Jundishapur Journal of Chronic Disease Care
Volume 9 · Issue 3 · e96493

OPEN PEER REVIEW

The Effect of Using Nutritional Guideline by Nurses on the Incidence and Severity of Malnutrition in Patients Admitted to the Intensive Care Units: A Randomized Control Trial

Mehdi Niksefat, Abdolale Shariati, Shahram Molavynejad, Seyed Hossein Jazayeri, Farhad Soltani, Mohammad Hosein Haghighizadeh

SUBMITTED	REVISED	ACCEPTED	DOI
2 Oct 2019	6 Apr 2020	6 Apr 2020	10.5812/jjcdc.96493

About this report

This open peer review (OPR) report shows the public comments made on this article during peer review, by the reviewers, the associate editor and the editor-in-chief, for every revision round, together with the authors' replies. Comments appear only with the consent of the people who wrote them. Reviewers who chose to sign their report are named; the others are shown as "Referee". Comments are edited for language only, and confidential remarks to the editors are not included.

More about open peer review: brieflands.com/knowledgebase/opr

Contents

1 **Original submission** Referee 1, Associate Editor, Editor-in-Chief 2
2 **Revision 1** Referee 1, Associate Editor, Editor-in-Chief 3
Authors' reply to reviewers 4
Reviewer and editor comments 15
3 **Revision 2** Editor-in-Chief 16
Authors' reply to reviewers 17
Reviewer and editor comments 30

1 Original submission

3 comments · 27 Oct 2019 – 25 Nov 2019

Referee 1 Reviewer

MAJOR REVISION 27 Oct 2019

Dear AE,
Thank you for sending your paper to me for review. the title of manuscript is: The effect of using nutritional guideline by nurses on incidence and severity of Malnutrition in patients admitted in the ICU. This manuscript is interesting. I think authors revise some comments before publication.
- Please check your Keywords with Mesh data base. It seems that the key words need some revisions
- Finding of abstract is need check again because some numbers mistake is seen.
- Please explain more about the novelty of your article in introduction.
- What was your sampling strategy; it is a critical point for external validity in your study.
- The reliability and validity of the measurement tools were unknown.
- What strategy did you use for verification bias how did you control some bias in your interventions specifically demographic and hospital variables.
- Please write ethical consideration in the method section. please see perilous published articles.
- Please write mean and deviation of variables in the table 1.
- There are some spelling and grammatical errors in the text. Please correct them.
- Please mention the limitation and strong points of your study.
with regards.

Associate Editor

MAJOR REVISION 25 Nov 2019

Dear EIC,
Thanks for this submission. The authors should revise the manuscript based on our reviewers comments and resubmit.
Thanks

Editor-in-Chief

MAJOR REVISION 25 Nov 2019

Dear Author,
Thank you for your submission. Please revise your manuscript based on our reviewers' comments and resubmit.
Thanks

2

Revision 1

AUTHORS' RESPONSE TO REVIEWERS

Authors' reply to reviewers

The next pages contain the authors' point-by-point reply to the comments of this revision round, as submitted with the revised manuscript. It is published as the authors wrote it.

The effect of using nutritional guideline by nurses on incidence and severity of Malnutrition in patients admitted in the ICU

Review:

Introduction: Malnutrition is still one of the most important and common problems in hospitals and increases the incidence, side effects and mortality in hospitalized patients. In this case, ICU patients are more at risk due to critical conditions. The aim of this study was to determine the effect of nurses' nutritional guidelines on the severity of malnutrition in ICU patients.

Materials and Methods: This is a one-blind clinical trial that was conducted in 2012 in ICU of Golestan and Imam Khomeini hospitals in Ahwaz on 70 patients hospitalized. Available patients were randomly divided into control and intervention groups. The data collection tool was a checklist of demographic data and Maastricht index for malnutrition assessment. Patients were evaluated based on the Maastricht index at baseline and 10 days after feeding.

Results: There was no significant difference between two groups in terms of demographic variables. Mean and standard deviation of albumin, pre-albumin and lymphocyte parameters before and after intervention were 3.13 ± 0.571, 1.28 ± 0.31, 1638.2 ± 489.59 and after intervention, were 536 3.32 ± 3.88, 1.88 ± 0.36, 2195 ± 40.85, respectively. Also, the amount of malnutrition intensity by the Maastricht formula before and after the intervention was 4.89 ± 2.17, ± 2.10 ± 2.00, which had a significant level of 0.001. Regarding the normal distribution of data, using T-test, two groups showed significant differences (p = 0.001).

Conclusion: Prevalence of malnutrition is high in patients admitted to intensive care units, which is mainly due to inappropriate nutrition of patients in these sectors. Although nurses play a significant role in feeding patients, their knowledge in this field is less than needed. According to the results of this study, the use of EDN by nurses reduced the severity of malnutrition. Therefore, it is necessary to create the necessary field for the scientific advancement of this group of treatment staff, and to educate valid nutrition guides for them to improve the nutritional status and subsequently accelerate the treatment process of the patients.

Key words: Nutrition Policy, nurses, malnutrition,

Introduction:

Malnutrition is a condition of nutrition that is caused by a decrease or increase or imbalance in energy, protein, and other nutrients which leads to measurable adverse effects on body tissue or shape (shape, size, body composition), performance and clinical status (1). In the study of reason, malnutrition is classified into two main categories: primary malnutrition which is caused due to inadequate nutrient intake usually due to economic or cultural poverty, and secondary malnutrition that results from maladaptation, illness, alcoholism, substance abuse, increased excretion and neurological disorders in eating (1). Patients in the ICU are not homogeneous and have been admitted to different illnesses and intensities (2,3). Diseases with critical conditions are typically associated with metabolic stress, in which patients develop systemic inflammatory responses (2). During ICU treatment period, with progression of the disease and decreased appetite or inability to swallow and, in some cases, inappropriate gastrointestinal activity and ultimately inadequate food intake, as well as increased need for food due to body metabolic response to stress, malnutrition can progress (4). As a result body metabolism increases and if adequate calorie and protein are not provided for metabolism timely, increased catabolism leads to a decrease in fat deposits, which leads to a reduction in muscle mass (5-6) and malnutrition of protein and energy, which is a major problem in hypercatabolic patients with high severity disease in the intensive care unit (7-9). Proper nutrition is one of the care standards in ICU, which partly emphasizes the regular and targeted blood glucose monitoring in patients with critical conditions. Studies have shown that maintaining blood glucose in the range of 80-110 mg/dl leads to a 42% reduction of mortality in ICUs(10).

Today, the European Society for Parenteral and Enteral Nutrition institute (ESPEN) is one of the most famous global institutes in collecting nutrition guidelines for different patients with different conditions (11).

The ESPEN is an international community that accelerates the development of clinical guidelines in the field of nutrition(12-14). The accuracy of the published guidelines by ESPEN institute is so widely accepted that most European countries use it as a clinical guideline (15-19). The nutrition guideline for ICU patients has been compiled by the best researchers of this institute (20).

