Original Article

Comparison of diagnosis-related group based reimbursement and case-mix index within hospitalized patients before and after modified malnutrition diagnosis

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Background and Objectives: Lack of professional and accurate diagnosis of malnutrition led to a reduction in Diagnosis Related Group (DRG) payment and a decrease in Case-Mix Index (CMI). The aim of this study was to explore the effects of adding a proper nutritional diagnosis and modifying complication groups on DRG payment and CMI. **Methods and Study Design:** Retrospective analysis was performed on patients admitted to the hospital from January to June 2022 who had received a nutritional assessment. Patients were diagnosed as well-nourished, mild malnutrition, moderate malnutrition or severe malnutrition according to patient-generated subjective global assessment (PG-SGA) scores within 24 hours of admission. CMI and DRG hospital internal control standards were recalculated and compared with the original values. **Results:** A total of 254 patients were enrolled, including 40 patients with mild malnutrition, 74 patients with moderate malnutrition and 122 patients with severe malnutrition. Of all subjects, 111 changed complication groups. The median of the DRG hospital internal control standard (12006.09 vs. 13797.19, p=0.01) and the median of CMI (0.91 vs. 1.04, p=0.026) were significantly higher than those before the diagnostic change. In patients with inflammatory bowel disease (IBD), the CMI value, hospital control standard of DRG, and the classification of DRG were significantly different from those before diagnosis revision (p<0.001). **Conclusions:** Fully identification and correct coding of malnutrition cases are conducive for hospitals to receive appropriate DRG compensation, and further contribute to the improvement of medical quality and the economic sustainability of hospitals.

Key Words: malnutrition, DRG, CMI, PG-SGA

INTRODUCTION

Malnutrition has been frequently found in hospitalized patients, and up to sixty-five percent of patients were threatened by malnutrition.[1] Reduced appetite, impaired digestion, examination-related fasting, side effects associated with drugs, and medical interventions are all barriers to adequate oral intake, leading to protein-energy malnutrition.[2] Malnutrition is a subject with heightened concern. It brought longer lengths of hospital stay, increased complication rates, elevated readmission rates, raised requirements for outpatient care, higher disability and mortality rates, along with huge increased hospital costs.[3-5] Several studies discovered that these potential health care costs could be saved from early diagnosis of malnutrition and nutritional intervention, which helps shorten the length of stay and recovery from disease.[6, 7]

Malnutrition has remarkable influences not only on individuals but on healthcare facilities as well. Since the 1970s, Diagnosis Related Group (DRG) system has been

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used in many countries for hospital reimbursement.[4, 8, 9] In recent years, in order to promote the establishment of efficient medical insurance payment mechanisms and better control the unreasonable growth of medical expenses, China started promoting the trial of DRG system.[10] The calculation of DRG works as follows, patients are assigned into specific case groups based on their primary diagnosis, operations, interventions, and complications that are documented on the medical record. Each case group has a DRG code that corresponding to a certain level of reimbursement. Case Mix Index (CMI) represents the average DRG relative weight, calculated by dividing total DRG weights by the number of cases, which reflects the complexity of medical services.[11] Under the DRG system, malnutrition as a complication causes significant medical costs and needs to be correctly coded, otherwise, undiagnosed or unrecorded malnutrition cases result in deficient compensation.[4, 8, 11] China has just started to implement the DRG system in recent years, and the impact of correcting malnutrition diagnosis on hospital compensation is unknown in Chinese hospitals, where the prevalence of malnourished patients generally reported more than 40%.[12, 13]

Therefore, the objective of this research was to explore the effects of adding proper nutritional diagnosis and modifying complication groups on the DRG-based reimbursement and CMI.

METHODS

Study participants and study design

A retrospective analysis was performed among patients who were hospitalized at Nanjing Drum Tower Hospital from January to June 2022. This retrospective analysis included patients hospitalized in medical groups where dietitians routinely performed nutritional assessments in the oncology, gastroenterology, and general surgery departments. Patients who had the uncleared diagnosis, dead during hospitalization, stay in the hospital for less than 24 hours, or were unable to cooperate with PG-SGA were excluded from the study. The process of study is shown as a flowchart in Figure 1. The retrospective protocol was approved, and informed consent was exempted by the ethics committee. The ethical approval number is 2022-565-01.

