Research article

The Effectiveness of the Nutrition Care Process on Improving Nutritional Status for In-Patient Department (IPD) Patients

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ABSTRACT

Malnutrition among In-Patient Department patients is common due to insufficient or inappropriate energy and protein intakes. While consultations with nutrition-specialized physicians can contribute significantly to case management, these physicians cannot act alone. A multidisciplinary team is essential to provide patients with support for adequate and successful nutritional care. Using a pre-post study design, this study examined if a Nutrition Care Process (NCP) could improve in-patient energy and protein intakes and overall nutrition based on nutrition assessment scores. Sixty-four in-patients needing nutritional consultations were recruited from January 2019 to March 2020 of which 86% were general IPD patients and 14% were palliative care patients. The NCP flow started with a nutrition-specialized physician referring patients to a dietitian using a physician's order sheet, the Line® program, or a nurse notifying the dietitian. The dietitian then conducted dietary assessments to determine protein and energy intakes and nutritional status using either the 7-point Subjective Global Assessment for general patients or Patient-Generated Subjective Global Assessment for cancer patients. Nutritional status was monitored every 1-7 days. The dietitian prepared reports and messages that were sent to physicians via Line® and provided dietary advice specific to conditions or diseases before patient discharge. The Key Performance Indicator, which was set at >60% for each parameter, was used to evaluate improvements in energy and protein intakes and nutritional status. Results showed that after the NCP, 80% of the patients had adequate energy and protein intakes, whereas 82% had better nutritional assessment scores. The NCP, therefore, is important for improving the nutritional status of malnourished IPD patients and achieving adequate energy and protein intakes.

Key words: Nutrition Care Process, Malnutrition, Multidisciplinary Team

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บทความวิจัย

ประสิทธิภาพการดูแลทางด้านโภชนาการเพื่อฟื้นฟูภาวะโภชนาการสำหรับผู้ป่วยในที่ได้รับการรักษา

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บทคัดย่อ

ภาวะทุพโภชนาการที่เกิดในผู้ป่วยในที่ได้รับการรักษา มักเกิดจากการที่ได้รับพลังงานและโปรตีนไม่เพียงพอหรือไม่เหมาะสม ในขณะที่การปรึกษาแพทย์ทางด้านโภชนาการถือเป็นวิธีหนึ่งในการรักษา เนื่องจากแพทย์ทางด้านโภชนาการไม่สามารถดูแลผู้ป่วยได้อย่างทั่วถึง ดังนั้น สหสาขาวิชาชีพมีส่วนช่วยในกระบวนการดูแลทางโภชนาการ (NCP) ประสบความสำเร็จ การศึกษานี้มีวัตถุประสงค์เพื่อทดสอบผลของ NCP ต่อพลังงาน โปรตีน และระดับของการประเมินภาวะโภชนาการในผู้ป่วยในที่รับการปรึกษาทางด้านโภชนาการ ใช้วิธีการเปรียบเทียบผลลัพธ์ของ NCP ต่อผู้ป่วยก่อนและหลังได้รับการรักษา ผู้ป่วยในที่ได้รับปรึกษาทางด้านโภชนาการจำนวน 64 คน ซึ่งเก็บข้อมูลระหว่างมกราคม 2562 ถึง มีนาคม 2563 และมีการส่งต่อข้อมูลการปรึกษาจากแพทย์ไปยังนักกำหนดอาหารโดย 1) คำสั่งการรักษาของแพทย์ 2) Line® 3) พยาบาลโทรแจ้ง นักกำหนดอาหารจะทำการประเมินการบริโภคอาหารโดยคำนวณพลังงาน โปรตีน และประเมินภาวะโภชนาการโดยใช้ 7-point Subjective Global Assessment (SGA) (ผู้ป่วยทั่วไป) หรือ Patient-Generated Subjective Global Assessment (ผู้ป่วยมะเร็ง) และแจ้งการให้โภชนบำบัดด้วยการเขียนรายงานความก้าวหน้าและ Line® กรณีเร่งด่วนจะโทรศัพท์แจ้งแพทย์โดยตรง ติดตามภาวะโภชนาการทุก 1 ถึง 7 วัน ขึ้นอยู่กับความรุนแรงผู้ป่วย รวมถึงให้ความรู้อาหารเฉพาะโรคก่อนกลับบ้าน ในส่วนของการวิเคราะห์ข้อมูลจะมีการใช้ Key Performance Indicator (KPI) ซึ่งผู้ป่วยที่ผ่านเกณฑ์จะมีระดับ KPI ที่มากกว่า 60 % ของแต่ละตัวชี้วัด ผู้ป่วยปรึกษาด้านโภชนาการ 64 ราย เป็นผู้ป่วยในทั่วไป 86 % และ ผู้ป่วยระยะสุดท้าย 14 % พบว่าผู้ป่วย 80% ได้รับพลังงานและโปรตีนเพียงพอ และผู้ป่วย 82 % มีภาวะโภชนาการดีขึ้น กระบวนการดูแลทางด้านโภชนาการ (NCP) มีความสำคัญและส่งผลให้ผู้ป่วยที่ขาดสารอาหารมีภาวะโภชนาการที่ดีขึ้นและได้รับพลังงานและโปรตีนที่เพียงพอ

