.
7. McClave SA, Martindale RG, Vanek VW, McCarthy M, Roberts P, Taylor B 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. 2009;33:277-316. doi: 10.1177/0148607109335234.
8. Kreymann KG, Berger MM, Deutz NE, Hiesmayr M, Jolliet P, Kazandjiev G et al. ESPEN Guidelines on Enteral Nutrition: Intensive care. Clin Nutr. 2006;25:210-23. doi: 10.1016/j.clnu.2006.01.021.

9. Singer P, Berger MM, Van den Berghe G, Biolo G, Calder P, Forbes A et al. ESPEN Guidelines on Parenteral Nutrition: Intensive care. Clin Nutr. 2009;28:387-400. doi: 10.1016/j.clnu.2009.04.024.
10. Heyland DK, Dhaliwal R, Drover JW, Gramlich L, Dodek P. Canadian clinical practice guidelines for nutrition support in mechanically ventilated, critically ill adult patients. JPEN J Parenter Enteral Nutr. 2003;27:355-73. doi: 10.1177/0148607103027005355.
11. Lane C, Wedlake LJ, Dougherty L, Shaw C. Attitudes towards and knowledge of nutrition support amongst health care professionals on London intensive care units. J Hum Nutr Diet. 2014;27(s2):339-51. doi: 10.1111/jhn.12152.
12. Vaquerizo AC, Mesejo A, Acosta EJ, Ruiz SS; grupo de trabajo PARENTTE. Management of parenteral nutrition in intensive care units in Spain. Nutr Hosp. 2013;28:1498-507. doi: 10.3305/nh.2013.28.5.6815.
13. Cahill NE, Narasimhan S, Dhaliwal R, Heyland DK. Attitudes and beliefs related to the Canadian critical care nutrition practice guidelines: an international survey of critical care physicians and dietitians. JPEN J Parenter Enteral Nutr. 2010;34:685-96. doi: 10.1177/0148607110361908.
14. Behara AS, Peterson SJ, Chen Y, Butsch J, Lateef O, Komanduri S. Nutrition support in the critically ill: a physician survey. JPEN J Parenter Enteral Nutr. 2008;32:113-9. doi: 10.1177/0148607108314763.
15. Vetter ML, Herring SJ, Sood M, Shah NR, Kalet AL. What do resident physicians know about nutrition? An evaluation of attitudes, self-perceived proficiency and knowledge. J Am Coll Nutr. 2008;27:287-98. doi: 10.1080/07315724.
16. Zhou H, Du B, Chai WZ, Zhou JX, Zhuang HZ, Ding L et al. An investigation on current practice of nutrition support for critically ill in Chinese ICU. Parenter Enteral Nutr. 2009; 16:259-63. (In Chinese).
17. Du B, Xi X, Chen D, Peng J. China Critical Care Clinical Trial Group. Clinical review: critical care medicine in mainland China. Crit Care. 2010;14:206. doi: 10.1186/cc8222.
18. Classification of Chinese Hospitals. [cited 2014/03/30]; Available at: http://en.wikipedia.org/wiki/Classification_ of_ Chinese_Hospitals.
19. Tabachnick BG, Fidell LS. Using multivariate statistics. 5th ed. Boston, MA: Pearson Education, Inc; 2007.
20. Ohlson M, Srivastava MS. Profile analysis for a growth curve model. J Jpn Statist Soc. 2010;40:1-21. doi: 10.14490/jjss.40.001.
21. Liu W, Lin HS. Application of SPSS in profile analysis. Mod Prev Med. 2008;35:4566-7. (In Chinese).
22. McClave SA, Hurt RT. Clinical guidelines and nutrition therapy: better understanding and greater application to patient care. Crit Care Clin. 2010;26:451-66. doi: 10.1016/j.ccc.2010.04.008.
23. Ruiz-Santana S, Arboleda Sánchez JA, Abilés J. Metabolism and Nutrition Working Group of the Spanish Society of Intensive Care Medicine and Coronary units. Guidelines for specialized nutritional and metabolic support in the critically-ill patient: update. Consensus SEMICYUC-SENPE: nutritional assessment. Nutr Hosp. 2011;26(Suppl 2):12-5. doi: 10.1590/S0212-16112011000800003.
24. Vanderheyden S, Casaer MP, Kesteloot K, Simoens S, De Rijdt T, Peers G et al. Early versus late parenteral nutrition in ICU patients: cost analysis of the EPaNIC trial. Crit Care. 2012;16:R96. doi:10.1186/cc11361.
25. Reignier J, Mercier E, Le Gouge A, Boulain T, Desachy A, Bellec F et al. Effect of not monitoring residual gastric volume on risk of ventilator-associated pneumonia in adults receiving mechanical ventilation and early enteral feeding: a randomized controlled trial. JAMA. 2013;309:249-56. doi: 10.1001/jama.2012.196377.
26. Cahill NE, Heyland DK. Bridging the guideline-practice gap in critical care nutrition: a review of guideline implementation studies. JPEN J Parenter Enteral Nutr. 2010;34:653-9. doi: 10.1177/0148607110361907.
27. Cahill NE, Suurdt J, Ouellette-Kuntz H, Heyland DK. Understanding adherence to guidelines in the intensive care unit: development of a comprehensive framework. JPEN J Parenter Enteral Nutr. 2010;34:616-24. doi: 10.1177/0148607110361904.
28. Yang WW, Chiang IJ. EBCPG: A visualized evidence-based clinical practice guideline system. Stud Health Technol Inform. 2006;122:465-70.
29. Ma X, He Z, Wang Y, Jiang L, Xu Y, Qian C et al. Knowledge and attitudes of healthcare workers in Chinese intensive care units regarding 2009 H1N1 influenza pandemic. BMC Infect Dis. 2011;11:24. doi: 10.1186/1471-2334-11-24.
30. Awad S, Herrod PJ, Forbes E, Lobo DN. Knowledge and attitudes of surgical trainees towards nutrition support: food for thought. Clin Nutr. 2010;29:243-8. doi: 10.1016/j.clnu.2009.08.016.