Although proper nutrition intake is an essential part in treatment of malnutrition, few studies have looked at patients' intake in ICUs (5). In Iran, there is no comprehensive data on malnutrition rates in hospitalized patients, but in a survey conducted in hospitalized patients in intensive care units, it was found that there was a significant difference between the calorie intake and the caloric target in the patients admitted in these wards (5). Studies show that the incidence of malnutrition in ICU patients is higher than in other patients (5-6). After identifying the guidelines of ESPEN global institute as one of the most comprehensive guidelines for patients admitted to the ICU, researches conducted this study to determine the effect of using a nutrition guideline by nurses on the incidence and severity of malnutrition in hospitalized patients in ICU.

Materials and methods:

This study is a blind clinical trial. The study population included all diabetic patients at risk of malnutrition in the ICU wards of Golestan and Imam Khomeini hospitals of Ahvaz who have been fed by mouth or through the nasogastric or gastrostomy tubes. Patients available and with inclusion criteria were randomly divided into intervention and control groups. Inclusion criteria include: having chronic diabetes, age of 14 and over, admission to the ICU up to 24 hours after admission to hospital, staying and admission to the ICU for at least 10 days, feeding the patient during 10 days of staying in ICU department and participating in the project through oral feeding or through the nasogastric or gastrostomy tubes, not having hyperparathyroidism, not having Hodgkin's disease, not having renal failure, not having pheochromocytoma, no use of corticosteroids or non-steroidal anti-inflammatory drugs, not having liver disease or severe infection, no injection of protein-containing components, and not having severe dehydration and the CVP of less than 2 water centimeters due to false increase in serum pre-albumin. Exclusion criteria included: having hyperparathyroidism , unwillingness of patients to participate in the study, pregnancy, lactation, smokers, using immunosuppressive drugs, following specific diets, changing the diet or deciding to lose weight, and leaving the ICU department in less than 10 days of admission. The sample size using formula was determined as 35, which, according to the control group, finally, 70 people entered the study whom were randomly divided into two groups of 35 for intervention and control groups. Sample size was calculated based on the results of similar studies with 95% confidence interval and 80% power using the following formula.

$$n_1 = n_2 = \frac{(S_1^2 + S_2^2)(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta})^2}{(\bar{X}_1 - \bar{X}_2)^2}$$

After determining the two groups, the amount of pre-albumin, albumin and total lymphocyte count was checked for each participant using nephelometry method and the results were recorded in the checklist paper, and their BMI was calculated. 2-cc blood sample was taken from the patient's vein and pre-albumin, albumin and serum lymphocyte count were measured immediately.

After collecting initial information from patients, the researcher determined the diet and nutrition requirements of each patient from the test group using the information of nutrition guideline and considering the laboratory test results as well as clinical symptoms, and notified the nurse and the relevant authorities in the kitchen. The researcher checked all patients for new information twice daily.

After 10 days, blood samples were taken from patient and pre-albumin, albumin and serum lymphocyte count, as well as BMI of patients were determined in the same manner and recorded in checklist. These were done for samples of control group too. The data was collected by a questionnaire containing patient's

demographic information, anthropometric measurements, nutrition type and nutrition routes. The data collection tool was a demographic questionnaire including demographic characteristics, anthropometric measurements, type of nutrition and feeding routes, and Maastricht index for malnutrition. In this index, according to albumin, complete count of lymphocyte, pre-albumin, and ideal patient weight a score was given to the patient. The values below zero did not indicate malnutrition, and values of zero or more indicate malnutrition in the patient, in other words the lower the rate of this index is, the patient has a better nutritional status (21).

Maastricht index formula

MI = 20.68- (0.24 × Serum albumin g/L)) - (19.21 × Serum Pre-albumin g/L) - (1.86 × TLC L (10^6 cells/g) - (0.04 Ideal body weight)

To assess the validity and reliability of the Maastricht Index in a study by Naber et al., Aimed at investigating the prevalence of malnutrition in the hospital using the MI, NRI, SGA indices, and correlating the results of each index with the patient's therapeutic return and prevalence of complications and complications. The index was selected to estimate complications in malnutrition patients (22). Another study reported sensitivity of 95% and specificity of 94% for Maastricht index (23).

A meter was used to determine the patients' height, and to determine the patients' weight, a digital or analog balance was used.

Ethical considerations of this study include: Obtaining permission from Jundishapur University of Medical Sciences officials and coordinating with Ahvaz Health Network and covered health centers, obtaining the approval of Ahvaz Jundishapur Medical Ethics Committee The work process was undertaken at the beginning of the written informed consent study, all participants were informed that they had the option to withdraw from the study at any time if they did not wish to do so. Steps to design and perform free patient testing and services All patients were assured that all information received from them would be kept confidential and used solely for research purposes. This study was performed after approval by the Ethics Committee of Ahvaz Jundishapur University of Medical Sciences and registered with Iran Clinical Trial Center under code IRCT20180314039097N1.

For statistical analysis, SPSS software version 23 was used. Data were reported as mean ± SD. The Kolmogorov-Smirnov test was used to assess the normal distribution of data. To compare the results before and after the intervention in each group, the Paired t-test was used and the Independent t-test was used to compare the results between the two groups. P-value less than 0.05 was considered statistically significant.

Discussion and conclusion:

Malnutrition is a growing problem in many hospitalized patients, especially in patients hospitalized in intensive care units (24). Malnutrition is not a new clinical topic, but a problem which is ongoing and is remained unresolved, especially in patients who are admitted to ICUs (25). The presence of malnutrition in patients at the time of admission has been reported with less prevalence in advanced countries (England 20%, Sydney Australia 6%, Canadian elderly 15%) and a higher prevalence in developing countries (more than 40%) (26-29). Comparison of the results shows that although malnutrition can be present at the time of admission to hospital, the prevalence of malnutrition in developing countries is higher than in advanced countries, and despite the developments in medicine, there has been no significant decrease in recent years (30).

Studies have shown that lack of attention to nutritional needs of patients in the ICU leads to increased disease severity, hospitalization time, ventilator dependency and costs. Malnutrition is described as a common problem that is not well recognized by the medical team. In most medical centers in the world, standard solutions are used to feed patients and meet their metabolic needs. Unfortunately, these solutions are still not known to our medical staff and their cost is high for the patient due to lack of insurance coverage, but it should be considered that the cost of providing nutritional services and food supplements is negligible compared with the costs of the disease.

In a study by Bauer, it was stated that on average about 50% of patients take half or less of their meals, and these patients are at a 4-point risk of malnutrition compared to patients who have more than half of their meals (31).

A prospective study of ICUs in England showed that the maximum calorie given to patients was between 75% and 85% of the prescribed order (32), and in another study, out of 49 patients, it was found that in the long run only 11 ICU Patients (23%) had a positive calorie intake, and the rest of the patients had less than their required caloric intake (33). In a study, it was found that calories of solutions used in the ICU are about one-third of the standard values of the ICUs. Based on the calculations, the caloric intake required forthese patients is more than 2000 kilocalories, yet the calorie intake of patients was about 600 Kcal a day (34). These findings have led to the belief that lack of calorie intake is a common problem in intensive care units. Studies show that adequate nutrition has shortened hospitalization time and patients with moderate and severe malnutrition stay for a twice longer duration in hospital and that the death rate of these patients was three times more than those who did not have malnutrition (25). Our results showed that malnutrition levels were homogeneous at the time of admission and after 10 days of hospitalization in the ICU and there was no significant difference, but in general, the prevalence of 53% of malnutrition means that more than half of the ICU patients suffer from malnutrition and this is a warning alarm for treatment teams that need to plan and apply strict nutritional policies from the beginning of the patient's entry to the hospital. A study found that patients with malnutrition had 30% more problems and complications than those who did not have malnutrition

(28). In another study in South America, it was found that the costs of patients with malnutrition could be increased in up to 300% mare than non-malnourished patients (35). On the other hand, malnutrition causes more deaths in high-risk patients, including patients in the ICU and the elderly. For this reason, new researches suggest that proper calorie intake for critically ill patients should be considered as an essential requirement and a base for treatment (32).