Nutritional assessment

Both nutritional screening and assessment were performed within 24 hours after admission. The nutritional risk screening 2002 (NRS2002) scale was adopted for nutritional risk screening, which consists of three components: condition of disease, nutritional status, and age.[14] Patients were considered at risk when total NRS2002 scores were equal to or more than three.

Patient-generated subjective global assessment (PG-SGA) is a universally accepted nutritional assessment tool, which is altered from subjective global assessment (SGA).[15, 16] The application of PG-SGA was in accordance with procedure previously published.[16, 17] The PG-SGA contains patient-reported parts (weight, intake, nutrition-related symptoms, physical status) and healthcare professional assessment (disease-related nutritional requirements, metabolic need and physical examination). After assessing each domain, the sum score was obtained to categorize patients into four groups: well-nourished group (score 0-1), mild malnutrition group (score 2-3), moderate malnutrition group (score 4-8), and severe malnutrition group (score ≥9).

Calculation of DRG weights and CMI

According to the primary and secondary diagnosis, major and secondary operation on the patient's medical record, the relevant DRG parameters were obtained in the DRG system, including the CMI and the DRG hospital internal control standard. DRG hospital internal control standard represents the actual compensation the hospital could receive. Then, after adding the corresponding nutritional diagnosis to each case, the DRG system simulated recoding. Further, CMI and DRG hospital internal control standards were recalculated and compared with the original values.

Statistical analyses

Statistical analyses were performed using SPSS, version 20.0 (IBM, New York State, USA). Continuous parameters were presented as the mean with standard deviation (SD) or median with minimum and maximum depending on whether the data are normally distributed. Student's t-test or Manney-Whitney U-test was used to compare means or medians between groups. Categorical parameters were shown as numbers with percentages, and χ^2-test was applied to investigate differences between groups. *p* values 0.05 indicates that the difference was statistically significant.

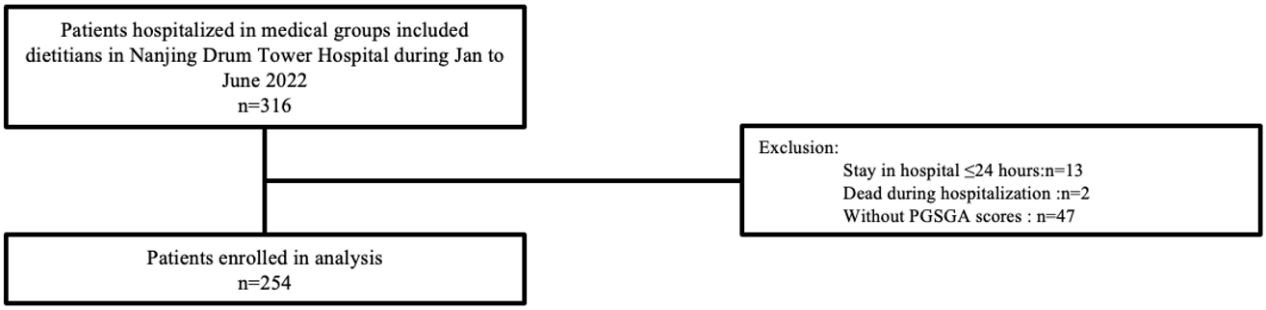

Figure 1. Flow chart of the study

RESULTS

General characters of all participants

Totally, two hundred fifty-four patients were included in the analysis. The patients' general characteristics are demonstrated in Table 1. The mean NRS 2002 score and PG-SGA scores were 3.18 and 7.82, respectively. According to PG-SGA, only 18 (7.1%) were well nourished, while others suffered from malnutrition (mild malnutrition n=40, moderate malnutrition n=74, severe malnutrition n=122). The median length of stay was 7 days. The median total expenses in hospital was ¥12929.69.