คำสำคัญ: กระบวนการดูแลทางด้านโภชนาการ, ภาวะทุพโภชนาการ, สหสาขาวิชาชีพ

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Introduction

Malnutrition arises from a lack or surplus of energy, protein, or other nutrients that can adversely affect body composition and size, bodily functions, and clinical manifestations[1]. It is common for malnutrition to be an unrecognized cause of poor health and morbidity that, in turn, can lead to increased health care costs, resource utilization, long hospital stays, re-admission, and mortality[2]. The prevalence of malnutrition among hospitalized elderly patients is increasing in Thailand and across the world[3]. Only 20-50% of hospitalized patients have been diagnosed as being malnourished[4].

Many nutrition screening and assessment tools (e.g., anthropometry, biochemical analysis, clinical signs and symptoms, dietary intake) are helpful in identifying malnutrition. Specific tools include the Mini Nutritional Assessment (MNA) [5-7], the Malnutrition Screening Tool (MST)[8], the Malnutrition University Screening Tool (MUST)[9], the Nutritional Risk Screening 2002 (NRS 2002)[10], the Subjective Global Assessment (SGA)[11], and the Simplified Nutritional Assessment Questionnaire (SNAQ)[12]. Unfortunately, however, nutrition screening and assessment tools might not be included, or be inappropriately used, in clinical practice, thus limiting the provision of adequate nutritional care to malnourished patients.

The Nutrition Care Process (NCP) is a systematic protocol developed and used by nutrition and dietetics practitioners to provide nutritional care for patients[13]. The NCP involves providing nutrition support through a multidisciplinary team of physicians, registered nurses, pharmacists, and nutritionists/dietitians according to an NCP protocol. It has been used successfully for patients receiving enteral nutrition and parenteral nutrition to assess their nutritional status and provide them with suitable nutritional therapy to enhance their recovery and address complications[14]. However, multidisciplinary team collaboration to perform the NCP among IPD patients is not always available[15]. Consequently, it is not uncommon for IPD patients to be malnourished due to inadequacies in the intakes of energy, protein, or other important nutrients. Since NCP effectiveness can be assessed using Key Performance Indicators (KPI), this study's objective was to investigate the effect of the NCP process on energy and protein intakes as well as nutrition assessment scores using KPI among internal medicine IPD patients.

Material and Methods

Design, Setting, and Participants

This study used a pre-post test design to determine if the NCP protocol and its support to IPD patients could improve energy and protein intakes as well as overall nutrition based on nutrition assessment scores among in-patients. The IPD at Siriraj Piyamaharajkarun Hospital, Bangkok, Thailand, served as the study setting. In this setting, the number of patients requiring nutrition consultations varies by month depending upon the number of nutrition-specialized physicians who receive referrals from attending physicians. For this study, 64 IPD patients who needed nutritional consultations were recruited from January 2019 to March 2020. These patients were from different wards, including medical, cancer, gastrointestinal tract, orthopedics, and surgery. Their health

conditions included cancer (all types), liver disease, renal disease, chyle leakage, as well as poor intake and the need for enteral and parenteral feedings. Of the patients, 86% were general IPD patients and 14% were palliative care patients. The main criteria for inclusion were a need for nutrition counseling as recommended by nutrition-specialized physicians and each patient's agreement to participate in this study. Exclusion criteria entailed patients and relatives who refused to participate in the NCP protocol. This study received approval from the Human Ethics Committee of Quality Development (QD) Department, Siriraj Piyamaharajkarun Hospital.