In a study by Kruizenega and colleagues (28) on 7606 patients, 12% of patients had severe malnutrition, 13% had moderate malnutrition and 75% had a good nutrition, and there was a significant negative correlation between malnutrition and BMI. This association was also reported in the study by Goiburu et al (31).

Increasing malnutrition rates in hospitalized patients can be due to several reasons: increased energy, protein, and micronutrient needs after surgery and failure to properly meet these needs is one of the most important reasons for the incidence and severity of malnutrition. Failure to meet these needs is also due to factors such as patient's lack of appetite, medication and interactions between medicine and food, emotional and psychological needs of the patient and as a result lack of food intake by the patient, secondary infections and consequently a secondary increase in the patient's need, the lack of attention or awareness of some of the authorities responsible for supplying and distributing food or family members to the patient's actual needs and the proper ways to provide this in the hospital environment.

In general, these factors can be divided into personal and organizational categories (25). Personal factors of malnutrition in patients including age, level of consciousness, type of disease and medical treatments, inability to chew and swallow, movement limitations, sensory disorders and the presence of specific treatments such as surgery, the use of mechanical ventilation or gastric emptying with tube that prevents proper nutrition in patients (25-26). Organizational factors include not evaluating and screening the nutritional status of patients, delaying in start of digestive nutrition, neglecting the proper nutrition of the patient, weakness in recording the patient's intake, lack of adequate nutrition of the patient according to the order, and finally, lack of awareness of the importance of proper nutrition (8).

Studies have shown that nutrition counseling and the implementation of various nutritional supportive strategies by the nutrition team in the hospital, especially the ICUs, lead to a reduction in the incidence of malnutrition. From these strategies the periodic visit of patients by dietitian, nursing staff education and monitoring the hospital's catering system can be mentioned.

A study done by the Department of Nutrition and Diet Therapy at London's Hammersmith Hospital during three cross-sectional studies in 1998, 2000, and 2003 showed that nutritional counseling and dietary strategies in patients would reduce the incidence of malnutrition and improve weight gain (36). Malnutrition continues to be a serious problem in intensive care units and is associated with inappropriate side effects. If the nutritional needs of patients

admitted to ICUs are properly addressed, they may have fewer connections to ventilator and less complications and faster recovery and discharge. Malnutrition, especially in ICU, may be due to delay in the start of nutritional support and the mismatch of nutritional order with patient's weight and recent nutritional history and actual calorie intake. It is also difficult to provide enough nutrients to patients in ICUs due to nutritional suppression as a result of physical examinations, medical interventions and some digestive problems (37). According to the ESPEN Guideline, if the patient admitted to the ICU is unable to have oral nutrition for up to 3 days, enteral nutrition should be started for such an individual (25).

As previously mentioned, one of the nutritional support strategies for patients admitted to ICU is the active presence of nursing staff in nutrition team and providing training for them in this area. The standards that ESPEN has published on Journal of Parenteral and Enteral Nutrition about nutritional support, lists a number of nursing duties in this system, including focusing on protection, promotion and adjustment of nutritional health and ability of prevention from injuries and diseases associated with nutrition, and reducing the patient suffers and pain. Nutrition formulations should be given to the patient carefully and according to a nutritionist's recommendation and according to patient's tolerance. Also, care should be taken in the patient's position while receiving nutritional support and up to 3 hours later by the nurse and the patient's head should be at least 30 degrees lifted. The nurse should ensure that the formulation is healthy and that it does not contaminate the microbial formulation, and that the enteral formulations should not be stored at room temperature for more than 12 hours. The gastric residual volume should be considered by nurse to evaluate nutritional tolerance and drug and food interactions (23).

Conclusion:

In this study, the results showed a significant difference between the level of albumin, pre-albumin, total lymphocytic count and in general the severity of malnutrition based on the Maastricht index before and after the use of guideline by nurses. The prevalence of malnutrition is high in patients admitted to ICU, which is due to poor nutrition in these wards. Although nurses play a significant role in feeding patients, their knowledge in this field is less than needed. Therefore, creating the necessary field for the improvement of this group of the treatment staff in order to improve the nutritional status and subsequently accelerate the process of treatment of patients seems

necessary. In this context, nutritional guidelines help to accelerate and facilitate this subject. Research limitations

Due to the time limitation and due to the half-life of three weeks of serum albumin, it was not possible to detect albumin changes.

The time and location limitations of this study made it impossible to evaluate the incidence of malnutrition in patients.

Ethical approval

Ethical approval of this research by Ahvaz Jundishapur University of Medical Sciences Ethics Committee [1IRCT20180314039097N.] Obtained.

Conflict of interest

No items reported by authors.

Funds

This article is the result of a Master's thesis in Ahvaz Jundishapur University of Medical Sciences.

Refrences:

1-Kruizenega HM, Seidell JC, Devet HC, Wierdsma NJ. Develoment and validation of a hospital screening tool for malnutrition: The short nutritional assessment questionnaire (SNAQ). Clin Nutr. 2005 ; 24(1):75-82.

2. 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 (ASPEN). J Parenteral Enteral Nutr 2009;33(3):277-316.

3. Mahoori AR, H F, Noruzinia H, Abasivash R, Noruzinia Sh , Salmani M. The role of the anesthesiologist resident at reducing ICU mortality Journal of Anesthesiology And intensive care of Iran. 1381: 23:17-22.[in persian]

4. Feldblum I, German L, Castel H, Harman- Boehm R, Bilenko N, Eisinger M, et al. Characteristics of undernourished older medical patient and the identification of predictors for undernutrition status. Nutr J 2007; 6(1): 37.

5. Amiri Farahani L, Heidari T, Narenji F, Asghari Jafarabadi M, Shirazi V. Relationship between Pre Menstrual Syndrome with Body Mass Index among University Students. Hayat 2011;17(4):85-95.[in persian]

6. Waitzberg DL, Caiaffa WT, Correia M. Hospital malnutrition: the Brazilian national survey (IBRANUTRI): a study of 4000 patients. Nutrition 2001;17(7):573-580.

7. Lochs H, Allison S, Meier R, Pirlich M, Kondrup J, Schneider S, et al. Introductory to the ESPEN Guidelines on Enteral Nutrition: Terminology, definitions and general topics. Clin Nutr 2006;25(2):180-186.

8. Commission directive 1999/21/EC of 25 March 1999 on dietary foods for special medical purposes. [cited February 10, 2006]. Available at: URL: http://www.idace.org/legislation/ fsmps/Dir%2099-21%20FSMPs.pdf.