APPENDIX 1. Questionnaire

Attitudes toward the American nutrition guidelines for the critically ill patients of Chinese intensive care physicians.

The purpose of this survey is to gain an understanding of the current attitudes and beliefs pertaining to the American nutrition guidelines of Chinese intensive care physicians.

Part 1: Personal characteristics and clinical practice guidelines

This section asks for a few personal and hospital details, and your general attitudes towards guidelines and nutrition therapy. Please fill in the checkers or blanks that best correspond to you.

1. As an intensive care physicians, what type of Intensive Care Units (ICUs) do you work in?
   □ Medical ICU
   □ Surgical ICU
   □ Mixed ICU
   □ Other, please specify _____
2. What is your professional seniority in ICU?
   □ Attending physician
   □ Fellow physician
   □ Resident physician
3. Are you a member of Chinese Society for Parenteral and Enteral Nutrition (CSPEN)?
   □ Yes
   □ No
4. What is your hospital level?
   □ Tertiary hospitals (level A)
   □ Tertiary hospitals (level B)
   □ Secondary hospitals or lower
5. When you think of critically ill adult patients, how important do you believe nutrition therapy is?
   □ Very important
   □ Somewhat important
   □ Neither important or unimportant
   □ Somewhat unimportant
6. Does your ICU currently utilize guidelines for nutrition therapy?
   □ Yes
   □ No
   □ Don't Know
7. If yes in question 6, which do you use? (You can select multiple choices)
   □ 2009 American guidelines
   □ 2006 European guidelines
   □ 2009 Canadian guidelines
   □ 2006 Chinese guidelines
   □ Other, please specify_____
8. How familiar would you say you are with the American guidelines?
   □ Very familiar
   □ Somewhat familiar
   □ Not very familiar
   □ Not at all familiar
9. Do you think the American guidelines represent best practice for nutrition therapy in the critical care?
   □ Yes
   □ No
   □ Don't Know
10. In your opinion, if the recommendations of the American guidelines are followed in your ICU, will patient outcomes improve?
    □ Yes
    □ No
    □ Don't Know

Part 2: Attitude toward the American nutrition guidelines

This section relates to your attitudes towards specific recommendations of the American guidelines. Please read each statement and fill in the checker that best represents your attitudes.