Methods

The NCP was established in 2018 through the cooperation of nutrition-specialized physicians, nurses, and dietitians. These persons have the major responsibility for the NCP. Two methods whereby nutrition-specialized physicians communicate with dietitians for nutritional support are: (1) the physician order sheet in a patient's profile at a ward, and (2) the mobile phone Line® application. Malnutrition cases that were referred by primary or attending physicians to nutrition-specialized physicians were included in this study. Dietitians would also be consulted by phone when nurses requested nutrition consultations.

Dietitians completed energy and protein intake counts using the 24-hour dietary recall method and evaluated nutritional status by using a nutrition assessment form, either the 7-point Subjective Global Assessment (SGA) for general patients or the Patient-Generated Subjective Global Assessment (PG-SGA) for cancer patients at the time of admission and discharge. Briefly, the 7-point SGA consisted of 7 questions on: (1) weight loss; (2) dietary intakes; (3) gastro-intestinal symptoms; (4) daily activities; (5) subcutaneous fat wasting; (6) muscle wasting; and (7) edema. The PG-SGA contained the same questions as the SGA but added information about disease severity. To interpret the SGA and the PG-SGA, higher scores mean that nutritional status was worsening, while lower scores mean nutritional status was improving. The SGA scale has been shown to be a reliable and valid tool for nutritional assessment in adults on hemodialysis[16], whereas the PG-SGA is reliable and valid for stroke patients[17]. Dietitians provided advice on nutrition interventions, such as modifying hospital diets both in food texture and palatability to increase the adequacy of energy and protein intakes, suggesting enteral supplements in case of inadequate oral intakes, recommending parenteral supplements in cases of gastrointestinal track problems, or when enteral nutrition was contraindicated by nutrition-specialized physicians. Furthermore, dietitians would describe additional information about patients (e.g., body weight, body mass index, clinical signs, fluid intake/output balances, laboratory results, dietary intake, other beliefs/additional information) using the dietitian's progress note and Line® application program. In urgent cases requiring immediate dietary adjustment, dietitians directly called the nutrition-specialized physician to discuss a solution. Depending on the patient's condition or severity, a follow-up was scheduled between 1-7 days after each intervention. For the dietitian

team, dietitians recorded the nutrition intervention and each patient's progress in the case record form. This form was developed in 2018 and revised every year for better communication within the multidisciplinary team about patient progression. This form also includes all details to subsequently share within the dietitian group. Before discharge, dietitians provided nutrition education. Moreover, this project also participated in a new meal plan project with nutritionists to better coordinate dietary orders from physicians with food preparation in the hospital kitchen (**Figure 1**). In addition, nutrition-specialized physicians and other NCP team members held ward rounds every month to discuss difficult cases.