9. Mehdizadeh Torghadar S M, Soltani M, Samargandian S, Zarban A, Ebrahimzadeh S. Comparison of Glucose Levels of the First and Second Fingertip Blood Drops in Edematous Diabetic Patients Hospitalized in Intensive Care Units (Point Of Care Method). Horizon of Medical Sciences. 2018;24(1) :67-72.

10. Lacherade JC, Jacqueminet S, Preiser JC. An overview of hypoglycemia in the critically ill. J Diabetes Sci Technol. 2009;3(6):1242-9

11.Beck AM, Iepsen UW, Tobberup R, Jørgensen KJ. Danish evidence-based clinical guideline for use of nutritional support in pulmonary rehabilitation of undernourished patients with stable COPD. Clinical Nutrition ESPEN2014;10(1):33-41

12-Plauth M, Merli M, Kondrup J, Weimann A, Ferenci P, Muller MJ. ESPEN guidelines for nutrition in liver disease and transplantation. Clin Nutr 1997;16: 43e55.

13- Toigo G, Aparicio M, Attman PO, Cano N, Cianciaruso B, Engel B, et al. Expert Working Group report on nutrition in adult patients with renal insufficiency (part 1 of 2). Clin Nutr 2000;19:197e207.

14- Toigo G, Aparicio M, Attman PO, Cano N, Cianciaruso B, Engel B, et al. Expert Working Group report on nutrition in adult patients with renal insufficiency (part 2 of 2). Clin Nutr 2000;19:281e91.

15- Cano NJM, Aparicio M, Brunori G, Carrero JJ, Cianciaruso B, Fiaccadori E, et al. ESPEN guidelines for adult parenteral nutrition. Clin Nutr 2009;28:359e479.

16- Gustafsson UO, Scott MJ, Schwenke W, Demartines N, Roulin D, Francis N, et al. Guidelines for perioperative care in elective colonic surgery: Enhanced Recovery After Surgery (ERAS) Society recommendations. Clin Nutr 2012;31:783e800.

17- Nygren J, Thacker J, Carli F, Fearon KCH, Norderval S, Lobo DN, et al. Guidelines for perioperative care in elective rectal/pelvic surgery: Enhanced Recovery After Surgery (ERAS) Society recommendations. Clin Nutr 2012;31:801e16.

18- Lassen K, Coolsen MME, Slim K, Carli F, de Aguilar-Nascimento JE, Sch€afer M,

et al. Guidelines for perioperative care for pancreaticoduodenectomy: Enhanced Recovery After Surgery (ERAS) Society recommendations. Clin Nutr 2012;31:817e30.

19- Rousseau AF, Losser MR, Ichai C, Berger MM. ESPEN endorsed recommendations:

nutritional therapy in major burns. Clin Nutr 2013;32:497e502.

20- Preiser JC, Schneider SM. ESPEN disease-specific guideline framework. Clin Nutr 2011;30:549e52.

21-Mardani M, Seifi F, Ebrahimzadeh F. Nutritional assessment in hospitalized patients of orthopedic ward at hospital admission and discharge time in Shohadaye Ashayer hospital. yafte. 2013; 15 (1) :5-12

22.Naber TH, Schermer T, De Bree A, Nusteling K, Eggink L, Bakkeren J, et al. Prevalence of malnutrition in non surgical hospitalized patients and its association with disease complication. Am J Clin Nutr 1997; 65(5): 1232-1239.

23.Huang YC, Yen CE, Cheng CH, Jih KS, Kan MN. Nutritional status of mechanically ventilated critically ill patients: comparison of different types of nutritional support. Clinical Nutrition 2000; 19(2): 101-107

24- Scholler C, James EL. The nutrition knowledge of Australian nurses. Nurse Educ Today. 2005; 25 (5): 23-27.

25. Naber TH. Lean body mass depletion is associated with an increased length of hospital stay. Am J Clin Nutr 2004; 79 (4):527-8.

26. Lochs H, Allison S, Meier R, Pirlich M, Kondrup J, Schneider S, et al. Introductory to the ESPEN Guidelines on Enteral Nutrition: Terminology, definitions and general topics. Clin Nutr 2006;25(2):180-186.

27. Commission directive 1999/21/EC of 25 March 1999 on dietary foods for special medical purposes. [cited February 10, 2006]. Available at: URL: http://www.idace.org/legislation/ fsmps/Dir%2099-21%20FSMPs.pdf.

28. Kruizenga HM, Van Tulder MW, Seidell JC, Thijs A, Ader HJ, VAN Bokhorstd-De Van Der Schueren MA. Effectiveness and costeffectiveness of early screening and treatment of malnourished patients. Am J Clin Nutr 2005; 82(5): 1082-1089.

29. Holmes S. The effects of predictors for under nutrition in hospitalized patient. Nurse Stand 2007; 22(1): 35-38.

30. Neelemaat F, Kruizenga HM, De Vet HCW, Seidell JC, Butterman M, van Bokhorst-de van der. Schueren MAE et al. Screening malnutrition in hospital outpatients. Can the SNAQ malnutrition screening tool also be applied to this population. Clin Nutr 2008; 27(3): 439-446.

31. Elia M, Ritz P, Stubbs RJ. Total energy expenditure in the elderly. Euro J Clin Nutr 2000; 54: 92-103.

32. Goiburu ME, \Goiburu MM, Bianco H, Ruiz DJ, Alderete F, Placios MC,et al. The impact of malnutrition on morbidity, mortality and length of hospital stay in trauma patients. Nutri Hosp. 2006; 21(5): 604-610.

33. Wyszynski DF, Perman M, Crivelli A. Prevalence of hospital malnutrition in Argentina: preliminary results of a population-based study. Nutrition 2003;19(2):115-119.

34- Hankey CR, Eley S, Leslie WS, Hunter CM, Lean MEJ. Eating habits, beliefs, attitudes and knowledge among health professionals regarding the links between obesity, nutrition and health. Public Health Nutrition. 2004; 7 (2): 337-343.

35. Norman K, Pichard C, Lochs H, Pirlich M. Prognostic impact of disease-related malnutrition. Clinical nutrition. 2008 Feb;27(I):5-15. PubMed PMID: 18061312.

36. Neelemaat F, Kruizenga HM, De Vet HCW, Seidell JC, Butterman M, van Bokhorst-de van der. Schueren MAE et al. Screening malnutrition in hospital outpatients. Can the SNAQ malnutrition screening tool also be applied to this population. Clin Nutr 2008; 27(3): 439-446.

37. Meguid MM, Laviano A. Malnutrition, outcome, and nutritional support: time to revisit the issues Ann Thorac Surg 2001; 71:766-8.

2 Revision 1

3 comments · 23 Mar 2020 – 23 Mar 2020

Referee 1 Reviewer

ACCEPT 23 Mar 2020

Dear AE,
All comments were done.
Thanks

Associate Editor

MINOR REVISION 23 Mar 2020

Dear EIC,
There are some additional comments by one of the reviewers that you should correct before the final decision.
Thanks

Editor-in-Chief

MINOR REVISION 23 Mar 2020

Dear Author
Please correct additional comments that made by one reviews.
Thanks

3

Revision 2

AUTHORS' RESPONSE TO REVIEWERS

Authors' reply to reviewers

The next pages contain the authors' point-by-point reply to the comments of this revision round, as submitted with the revised manuscript. It is published as the authors wrote it.