APPENDIX 1. Survey about attitude toward the American guidelines

NO.	Recommendations	Strong agreement	Agreement	Don't know	Disagreement	Strong disagreement
1	Traditional nutrition assessment tools (albumin, prealbumin, and anthropometry) are not validated in critical care.	□	□	□	□	□
2	Enteral nutrition (EN) is the preferred route of feeding over parenteral nutrition (PN).	□	□	□	□	□
3	Neither the presence nor absence of bowel sounds nor evidence of passage of flatus and stool is required for the initiation of EN.	□	□	□	□	□
4	EN should be started early within the first 24-48 hours following admission.	□	□	□	□	□
5	Use of EN protocols increases the overall percentage of goal calories provided and should be implemented.	□	□	□	□	□
6	Efforts to provide > 50%-65 % of goal calories should be made in order to achieve the clinical benefit of EN over the first week of hospitalization.	□	□	□	□	□
7	Elevating the head of the bed to 30-45 degrees could reduce the risk of aspiration in patients receiving enteral nutrition.	□	□	□	□	□
8	EN should be given continuously for those patients who at high risk for aspiration or shown to be intolerance to gastric feeding.	□	□	□	□	□
9	Small bowel feedings should be used for those patients who at high risk for aspiration or shown to be intolerance to gastric feeding or repeatedly demonstrate high gastric residual volumes (GRV).	□	□	□	□	□
10	Holding EN for gastric residual volumes <500 mL in the absence of other signs of intolerance should be avoided.	□	□	□	□	□
11	In the setting of hemodynamic compromise, EN should be withheld until the patient is fully resuscitated and/or stable.	□	□	□	□	□
12	No nutrition support therapy should be provided if early EN is not feasible or available the first 7 days following admission.	□	□	□	□	□
13	Supplemental PN should be considered if unable to meet energy requirements after 7-10 days by the enteral route alone.	□	□	□	□	□
14	In all ICU patients receiving PN, mild permissive underfeeding should be considered at least initially.	□	□	□	□	□
15	In patients stabilized on PN, periodically repeated efforts should be made to initiate EN.	□	□	□	□	□
16	PN should not be terminated until ≥60% of target energy requirements are being delivered by the enteral route.	□	□	□	□	□
17	Immune-modulating enteral formulations should be used for the appropriate patient population, with caution in patients with severe sepsis.	□	□	□	□	□
18	Patients with Acute Respiratory Distress Syndrome (ARDS) and Acute Lung Injury (ALI) should be placed on an enteral formulation characterized by an anti-inflammatory lipid profile (ie, ω-3 fish oils, borage oil) and antioxidants.	□	□	□	□	□
19	Administration of probiotic agents has been shown to improve outcome in specific critically ill patient populations involving transplantation, major abdominal surgery, and severe trauma.	□	□	□	□	□
20	Soluble fiber may be beneficial for the fully resuscitated, hemodynamically stable critically ill patient receiving EN who develops diarrhea.	□	□	□	□	□
21	In patients prescribed parenteral nutrition, supplementation with parenteral glutamine should be used.	□	□	□	□	□
22	Serum phosphate levels should be monitored closely and replaced appropriately when needed.	□	□	□	□	□
23	A range of serum glucose between 110-150 mg/dL may be most appropriate.	□	□	□	□	□

APPENDIX 1. Survey about attitude toward the American guidelines (cont.)

NO.	Recommendations	Strong agreement	Agreement	Don't know	Disagreement	Strong disagreement
24	Patients receiving hemodialysis or Continuous Renal Replacement Therapy (CRRT) should receive increased protein, up to a maximum of 2.5 g/kg·d.	□	□	□	□	□
25	Nutrition regimens should avoid restricting protein in patients with liver failure.	□	□	□	□	□
26	Patients with severe acute pancreatitis should have a nasoenteric tube placed and EN initiated as soon as fluid volume resuscitation is complete.	□	□	□	□	□