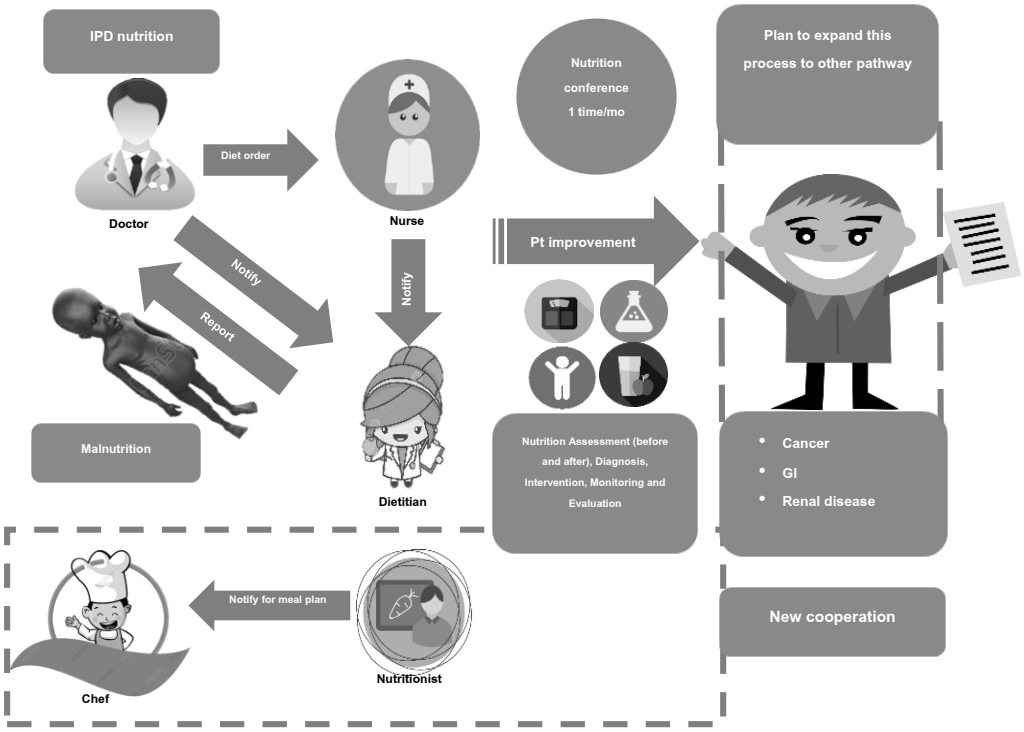

Figure 1 Nutrition Care Process (NCP) Protocol

Data analysis

Baseline characteristics of study patients were presented in number (n) and percentage (%). The Key Performance Indicator (KPI) for adequacy of energy and protein intake was energy and protein intakes above 80% of patient requirement.[18] For both nutrition assessment scores (SGA or PG-SGA), KPI values should be more than 60% for each month's assessment. To evaluate NCP effectiveness, we used improvement ratio [(value of patient at discharge divided by value of patient at admission) x 100] to monitor patient improvement. For KPI calculations, only curative cases (general patients) were included. Palliative cases (terminal cases) who did not improve in nutritional status from their original conditions were not considered in the calculation.

Results

Among the 64 patients participating in this study, 86% were general patients and 14%

were palliative cases. For baseline characteristics, about half of the patients were 60-70 years old, with a male to female ratio of 30:70. The three main types of diseases or conditions affecting the patients were cancer (47%), kidney (23%) and heart disease (17%) (**Table 1**).

Dietary intakes among the nutrition consulted patients before and after NCP is presented in **Table 2**. Before the NCP, the majority (44%) only took oral diets, and only 22% had taken oral nutrition supplements (ONS) in addition to oral diets. The remaining patients were on either enteral or parenteral nutrition (29 and 5%, respectively). After the NCP, the percentage of patients who had ONS along with oral diets increased to 44%, while 22% retained the practice of eating an oral diet only. There was no change in enteral or parenteral nutrition patients. Overall, the adequacy of energy and protein increased from 30% to 81%.

The mean 7-point SGA dramatically improved from 18 points to 9 points after the NCP. The average PG-SGA grade improved, as there are shifts from B and C to A and B after the NCP, indicating that the majority (69%) of patients became normal and only 31% remained in the moderate category with none having severe malnutrition. The average length of hospital stay among the nutrition consulted patients was 8 days (**Table 2**).

Compared to the baseline in the overall trends of both KPI, 80% of patients achieved adequate energy and protein intake (i.e., more than 80% of the requirements). Furthermore, 82% had lower nutrition assessment scores (SGA or PG-SGA) at the time of discharge. Differentiation of KPI results by month are shown in Figures 2 and 3. In October 2019 and January 2020, some nutrition consulted patients did not meet energy and protein requirements.

Table 1 Baseline characteristics of nutrition consulted patients (n=64)

Patient Characteristics	Value
Age groups (Years), n (%)	
50-55	8 (12.5%)
55-60	12 (18.8%)
60-65	15 (23.4%)
65-70	17 (26.5%)
70 up	12 (18.8%)
Sex (%Male: %Female)	19 (30%): 45 (70%)
Diseases	
Cancer, n (%)	30 (47%)
Kidney disease, n (%)	15 (23%)
Heart disease, n (%)	11 (17%)
Others *, n (%)	8 (13%)

** Malnutrition, femoral hernia, encephalitis, esophageal rupture, human immunodeficiency virus, vertebral compression, cellulitis, benign prostatic hypertrophy with Urinary tract infection*

Table 2 Nutrition consulted patient parameters before and after nutrition care process (n=64)