The effect of using nutritional guideline by nurses on incidence and severity of Malnutrition in patients admitted in the ICU

mehdi niksefat [1,*], Abdolale Shariati [1,*], Shahram Baraz [1], mohammad hosein jazayeri [2], farhad soltani [3], Mohammadhosein Haghighizadeh [4]

- 1 Chronic Disease Care Research Center, Jondishapour University of Medical Sciences, Ahvaz, I.R. Iran
- 2 Nutrition and Metabolic Disease Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, I.R. Iran
- 3 Dr farhad soltani .associate proffesor .MD. Anesthesiologist and fellowship of critical care medicine .Ahvaz university medical science .Golestan hospital.Ahvaz Iran
- 4 Departement biostatistics.school ofhealth' .ahvaz jundishapout university of medical sience.ahvaz.iran
- * Corresponding author: Chronic Disease Care Research Center, Jondishapour University of Medical Sciences, Ahvaz, I.R. Iran

Review:

Introduction: Malnutrition is still one of the most important and common problems in hospitals and increases the incidence, side effects and mortality in hospitalized patients. In this case, intensive care unit patients are more at risk due to critical conditions. The aim of this study was to determine the effect of nurses' nutritional guidelines on the severity of malnutrition in ICU patients.

Materials and Methods: This is a one-blind clinical trial that was conducted in 2012 in ICU of Golestan and Imam Khomeini hospitals in Ahwaz on 70 patients hospitalized. Available patients were randomly divided into control and intervention groups. The data collection tool was a checklist of demographic data and Maastricht index for malnutrition assessment. Patients were evaluated based on the Maastricht index at baseline and 10 days after feeding.

Results: There was no significant difference between two groups in terms of demographic variables. Mean and standard deviation of albumin, pre-albumin and lymphocyte parameters before and after intervention were 3.13 ± 0.571, 1.28 ± 0.31, 1638.2 ± 489.59 and after intervention, were 536 3.32 ± 3.88, 1.88 ± 0.36, 2195 ± 40.85, respectively. Also, the amount of malnutrition intensity by the Maastricht formula before and after the intervention was 4.89 ± 2.17, ± 2.10 ± 2.00, which had a significant level of 0.001. Regarding the normal distribution of data, using T-test, two groups showed significant differences (p = 0.001).

Conclusion: Prevalence of malnutrition is high in patients admitted to intensive care units, which is mainly due to inappropriate nutrition of patients in these sectors. Although nurses play a significant role in feeding patients, their knowledge in this field is less than needed. According to the results of this study, the use of EDN by nurses reduced the severity of malnutrition. Therefore, it is necessary to create the necessary field for the scientific advancement of this group of treatment staff, and to educate valid nutrition guides for them to improve the nutritional status and subsequently accelerate the treatment process of the patients.

Key words: Nutrition Policy, nurses, malnutrition,

Introduction:

Malnutrition is a condition of nutrition that is caused by a decrease or increase or imbalance in energy, protein, and other nutrients which leads to measurable adverse effects on body tissue or shape (shape, size, body composition), performance and clinical status (1). In the study of reason, malnutrition is classified into two main categories: primary malnutrition which is caused due to inadequate nutrient intake usually due to economic or cultural poverty, and secondary malnutrition that results from maladaptation, illness, alcoholism, substance abuse, increased excretion and neurological disorders in eating (1). Patients in the ICU are not homogeneous and have been admitted to different illnesses and intensities (2,3). Diseases with critical conditions are typically associated with metabolic stress, in which patients develop systemic inflammatory responses (2). During ICU treatment period, with progression of the disease and decreased appetite or inability to swallow and, in some cases, inappropriate gastrointestinal activity and ultimately inadequate food intake, as well as increased need for food due to body metabolic response to stress, malnutrition can progress (4). As a result body metabolism increases and if adequate calorie and protein are not provided for metabolism timely, increased catabolism leads to a decrease in fat deposits, which leads to a reduction in muscle mass (5-6) and malnutrition of protein and energy, which is a major problem in hypercatabolic patients with high severity disease in the intensive care unit (7-9). Proper nutrition is one of the care standards in ICU, which partly emphasizes the regular and targeted blood glucose monitoring in patients with critical conditions. Studies have shown that maintaining blood glucose in the range of 80-110 mg/dl leads to a 42% reduction of mortality in ICUs(10).

Today, the European Society for Parenteral and Enteral Nutrition institute (ESPEN) is one of the most famous global institutes in collecting nutrition guidelines for different patients with different conditions (11).

The ESPEN is an international community that accelerates the development of clinical guidelines in the field of nutrition(12-14). The accuracy of the published guidelines by ESPEN institute is so widely accepted that most European countries use it as a clinical guideline (15-19). The nutrition guideline for ICU patients has been compiled by the best researchers of this institute (20).

Although proper nutrition intake is an essential part in treatment of malnutrition, few studies have looked at patients' intake in ICUs (5). In Iran, there is no comprehensive data on malnutrition rates in hospitalized patients, but in a survey conducted in hospitalized patients in intensive care units, it was found that there was a significant difference between the calorie intake and the caloric target in the patients admitted in these wards (5). Studies show that the incidence of malnutrition in ICU patients is higher than in other patients (5-6). After identifying the guidelines of ESPEN global institute as one of the most comprehensive guidelines for patients admitted to the ICU, researches conducted this study to determine the effect of using a nutrition guideline by nurses on the incidence and severity of malnutrition in hospitalized patients in ICU.

Materials and methods:

This study is a blind clinical trial. The study population included all diabetic patients at risk of malnutrition in the ICU wards of Golestan and Imam Khomeini hospitals of Ahvaz who have been fed by mouth or through the nasogastric or gastrostomy tubes. Patients available and with inclusion criteria were randomly divided into intervention and control groups. Inclusion criteria include: having chronic diabetes, age of 14 and over, admission to the ICU up to 24 hours after admission to hospital, staying and admission to the ICU for at least 10 days, feeding the patient during 10 days of staying in ICU department and participating in the project through oral feeding or through the nasogastric or gastrostomy tubes, not having hyperparathyroidism, not having renal failure, not having pheochromocytoma, no use of corticosteroids, not having liver disease or severe infection, no injection of protein-containing components, and not having severe dehydration and the CVP of less than 2 water centimeters due to false increase in serum pre-albumin. Exclusion criteria included: unwillingness of patients to participate in the study, pregnancy, lactation, smokers, using immunosuppressive drugs, following specific diets, changing the diet or deciding to lose weight, and leaving the ICU department in less than 10 days of admission. The sample size using formula was determined as 35, which, according to the control group, finally, 70 people entered the study whom were randomly divided into two groups of 35 for intervention and control groups. Sample size was calculated based on the results of similar studies with 95% confidence interval and 80% power using the following formula.

$$n_1 = n_2 = \frac{(S_1^2 + S_2^2)(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta})^2}{(\overline{X}_1 - \overline{X}_2)^2}$$

After determining the two groups, the amount of pre-albumin, albumin and total lymphocyte count was checked for each participant using nephelometry method and the results were recorded in the checklist paper, and their BMI was calculated. 2-cc blood sample was taken from the patient's vein and pre-albumin, albumin and serum lymphocyte count were measured immediately.