Comparison of relevant DRG indicators among all participants

All relevant DRG indicators demonstrated significant disparities after adding the corresponding nutritional diagnosis (Table 2). Both median CMI (1.04 [min, max: 0.09，6.38] vs. 0.91 [min, max: 0.54，6.38]; p=0.026) and median DRG hospital internal control standard (1.04 [min, max: 0.09，6.38] vs. 0.91 [min, max: 0.54，6.38]; p=0.010) were significantly higher after adding nutritional diagnosis than original values, while the difference between actual and reimbursement costs did not change significantly. In terms of DRG, well-nourished patients were considered with no complications, while mild and moderate malnourished patients were classified with complications or comorbidities (CC), and severe malnourished patients were identified with major complications or comorbidities (MCC). Both numbers of cases with CC or without complications declined, whereas patients with MCC increased from 28 to 122 after corrected diagnosis (p<0.001).

General characteristics of IBD participants

IBD participants were analyzed separately, the results of general characters were displayed in Table 3. For IBD, the NRS 2002 score and PG-SGA scores were 3.64 and 7.62, respectively. Ninety-six (99.0 %) of them were considered malnourished as specified by PG-SGA, among which 39 (40.2 %) were severely malnutrition.

Comparison of relevant DRG indicators among IBD participants

Among IBD patients, significant effects were shown on all relevant DRG indicators after diagnosis correction in Table 4. Mean CMI increased from 0.75 to 0.81(p<0.001) and the DRG hospital internal control standard also raised from ¥ 9924.21 to 10827.47 (p<0.001). There was also no significant change in the difference between actual and reimbursed costs among IBD patients. DRG significantly changed, the cases with MCC increased to 39.

DISCUSSION

In this study, diagnosis and coding for malnutrition showed significant abilities to affect DRG. After adding the corresponding nutritional diagnosis, DRG showed an upgrading classification, meanwhile CMI and DRG hospital internal control standards demonstrated a significant

Table 1. Characteristics of all participants

Number of cases	254
Age (years)	49.8 ± 17.5
Sex	
Male (n, %)	160 (63.0)
Female (n, %)	94 (37.0)
Length of Stay (median [min, max])	7 (2, 59)
NRS 2002 score (mean ± SD)	3.18±1.05
PG-SGA score (mean ± SD)	7.82±4.26
PG-SGA	
Well nourished (n, %)	18 (7.1)
Mild malnutrition (n, %)	40 (15.7)
Moderate malnutrition (n, %)	74 (29.1)
Severe malnutrition (n, %)	122 (48.1)
Actual health care cost (¥, median [min, max])	12930 (647, 162241)

NRS 2002: Nutritional Risk Score; PG-SGA: Patient-Generated Subjective Global Assessment

Table 2. Comparison of relevant DRG indicators before and after adding the corresponding nutritional diagnosis among all patients

	Before	After	p
CMI (median [min, max])	0.91 (0.54，6.38)	1.04 (0.09，6.38)	0.026
DRG hospital internal control standard (¥, median [min, max])	12006 (1124，84412)	13797 (6788，84412)	0.010
Differences between actual costs and DRG hospital internal control standard (¥, median [min, max])	645 (-102584, 55622)	1795 (-99277, 60491)	0.070
DRG			< 0.001
With no complications	35	18	
With CC	191	114	
With MCC	28	122	

CMI: Case-Mix Index; DRG Disease Diagnosis Group; CC: Complications or Comorbidities; MCC: Major Complications or Comorbidi-