APPENDIX 2. Attitudes toward nutrition practices of the American guidelines

NO.	Response options	Response percentage									
		Overall	Members of CSPEN		*p* value	Professional rank			*p* value	Hospital level		*p* value
			Yes	No		Attending	Fellow	Resident		1st-class Third-level hospitals	Other hospitals	
1	I	20.4	32.6	16.0		25.0	16.1	20.5		22.1	16.3	
	II	36.4	39.5	35.3		46.4	29.0	34.1		39.8	28.6	
	III	14.8	9.30	16.8		12.5	12.9	20.5		13.3	18.4	
	IV	27.8	18.6	31.1		16.1	40.3	25.0		23.9	36.7	
	V	0.62	0.00	0.84	0.093	0.00	1.61	0.00	0.091	0.88	0.00	0.296
2	I	74.1	76.7	73.1		75.0	74.2	72.7		75.2	71.4	
	II	22.2	18.6	23.5		19.6	25.8	20.5		21.2	24.5	
	III	3.70	4.65	3.36	0.679	5.36	0.00	6.82	0.292	3.54	4.08	0.845
3	I	26.5	37.2	22.7		28.6	22.6	29.6		26.6	26.5	
	II	30.9	34.9	29.4		26.8	43.6	18.2		33.6	24.5	
	III	18.5	9.30	21.9		19.6	12.9	25.0		16.8	22.5	
	IV	22.8	16.3	25.2		23.2	21.0	25.0		22.1	24.5	
	V	1.23	2.33	0.84	0.117	1.79	0.00	2.27	0.205	0.88	2.04	0.659
4	I	28.4	37.2	25.2		28.6	32.3	22.7		29.2	26.5	
	II	59.9	60.5	59.7		66.1	59.7	52.3		58.4	63.3	
	III	5.56	0.00	7.56		1.79	3.23	13.6		6.19	4.08	
	IV	6.17	2.33	7.56	0.105	3.57	4.84	11.4	0.119	6.19	6.12	0.944
5	I	47.5	60.5	42.9		62.5	45.2	31.8		47.8	46.9	
	II	48.2	39.5	51.3		32.1	53.2	61.4		49.6	44.9	
	III	3.09	0.00	4.20		3.57	0.00	6.82		2.65	4.08	
	IV	1.23	0.00	1.68	0.179	1.79	1.61	0.00	0.005	0.00	4.08	0.196
6	I	47.5	58.1	43.7		46.4	48.4	47.7		53.1	34.7	
	II	41.4	34.9	43.7		48.2	40.3	34.1		36.3	53.1	
	III	9.88	4.65	11.8		5.36	9.68	15.9		8.85	12.2	
	IV	1.23	2.33	0.84	0.210	0.00	1.61	2.27	0.475	1.77	0.00	0.109
7	I	77.2	86.1	74.0		78.6	83.9	65.9		78.8	73.5	
	II	21.0	14.0	23.5		19.6	14.5	31.8		19.5	24.5	
	III	1.85	0.00	2.52	0.296	1.79	1.61	2.27	0.213	1.77	2.04	0.790
8	I	61.7	69.8	58.8		62.5	61.3	61.4		62.0	61.2	
	II	35.2	30.2	37.0		35.7	33.9	36.4		34.5	36.7	
	III	1.85	0.00	2.52		1.79	1.61	2.27		1.77	2.04	
	V	1.23	0.00	1.68	0.537	0.00	3.23	0.00	0.933	1.77	0.00	0.969
9	I	70.4	81.4	66.4		64.3	77.4	68.2		71.7	67.4	
	II	27.8	16.3	32.0		35.7	22.6	25.0		26.6	30.6	
	III	1.23	2.33	0.84		0.00	0.00	4.55		1.77	0.00	
	IV	0.62	0.00	0.84	0.111	0.00	0.00	2.27	0.096	0.00	2.04	0.438
10	I	14.8	20.9	12.6		12.5	24.2	4.55		16.8	10.2	
	II	43.8	48.8	42.0		46.4	40.3	45.5		38.9	55.1	
	III	15.4	2.33	20.2		14.3	16.1	15.9		16.8	12.2	
	IV	24.1	27.9	22.7		25.0	17.7	31.8		24.8	22.5	
	V	1.85	0.00	2.52	0.031	1.79	1.61	2.27	0.228	2.65	0.00	0.367
11	I	26.5	46.5	19.3		26.8	24.2	29.6		30.1	18.4	
	II	46.9	51.2	45.4		50.0	50.0	38.6		44.3	53.1	
	III	9.88	0.00	13.5		7.14	12.9	9.09		11.5	6.12	

Note: To simplify the length, we adopted Roman numerals to represent the grade of the response options: I="strong agreement", II="agreement", III="don't know", IV="disagreement", V= "strong disagreement". We omitted the blanks in which the overall response percentage was 0.00.

APPENDIX 2. Attitudes toward nutrition practices of the American guidelines (cont.)