After collecting initial information from patients, the researcher determined the diet and nutrition requirements of each patient from the test group using the information of nutrition guideline and considering the laboratory test results as well as clinical symptoms, and notified the nurse and the relevant authorities in the kitchen. The researcher checked all patients for new information twice daily.

After 10 days, blood samples were taken from patient and pre-albumin, albumin and serum lymphocyte count, as well as BMI of patients were determined in the same manner and recorded in checklist. These were done for samples of control group too. The data was collected by a questionnaire containing patient's demographic information, anthropometric measurements, nutrition type and nutrition routes. The data collection tool was a demographic questionnaire including demographic characteristics, anthropometric measurements, type of nutrition and feeding routes, and Maastricht index for malnutrition. In this index, according to albumin, complete count of lymphocyte, pre-albumin, and ideal patient weight a score was given to the patient. The values below zero did not indicate malnutrition, and values of zero or more indicate malnutrition in the patient, in other words the lower the rate of this index is, the patient has a better nutritional status (21).

Maastricht index formula

MI = 20.68- (0.24 × Serum albumin g/L)) - (19.21 × Serum Pre-albumin g/L) - (1.86 × TLC L (106 cells/g) - (0.04 Ideal body weight)

To assess the validity and reliability of the Maastricht Index in a study by Naber et al., Aimed at investigating the prevalence of malnutrition in the hospital using the MI, NRI, SGA indices, and correlating the results of each index with the patient's therapeutic return and prevalence of complications and complications. The index was selected to estimate complications in malnutrition patients (22). Another study reported sensitivity of 95% and specificity of 94% for Maastricht index (23).

A meter was used to determine the patients' height, and to determine the patients' weight, a digital or analog balance was used.

Ethical considerations of this study include: Obtaining permission from Jundishapur University of Medical Sciences officials and coordinating with Ahvaz Health Network and covered health centers, obtaining the approval of Ahvaz Jundishapur Medical Ethics Committee The work process was undertaken at the beginning of the written informed consent study, all participants were informed that they had the option to withdraw from the study at any time if they

did not wish to do so. This study was performed after approval by the Ethics Committee of Ahvaz Jundishapur University of Medical Sciences and registered with Iran Clinical Trial Center under code IRCT20180314039097N1.

For statistical analysis, SPSS software version 23 was used. Data were reported as mean ± SD. The Kolmogorov-Smirnov test was used to assess the normal distribution of data. To compare the results before and after the intervention in each group, the Paired t-test was used and the Independent t-test was used to compare the results between the two groups. P-value less than 0.05 was considered statistically significant.

Findings

Of the 75 patients, clinical and laboratory evaluations were completed for 70 patients. Two of the control group and one of the intervention group were excluded from the study because of need for one or more days (due to the fact that one person suffered from abdominal distension and NPO and two required tracheostomy). One in control group and one in intervention group died. Table 1 shows the demographic characteristics of the patients under study.

Table 1- demographic characteristics of the patients under study

	Intervention group	Control group	Level of significance
Age (year)	70.28±3.61	66.74±3.44	0.392
Ideal body weight (kg)	69.51±2.22	67.69±2.45	0.280
Primary BMI (kg/cm^2)	22.04±2.96	21.80±2.53	0.804

There were no significant differences in age and ideal weight as two baseline indices in two groups (P-value: 0.392 and p: 0.280). It is worth noting that the ideal weight parameter is calculated in the Maastricht index, and the lack of difference between the two groups in this regard initially eliminates the probability of a bias due to its non-difference in the two groups. The amounts of laboratory parameters effective in evaluating in Maastricht method (albumin, pre-albumin, total lymphocytic counts) are also included in Table 2.

Table 2- amounts of fasting blood glucose, albumin, pre-albumin, and total lymphocyte count in patients under study

		Intervention group	Control group	Level of significance
Fasting blood sugar	Base	110.80 ± 23.23	109.20±62.67	0.14
	10^{th} day	103.50±80.22	112.40±23.14	0.001
Level of significance		0.001	0.35	
Albumin (g/l)	Base	3.13±0.571	3.22±0.61	0.535

	10th day	3.52±0.536	3.02±0.59	0.0001
Level of significance		0.001	0.005	
pre-albumin (mg/dl)	Base	1.28±0.31	1.51±0.46	0.023
	10th day	1.88±0.36	1.47±0.42	0.0001
Level of significance		0.001	0.196	
Total lymphocytic counts (cell/mm^3)	Base	1638.2±489.5	1591.57±505.2	0.696
	10th day	2195.40±500.8	1575.23±476.6	0.0001
Level of significance		0.001	0.286	

Although there is no significant difference in the albumin index at different times between the groups, what is important in determining the overall nutrition of the patient is its use along with other indicators. Using the values of albumin, pre-albumin, total lymphocytic count and body mass index and substitution in the formula, the values of Maastricht index was determined for each of the patients. Then the mean values of Maastricht index were determined in 2 times and in 2 groups of patients separately. In Table 3, the values of the Maastricht index are shown. The use of T-test showed that the values of this index between the two groups after the start of feeding with two methods, according to the Maastricht index patients of intervention group were in a more favorable condition and considering normal distribution of the data and using the T-test it was found that the two groups had a significant difference (P: 0.001).

Table 3- The mean values of Maastricht index in each of the triple sections in two groups

Maastricht index	Intervention group	Control group	Level of significance
Before intervention	4.89±2.17	4.18±2.62	0.222
After intervention	2.02±2.10	3.74±2.26	0.002
Level of significance	0.001	0.115	

Discussion and conclusion:

Malnutrition is a growing problem in many hospitalized patients, especially in patients hospitalized in intensive care units (24). Malnutrition is not a new clinical topic, but a problem which is ongoing and is remained unresolved, especially in patients who are admitted to ICUs (25). The presence of malnutrition in patients at the time of admission has been reported with less prevalence in advanced countries (England 20%, Sydney Australia 6%, Canadian elderly 15%) and a higher prevalence in developing countries (more than 40%) (26-29). Comparison of the results shows that although malnutrition can be present at the time of admission to hospital, the prevalence of malnutrition in developing countries is higher than in advanced countries, and despite the developments in medicine, there has been no significant decrease in recent years (30).

Studies have shown that lack of attention to nutritional needs of patients in the ICU leads to increased disease severity, hospitalization time, ventilator dependency and costs. Malnutrition is described as a common problem that is not well recognized by the medical team. In most medical centers in the world, standard solutions are used to feed patients and meet their metabolic needs. Unfortunately, these solutions are still not known to our medical staff and their cost is high for the patient due to lack of insurance coverage, but it should be considered that the cost of providing nutritional services and food supplements is negligible compared with the costs of the disease.