Parameters	Before NCP	After NCP
Type of dietary intake, n (%)		
Oral diet	28 (44%)	14 (22%)
Oral diet + oral nutrition supplement	14 (22%)	28 (44%)
Enteral nutrition	20 (29%)	20 (29%)
Parenteral nutrition	3 (5%)	3 (5%)
Adequate energy and protein, n (%)	19 (30%)	52 (81%)
Mean 7-points SGA scores*	18	9
PG-SGA grades*, n (%)		
A	0 (0%)	44 (69%)
B	51 (80%)	20 (31%)
C	13 (20%)	0 (0%)
Average length of hospital stays	8 days	

*Nutrition assessment scores and grades indicated severity of malnutrition. For 7-points SGA, 7 indicates a normal status. For PG-SGA, A = normal, B = moderate risk of malnutrition and C = severe malnutrition

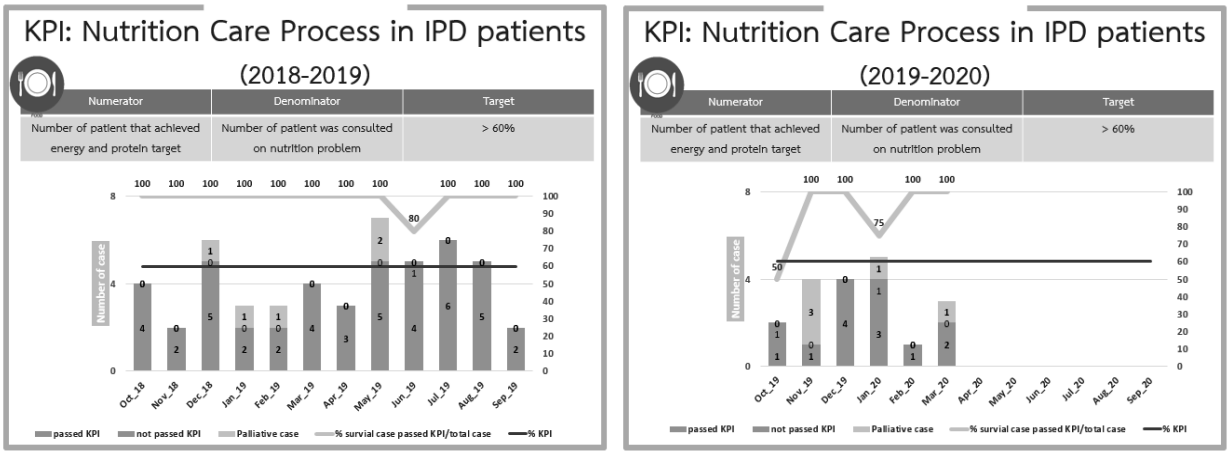

Figure 2 KPI on energy and protein intakes

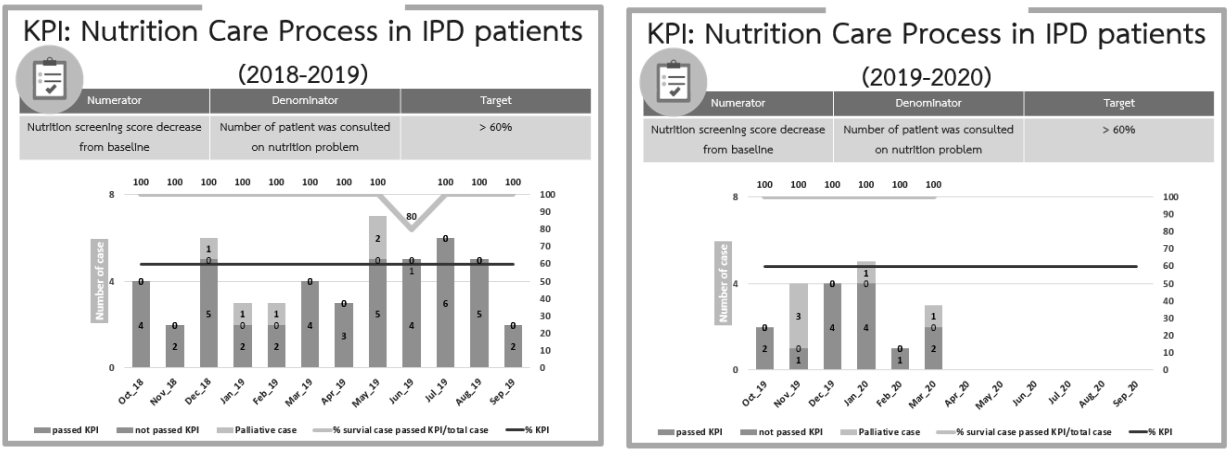

Figure 3 KPI on nutrition status

Discussion

The NCP can enhance food intake from 28% to 62% when equated with a patient's requirement, which is in agreement with a previous study[21]. As noted in a prior study, individualized nutritional interventions can effectively increase energy and protein intakes in cancer patients[19,20]. However, in this study, patients who were monitored in October 2019 and January 2020 did not meet energy and protein requirements due to disease severity. In palliative cases, the NCP did not achieve energy and protein intake targets, since purposive supportive care was needed among patients in this group, who were no longer up to participating in a nutrition intervention and did not desire to achieve energy and protein intake goals.

The major NCP strategies to improve patient nutrition were via improving dietary acceptance in terms of food texture modification of the oral diet, the use of ONS to complement the nutrition of the oral diet, and adjustments to enteral and parenteral nutrition formulas. However, nutrition assessment scores (from SGA or PG-SGA) improved in all months from January 2019 until March 2020. It appears that other factors, such as body weight, BMI, clinical signs and laboratory data, also improved. The overall nutrition assessment scores (from SGA or PG-SGA) decreased dramatically despite energy and protein intake not reaching the target.

After analyzing the causes of malnutrition in 2018 (when this study started), cancer was the main cause of malnutrition for around 40-60% of patients who passed or did not pass the KPI. The second and third causes of malnutrition were kidney and heart disease, respectively. Consequently, the multidisciplinary team containing physicians (both nutrition or not nutritionally trained), dietitians, and professional nurses can play a significant role in patient care by screening and identifying early malnutrition[22].

One strength of this project is its long-term data collection of around 16 months. All general cases still alive at the time of discharge after having an average 8-day hospital stay and exhibiting improved nutritional status before discharge were a part of the NCP collaboration between nutrition-specialized physicians, dietitians, and nurses. Important impediments to this study included the uncertain and not predictable number of nutrition consulted patients for each month as well as the disease severity of such patients that could affect NCP results. For further research, NCP collaborations using other physicians (not only nutrition-specialized physicians) should be investigated as well as a clearly set protocol for holistic nutrition care.

Conclusion

In conclusion, the NCP is an effective nutrition intervention that can play an important role in improving nutritional status among hospital patients. In particular, a multidisciplinary approach encompassing nutrition-specialized physicians, dietitians, and nurses can provide a systemic strategy for nutritional care for chronically ill hospitalized patients.