NO.	Response options	Response percentage										
		Overall	Members of CSPEN		*p* value	Professional rank			*p* value	Hospital level		*p* value
			Yes	No		Attending	Fellow	Resident		1st-class Third-level hospitals	Other hospitals	
11	IV	15.4	2.33	20.2		16.1	12.9	18.2		14.2	18.4	
	V	1.23	0.00	1.68	<0.001	0.00	0.00	4.55	0.618	0.00	4.08	0.095
12	I	15.4	27.9	10.9		17.9	14.5	13.6		15.0	16.3	
	II	25.9	30.2	24.4		23.2	29.0	25.0		24.8	28.6	
	III	14.2	4.65	17.7		17.9	9.68	15.9		11.5	20.4	
	IV	37.0	32.6	38.7		35.7	41.9	31.8		42.5	24.5	
	V	7.41	4.65	8.40	0.019	5.36	4.84	13.6	0.671	6.19	10.2	0.184
13	I	11.1	23.3	6.72		14.3	9.68	9.09		9.73	14.3	
	II	27.2	34.9	24.4		25.0	30.7	25.0		27.4	26.5	
	III	24.1	9.30	29.4		26.8	19.4	27.3		23.9	24.5	
	IV	28.4	25.6	29.4		28.6	29.0	27.3		31.0	22.5	
	V	9.26	6.98	10.1	<0.001	5.36	11.3	11.4	0.893	7.96	12.4	0.680
14	I	41.4	67.4	31.9		48.2	41.9	31.8		41.6	40.8	
	II	34.6	25.6	37.8		33.9	29.0	43.2		40.7	20.4	
	III	16.1	6.98	19.3		10.7	17.7	20.5		12.4	24.5	
	IV	7.41	0.00	10.1		7.14	11.3	2.27		5.31	12.2	
	V	0.62	0.00	0.84	<0.001	0.00	0.00	2.27	0.242	0.00	2.04	0.013
15	I	63.0	67.4	61.3		66.1	59.7	63.6		66.4	55.1	
	II	33.3	30.2	34.5		33.9	33.9	31.8		28.3	44.9	
	III	1.23	0.00	1.68		0.00	0.00	4.55		1.77	0.00	
	IV	2.47	2.33	2.52	0.957	0.00	6.45	0.00	0.126	3.54	0.00	0.126
16	I	32.7	41.9	29.4		42.9	27.4	27.3		33.6	30.6	
	II	45.7	41.9	47.1		46.4	45.2	45.5		48.7	38.8	
	III	11.7	9.30	12.6		5.36	12.9	18.2		12.4	10.2	
	IV	9.88	6.98	10.9	0.512	5.36	14.5	9.09	0.191	5.31	20.4	0.044
17	I	14.2	25.6	10.1		16.1	11.3	15.9		15.9	10.2	
	II	55.6	55.8	55.5		60.7	59.7	43.2		60.2	44.9	
	III	17.9	11.6	20.2		10.7	12.9	34.1		16.8	20.4	
	IV	12.4	6.98	14.3	0.062	12.5	16.13	6.82	0.061	7.08	24.5	0.016
18	I	35.2	46.5	31.1		44.6	35.5	22.7		41.6	20.4	
	II	46.3	51.2	44.5		39.3	45.2	56.8		43.4	53.1	
	III	18.5	2.33	24.4	<0.001	16.1	19.4	20.5	0.251	15.0	26.5	0.022
19	I	13.0	30.2	6.72		14.3	14.5	9.09		14.2	10.2	
	II	43.2	37.2	45.4		44.6	46.8	36.4		41.6	46.9	
	III	25.9	16.3	29.4		21.4	25.8	31.8		25.7	26.5	
	IV	16.1	16.3	16.0		16.1	11.3	22.7		17.7	12.2	
	V	1.85	0.00	2.52	<0.001	3.57	1.61	0.00	0.660	0.88	4.08	0.538
20	I	24.7	34.9	21.0		28.6	27.4	15.9		27.4	18.4	
	II	54.9	55.8	54.6		53.6	50.0	63.6		54.9	55.1	
	III	20.4	9.30	24.4	0.031	17.9	22.6	20.5	0.532	17.7	26.5	0.302
21	I	56.2	60.5	54.6		64.3	46.8	59.1		58.4	51.0	
	II	38.9	37.2	39.5		28.6	50.0	36.4		38.1	40.8	
	III	4.94	2.33	5.88	0.673	7.14	3.23	4.55	0.175	3.54	8.16	0.347
22	I	45.1	48.8	43.7		55.4	45.2	31.8		44.3	46.9	
	II	50.0	48.8	50.4		41.1	51.6	59.1		50.4	49.0	
	III	4.94	2.33	5.88	0.772	3.57	3.23	9.09	0.145	5.31	4.08	0.958
23	I	22.2	30.2	19.3		28.6	22.6	13.6		29.2	6.12	
	II	50.6	55.8	48.7		48.2	53.2	50.0		42.5	69.4	
	III	17.3	11.6	19.3		12.5	19.4	20.5		16.8	18.4	
	IV	9.88	2.33	12.6	0.086	10.7	4.84	15.9	0.306	11.5	6.12	0.001
24	I	24.1	23.3	24.4		26.8	29.0	13.6		27.4	16.3	
	II	57.4	60.5	56.3		58.9	59.7	52.3		54.9	63.3	
	III	15.4	16.3	15.1		12.5	9.68	27.3		16.8	12.2	
	IV	3.09	0.00	4.20	0.728	1.79	1.61	6.82	0.082	0.88	8.16	0.043
25	I	17.9	18.6	17.7		19.6	21.0	11.4		19.5	14.3	
	II	44.4	48.8	42.7		37.5	48.4	47.7		44.3	44.9	
	III	24.7	14.0	28.6		30.4	21.0	22.7		20.4	34.7	
	IV	13.0	18.6	10.9	0.228	12.5	9.68	18.2	0.549	15.9	6.12	0.125