In a study by Bauer, it was stated that on average about 50% of patients take half or less of their meals, and these patients are at a 4-point risk of malnutrition compared to patients who have more than half of their meals (31). A prospective study of ICUs in England showed that the maximum calorie given to patients was between 75% and 85% of the prescribed order (32), and in another study, out of 49 patients, it was found that in the long run only 11 ICU Patients (23%) had a positive calorie intake, and the rest of the patients had less than their required caloric intake (33). In a study, it was found that calories of solutions used in the ICU are about one-third of the standard values of the ICUs. Based on the calculations, the caloric intake required for these patients is more than 2000 kilocalories, yet the calorie intake of patients was about 600 Kcal a day (34). These findings have led to the belief that lack of calorie intake is a common problem in intensive care units. Studies show that adequate nutrition has shortened hospitalization time and patients with moderate and severe malnutrition stay for a twice longer duration in hospital and that the death rate of these patients was three times more than those who did not have malnutrition (25). Our results showed that malnutrition levels were homogeneous at the time of admission and after 10 days of hospitalization in the ICU and there was no significant difference, but in general, the prevalence of 53% of malnutrition means that more than half of the ICU patients suffer from malnutrition and this is a warning alarm for treatment teams that need to plan and apply strict nutritional policies from the beginning of the patient's entry to the hospital. A study found that patients with malnutrition had 30%

more problems and complications than those who did not have malnutrition (28). In another study in South America, it was found that the costs of patients with malnutrition could be increased in up to 300% mare than non-malnourished patients (35). On the other hand, malnutrition causes more deaths in high-risk patients, including patients in the ICU and the elderly. For this reason, new researches suggest that proper calorie intake for critically ill patients should be considered as an essential requirement and a base for treatment (32). In a study by Kruizenega and colleagues (28) on 7606 patients, 12% of patients had severe malnutrition, 13% had moderate malnutrition and 75% had a good nutrition, and there was a significant negative correlation between malnutrition and BMI. This association was also reported in the study by Goiburu et al (31).

Increasing malnutrition rates in hospitalized patients can be due to several reasons: increased energy, protein, and micronutrient needs after surgery and failure to properly meet these needs is one of the most important reasons for the incidence and severity of malnutrition. Failure to meet these needs is also due to factors such as patient's lack of appetite, medication and interactions between medicine and food, emotional and psychological needs of the patient and as a result lack of food intake by the patient, secondary infections and consequently a secondary increase in the patient's need, the lack of attention or awareness of some of the authorities responsible for supplying and distributing food or family members to the patient's actual needs and the proper ways to provide this in the hospital environment.

Studies have shown that nutrition counseling and the implementation of various nutritional supportive strategies by the nutrition team in the hospital, especially the ICUs, lead to a reduction in the incidence of malnutrition. From these strategies the periodic visit of patients by dietitian, nursing staff education and monitoring the hospital's catering system can be mentioned.

A study done by the Department of Nutrition and Diet Therapy at London's Hammersmith Hospital during three cross-sectional studies in 1998, 2000, and 2003 showed that nutritional counseling and dietary strategies in patients would reduce the incidence of malnutrition and improve weight gain (36). Malnutrition continues to be a serious problem in intensive care units and is associated with inappropriate side effects. If the nutritional needs of patients admitted to ICUs are properly addressed, they may have fewer connections to ventilator and less complications and faster recovery and discharge. Malnutrition, especially in ICU, may be due to delay in the start of nutritional support and the mismatch of nutritional order with patient's weight and recent nutritional history and actual calorie intake. It is also difficult to provide enough nutrients to patients in ICUs due to nutritional suppression as a result of physical examinations, medical interventions and some digestive problems (37). According to the ESPEN Guideline, if the patient admitted to the ICU is unable to have oral nutrition for up to 3 days, enteral nutrition should be started for such an individual (25).

As previously mentioned, one of the nutritional support strategies for patients admitted to ICU is the active presence of nursing staff in nutrition team and providing training for them in this area. The standards that ESPEN has published on Journal of Parenteral and Enteral Nutrition about nutritional support, lists a number of nursing duties in this system, including focusing on protection, promotion and adjustment of nutritional health and ability of prevention from injuries and diseases associated with nutrition, and reducing the patient suffers and pain. Nutrition formulations should be given to the patient carefully and according to a nutritionist's recommendation and according to patient's tolerance. Also, care should be taken in the patient's position while receiving nutritional support and up to 3 hours later by the nurse and the patient's head should be at least 30 degrees lifted. The nurse should ensure that the formulation is healthy and that it does not contaminate the microbial formulation, and that the enteral formulations should not be stored at room temperature for more than 12 hours. The gastric residual volume should be considered by nurse to evaluate nutritional tolerance and drug and food interactions (23).

Conclusion:

In this study, the results showed a significant difference between the level of albumin, pre-albumin, total lymphocytic count and in general the severity of malnutrition based on the Maastricht index before and after the use of guideline by nurses. The prevalence of malnutrition is high in patients admitted to ICU, which is due to poor nutrition in these wards. Although nurses play a significant role in feeding patients, their knowledge in this field is less than needed. Therefore, creating the necessary field for the improvement of this group of the treatment staff in order to improve the nutritional status and subsequently accelerate the process of treatment of patients seems

necessary. In this context, nutritional guidelines help to accelerate and facilitate this subject. Research limitations

Due to the time limitation and due to the half-life of three weeks of serum albumin, it was not possible to detect albumin changes.

The time and location limitations of this study made it impossible to evaluate the incidence of malnutrition in patients.

Ethical approval

Ethical approval of this research by Ahvaz Jundishapur University of Medical Sciences Ethics Committee [1IRCT20180314039097N.] Obtained.

Conflict of interest

No items reported by authors.

Funds

This article is the result of a Master's thesis in Ahvaz Jundishapur University of Medical Sciences.

Refrences:

1-Kruizenega HM, Seidell JC, Devet HC, Wierdsma NJ. Develoment and validation of a hospital screening tool for malnutrition: The short nutritional assessment questionnaire (SNAQ). Clin Nutr. 2005 ; 24(1):75-82.

2. 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 (ASPEN). J Parenteral Enteral Nutr 2009;33(3):277-316.

3. Mahoori AR, H F, Noruzinia H, Abasivash R, Noruzinia Sh , Salmani M. The role of the anesthesiologist resident at reducing ICU mortality Journal of Anesthesiology And intensive care of Iran. 1381: 23:17-22.[in persian]

4. Feldblum I, German L, Castel H, Harman- Boehm R, Bilenko N, Eisinger M, et al. Characteristics of undernourished older medical patient and the identification of predictors for undernutrition status. Nutr J 2007; 6(1): 37.

5. Amiri Farahani L, Heidari T, Narenji F, Asghari Jafarabadi M, Shirazi V. Relationship between Pre Menstrual Syndrome with Body Mass Index among University Students. Hayat 2011;17(4):85-95.[in persian]

6. Waitzberg DL, Caiaffa WT, Correia M. Hospital malnutrition: the Brazilian national survey (IBRANUTRI): a study of 4000 patients. Nutrition 2001;17(7):573-580.

7. Lochs H, Allison S, Meier R, Pirlich M, Kondrup J, Schneider S, et al. Introductory to the ESPEN Guidelines on Enteral Nutrition: Terminology, definitions and general topics. Clin Nutr 2006;25(2):180-186.