References

1. Soeters P, Bozzetti F, Cynober L, Forbes A, Shenkin A and Sobotka L. Defining malnutrition: a plea to rethink. Clin Nutr 2017; 36(3):896-901.
2. Daphnee L, Rajalakshmi P and Anand R. Combating hospital malnutrition. Clin Nutr 2019: 30;19-25.
3. Abd Aziz NAS, Teng NIMF, Abdul Hamid MR and Ismail NH. Assessing the nutritional status of hospitalized elderly. Clin Interv Aging 2017; 12:1615-25.
4. Ana CF, Ana P, Maria AV, Harriët JW and João P. Does malnutrition influence hospital reimbursement? A call for malnutrition diagnosis and coding. Nutrition 2020; 74:1-6.
5. Vellas B, Villars H, Abellan G, Soto ME, Rolland Y, Guigoz Y, Morley JE, Chumlea W, Salva A, Rubenstein LZ and Garry P. Overview of the MNA--Its history and challenges. J Nutr Health Aging 2006; 10(6):456-63.
6. Rubenstein LZ, Harker JO, Salvà A, Guigoz Y and Vellas B. Screening for undernutrition in geriatric practice: developing the short-form mini-nutritional assessment (MNA-SF). J Gerontol A Biol Sci Med Sci 2001; 56(6):M366-72.
7. Kaiser MJ, Bauer JM, Ramsch C, Uter W, Guigoz Y, Cederholm T, Thomas DR, Anthony P, Charlton KE, Maggio M, Tsai AC, Grathwohl D, Vellas B and Sieber CC. Validation of the Mini Nutritional Assessment short-form (MNA-SF): a practical tool for identification of nutritional status. J Nutr Health Aging 2009; 13(9):782-8.
8. Ferguson M, Capra S, Bauer J and Banks M. Development of a valid and reliable malnutrition screening tool for adult acute hospital patients. Nutrition 1999; 15(6):458-64.
9. Stratton RJ, Hackston A, Longmore D, Dixon R, Price S, Stroud M, King C and Elia M. Malnutrition in hospital outpatients and inpatients: prevalence, concurrent validity and ease of use of the 'malnutrition universal screening tool' ('MUST') for adults. Br J Nutr 2004; 92(5):799-808.
10. Kondrup J, Rasmussen HH, Hamberg O and Stanga Z. Nutritional risk screening (NRS 2002): a new method based on an analysis of controlled clinical trials. Clin Nutr. 2003 Jun; 22(3):321-36.
11. Detsky AS, McLaughlin JR, Baker JP, Johnston N, Whittaker S, Mendelson RA and Jeejeebhoy KN. What is subjective global assessment of nutricional status? JPEN 1987; 11(1):8-13
12. Wilson MM, Thomas DR, Rubenstein LZ, Chibnall JT, Anderson S, Baxi A, Diebold MR and Morley JE. Appetite assessment: simple appetite questionnaire predicts weight loss in community-dwelling adults and nursing home residents. Am J Clin Nutr 2005; 82(5):1074-81.
13. William IS, Angela V, Nancy AH, Brenda H, Ylva O and Naomi T, et al. Nutrition Care process and model update: toward realizing people-centered care and outcomes management. J Acad Nutr Diet 2017; 117(12):2003-d14.
14. Shin BC, Chun IA, Ryu SY, Oh JE, Choi PK and Kang HG. Association between indication for therapy by nutrition support team and

nutritional status. Medicine (Baltimore) 2018; 97(52):e13932.

15. Tappenden KA, Quatrara B, Parkhurst ML, Malone AM, Fanjiang G and Ziegler TR. Critical role of nutrition in improving quality of care: an interdisciplinary call to action to address adult hospital malnutrition. J Acad Nutr Diet 2013; 113(9):1219-37.
16. Steiber A, Leon JB, Secker D, McCarthy M, McCann L, Serra M, Sehgal AR and Kalantar-Zadeh K. Multicenter study of the validity and reliability of subjective global assessment in the hemodialysis population. J Ren Nutr 2007; 17(5):336-42.
17. Yoo SH, Oh EG and Youn MJ. The reliability and validity of patient-generated subjective global assessment (PG-SGA) in stroke patients. Korean J Adult Nurs 2009; 21(6):559-69.
18. Javid Z, Shadnoush M, Khadem-Rezaiyan M, Mohammad Zadeh Honarvar N, Sedaghat A, Hashemian SM, Ardehali SH, Nematy M, Pournik O, Beigmohammadi MT, Safarian M, Moradi Moghaddam O, Khoshfetrat M, Zand F, Mohammad Alizadeh A, Kosari Monfared M, Mazaheri Eftekhar F, Mohamadi Narab M, Taheri AS, Babakhani K, Foroutan B, Jamialahmadi T, Jabbarzadeh Gangeh B, Meshkani M, Kimiaee F, Norouzy A. Nutritional adequacy in critically ill patients: Result of PNSI study. Clin Nutr 2021; 40(2):511-17.
19. Park KO and Choi-Kwon S. Effects of individualized nutritional education programs on the level of nutrient intake and nutritional status of colorectal cancer patients undergoing palliative chemotherapy. J Korean Acad Nurs 2012; 42(6):799-809.
20. Poulsen GM, Pedersen LL, Østerlind K, Bæksgaard L and Andersen JR. Randomized trial of the effects of individual nutritional counseling in cancer patients. Clin Nutr 2014; 33(5):749-53.
21. Lee HO and Lee JJ. Nutritional intervention using nutrition care process in a malnourished patient with chemotherapy side effects. Clin Nutr Res 2015; 4(1):63-7.
22. Lin JX, Chen XW, Chen ZH, Huang XY, Yang JJ, Xing YF, Yin LH, Li X and Wu XY. A multidisciplinary team approach for nutritional interventions conducted by specialist nurses in patients with advanced colorectal cancer undergoing chemotherapy: A clinical trial. Medicine (Baltimore) 2017; 96(26):e7373.