Note: To simplify the length, we adopted Roman numerals to represent the grade of the response options: I="strong agreement", II="agreement", III="don't know", IV="disagreement", V= "strong disagreement", we omitted the blanks in which the overall response percentage was 0.00.

APPENDIX 2. Attitudes toward nutrition practices of the American guidelines (cont.)

NO.	Response options	Response percentage										
		Overall	Members of CSPEN		*p* value	Professional rank			*p* value	Hospital level		*p* value
			Yes	No		Attending	Fellow	Resident		1st-class Third-level hospitals	Other hospitals	
26	I	42.0	53.5	37.8		44.6	40.3	40.9		44.3	36.7	
	II	35.2	25.6	38.7		37.5	46.8	15.9		35.4	34.7	
	III	17.9	14.0	19.3		14.3	9.68	34.1		14.2	26.5	
	IV	4.94	6.98	4.20	0.210	3.57	3.23	9.09	0.004	6.19	2.04	0.241

Note: To simplify the length, we adopted Roman numerals to represent the grade of the response options: I="strong agreement", II="agreement", III="don't know", IV="disagreement", V= "strong disagreement", we omitted the blanks in which the overall response percentage was 0.00.

Original Article

Attitudes toward the American nutrition guidelines for the critically ill patients of Chinese intensive care physicians

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中国 ICU 医生对美国重症患者营养指南的认同度调查

营养治疗对重症患者是必不可少的。为规范和优化营养治疗，近年来有不少机构出版了营养治疗指南。然而，目前在营养治疗实践中仍存在着不少争议，重症患者的营养治疗实践与营养指南之间存在着差距。查阅文献资料发现，目前中国 ICU 医生临床营养治疗实际情况的数据十分有限。鉴于美国营养指南被中国 ICU 医生广泛采用，本文旨在借助于美国营养指南来评价中国 ICU 医生营养治疗的理念。我们依据美国营养指南设计了一份调查问卷，并将此问卷通过信件或邮件的方式发送至中国 45 家医院的 ICU 进行调查。共有来自此 45 家医院 ICU 的 162 位医生进行了有效回复。我们分别依据医生的职称、所在医院等级以及医生是否为中华医学会肠内肠外营养学分会（CSPEN）会员这三方面对该 162 位医生进行分类。总的来说，94%的被调查医生肯定了营养治疗对重症患者的重要性，80%的医生表示正在使用美国营养指南。调查发现，对于营养状况评估、补充的肠外营养以及胃残余量截断值的界定这三个方面，被调查医生之间存在较大争议，对指南意见持否定或中立态度的比例分别为 43%、59% 和 41%。与非 CSPEN 会员相比，CSPEN 会员对指南意见有更积极的认同度。我们的研究表明，中国 ICU 医生对美国营养指南总体的看法是支持和赞同的，然而，鉴于指南与实践之间的较大差距，对于中国的大多数 ICU 医生而言，有必要进行针对营养治疗的系统培训。

关键词：营养治疗、临床实践指南、重症监护室、调查、中国