8. Commission directive 1999/21/EC of 25 March 1999 on dietary foods for special medical purposes. [cited February 10, 2006]. Available at: URL: http://www.idace.org/legislation/ fsmps/Dir%2099-21%20FSMPs.pdf.

9. Mehdizadeh Torghadar S M, Soltani M, Samargandian S, Zarban A, Ebrahimzadeh S. Comparison of Glucose Levels of the First and Second Fingertip Blood Drops in Edematous Diabetic Patients Hospitalized in Intensive Care Units (Point Of Care Method). Horizon of Medical Sciences. 2018;24(1) :67-72.

10. Lacherade JC, Jacqueminet S, Preiser JC. An overview of hypoglycemia in the critically ill. J Diabetes Sci Technol. 2009;3(6):1242-9

11.Beck AM, Iepsen UW, Tobberup R, Jørgensen KJ. Danish evidence-based clinical guideline for use of nutritional support in pulmonary rehabilitation of undernourished patients with stable COPD. Clinical Nutrition ESPEN2014;10(1):33-41

12-Plauth M, Merli M, Kondrup J, Weimann A, Ferenci P, Muller MJ. ESPEN guidelines for nutrition in liver disease and transplantation. Clin Nutr 1997;16: 43e55.

13- Toigo G, Aparicio M, Attman PO, Cano N, Cianciaruso B, Engel B, et al. Expert Working Group report on nutrition in adult patients with renal insufficiency (part 1 of 2). Clin Nutr 2000;19:197e207.

14- Toigo G, Aparicio M, Attman PO, Cano N, Cianciaruso B, Engel B, et al. Expert Working Group report on nutrition in adult patients with renal insufficiency (part 2 of 2). Clin Nutr 2000;19:281e91.

15- Cano NJM, Aparicio M, Brunori G, Carrero JJ, Cianciaruso B, Fiaccadori E, et al. ESPEN guidelines for adult parenteral nutrition. Clin Nutr 2009;28:359e479.

16- Gustafsson UO, Scott MJ, Schwenke W, Demartines N, Roulin D, Francis N, et al. Guidelines for perioperative care in elective colonic surgery: Enhanced Recovery After Surgery (ERAS) Society recommendations. Clin Nutr 2012;31:783e800.

17- Nygren J, Thacker J, Carli F, Fearon KCH, Norderval S, Lobo DN, et al. Guidelines for perioperative care in elective rectal/pelvic surgery: Enhanced Recovery After Surgery (ERAS) Society recommendations. Clin Nutr 2012;31:801e16.

18- Lassen K, Coolsen MME, Slim K, Carli F, de Aguilar-Nascimento JE, Sch€afer M,

et al. Guidelines for perioperative care for pancreaticoduodenectomy: Enhanced Recovery After Surgery (ERAS) Society recommendations. Clin Nutr 2012;31:817e30.

19- Rousseau AF, Losser MR, Ichai C, Berger MM. ESPEN endorsed recommendations:

nutritional therapy in major burns. Clin Nutr 2013;32:497e502.

20- Preiser JC, Schneider SM. ESPEN disease-specific guideline framework. Clin Nutr 2011;30:549e52.

21-Mardani M, Seifi F, Ebrahimzadeh F. Nutritional assessment in hospitalized patients of orthopedic ward at hospital admission and discharge time in Shohadaye Ashayer hospital. yafte. 2013; 15 (1) :5-12

22.Naber TH, Schermer T, De Bree A, Nusteling K, Eggink L, Bakkeren J, et al. Prevalence of malnutrition in non surgical hospitalized patients and its association with disease complication. Am J Clin Nutr 1997; 65(5): 1232-1239.

23.Huang YC, Yen CE, Cheng CH, Jih KS, Kan MN. Nutritional status of mechanically ventilated critically ill patients: comparison of different types of nutritional support. Clinical Nutrition 2000; 19(2): 101-107

24- Scholler C, James EL. The nutrition knowledge of Australian nurses. Nurse Educ Today. 2005; 25 (5): 23-27.

25. Naber TH. Lean body mass depletion is associated with an increased length of hospital stay. Am J Clin Nutr 2004; 79 (4):527-8.

26. Lochs H, Allison S, Meier R, Pirlich M, Kondrup J, Schneider S, et al. Introductory to the ESPEN Guidelines on Enteral Nutrition: Terminology, definitions and general topics. Clin Nutr 2006;25(2):180-186.

27. Commission directive 1999/21/EC of 25 March 1999 on dietary foods for special medical purposes. [cited February 10, 2006]. Available at: URL: http://www.idace.org/legislation/ fsmps/Dir%2099-21%20FSMPs.pdf.

28. Kruizenga HM, Van Tulder MW, Seidell JC, Thijs A, Ader HJ, VAN Bokhorstd-De Van Der Schueren MA. Effectiveness and costeffectiveness of early screening and treatment of malnourished patients. Am J Clin Nutr 2005; 82(5): 1082-1089.

29. Holmes S. The effects of predictors for under nutrition in hospitalized patient. Nurse Stand 2007; 22(1): 35-38.

30. Neelemaat F, Kruizenga HM, De Vet HCW, Seidell JC, Butterman M, van Bokhorst-de van der. Schueren MAE et al. Screening malnutrition in hospital outpatients. Can the SNAQ malnutrition screening tool also be applied to this population. Clin Nutr 2008; 27(3): 439-446.

31. Elia M, Ritz P, Stubbs RJ. Total energy expenditure in the elderly. Euro J Clin Nutr 2000; 54: 92-103.

32. Goiburu ME, \Goiburu MM, Bianco H, Ruiz DJ, Alderete F, Placios MC,et al. The impact of malnutrition on morbidity, mortality and length of hospital stay in trauma patients. Nutri Hosp. 2006; 21(5): 604-610.

33. Wyszynski DF, Perman M, Crivelli A. Prevalence of hospital malnutrition in Argentina: preliminary results of a population-based study. Nutrition 2003;19(2):115-119.

34- Hankey CR, Eley S, Leslie WS, Hunter CM, Lean MEJ. Eating habits, beliefs, attitudes and knowledge among health professionals regarding the links between obesity, nutrition and health. Public Health Nutrition. 2004; 7 (2): 337-343.

35. Norman K, Pichard C, Lochs H, Pirlich M. Prognostic impact of disease-related malnutrition. Clinical nutrition. 2008 Feb;27(I):5-15. PubMed PMID: 18061312.

36. Neelemaat F, Kruizenga HM, De Vet HCW, Seidell JC, Butterman M, van Bokhorst-de van der. Schueren MAE et al. Screening malnutrition in hospital outpatients. Can the SNAQ malnutrition screening tool also be applied to this population. Clin Nutr 2008; 27(3): 439-446.

37. Meguid MM, Laviano A. Malnutrition, outcome, and nutritional support: time to revisit the issues Ann Thorac Surg 2001; 71:766-8.

3 Revision 2

1 comment · 6 Apr 2020

Editor-in-Chief

ACCEPT 6 Apr 2020

Dear Author,
The document is reviewed carefully by the reviewers. According to their comments and your revisions as requested, this manuscript is accepted.
Thanks.