Table 3. Characteristics of IBD participants

Number of cases	97
Age (years)	35.2 ± 13.3
Sex	
Male (n, %)	47 (48.5)
Female (n, %)	50 (51.5)
Length of Stay (median [min, max])	5 (2,31)
NRS 2002 score (mean ± SD)	3.64 ± 0.48
PG-SGA score (mean ± SD)	7.62 ± 2.90
PG-SGA	
Well nourished (n, %)	1 (1.0)
Mild malnutrition (n, %)	10 (10.3)
Moderate malnutrition (n, %)	47 (48.5)
Severe malnutrition (n, %)	39 (40.2)
Actual health care cost (¥, mean ± SD)	13514 ± 9060
Grouping change by PG-SGA (n, %)	51 (52.6)

NRS 2002: Nutritional Risk Score; PG-SGA: Patient-Generated Subjective Global Assessment

Table 4. Comparison of relevant DRG indicators before and after adding the corresponding nutritional diagnosis among IBD patients

	Before	After	*p*
CMI (mean ± SD)	0.75 ± 0.12	0.81 ± 0.10	< 0.001
DRG hospital internal control standard (¥, mean ± SD)	9924 ± 1596	10827 ± 1362	< 0.001
Differences between actual costs and DRG hospital internal control standard (¥, median [min, max])	-1576 (-57082, 10482)	-307 (56352, 10482)	0.207
DRG			< 0.001
With no complications	28	0	
With CC	62	58	
With MCC	7	39	

CMI: Case-Mix Index; DRG: Disease Diagnosis Group; CC: Complications or Comorbidities; MCC: Major Complications or Comorbidities

increase.

The average NRS 2002 score was 3.18 and the PG-SGA score was 7.82. After nutritional assessment by PG-SGA, 92.9% of studied participants were considered malnutrition. The prevalence was impressively high, because the patients involved were mainly from the departments of gastroenterology, oncology, and general surgery, and the diseases largely consist of IBD, esophageal cancer which commonly with a high incidence of malnutrition resulting from impaired digestive system.[18, 19]

CMI, an important indicator to judge the difficulty of medical service, was significantly increased in the analysis, which reflected that malnutrition-related complications increased the difficulty of medical treatment. Malnourished patients spent more on health care costs than patients with normal nutritional status, since they need more nutritional interventions and support.[5] The additional medical cost is not only originally from nutrition implementation but the fact that poor nutritional status could aggravate pre-existing diseases, such as increased infection rate, increased likelihood of organ failure, prolonged hospital stays, and even elevated readmission rate and 3-years mortality, all of which increase costs as well.[6, 20-22] On average, nearly one-third extra hospitalized cost were paid by malnourished patients compared with individuals whom without nutritional problems in Columbia.[3] Malnutrition was also highly prevalent in Asia and brought an enormous economic burden.[23] A previous study estimated that malnutrition could contribute to more than 30 billion dollars in additional medical costs each year.[23] Health care costs also could be saved from early diagnosis and consequent nutritional interventions.[22] Buitrago et al conducted a budget analysis in Colombia and detected that early nutrition care for malnourished patients could potentially save approximately one billion dollars annually.[6]

After coding nutritional diagnosis, DRG hospital internal control standard had an increase of ¥1791.10, which represented lack of coding contributed to a deficit to the hospital in reimbursements. Under recognition or codification of malnutrition resulted in deficient compensation causing massive financial loss worldwide each year.[4, 8, 24, 25] One research conducted in a Germany hospital discovered that the coding of malnutrition has an influence on DRG and CMI resulting in an additional financial benefit of €35280 and heightened mean case mix value.[4] Kellett et al investigated that only approximately 1/10 research patients were coded with malnutrition, which cause an estimated annual financial loss of AU$8,536,200.[25] Similarly, among cancer patients enrolled in a Spanish study, over 30% of malnourished patients lack of codification brought nearly €200,000 in financial shortfall.[8] Therefore, diagnoses of moderate or severe PEM are awaited to be recorded on the medical charts and be correctly coded, which are important sources of information for DRG payment. It is an apparent trend that limited healthcare system resources and reimbursement might shift to patients with more complications, whereas a lack of codifi-

cation of malnutrition might result in great economic losses for the hospital.

Proper coding requires early recognition of malnutrition by routine and timely nutrition screening and assessment, especially for diseases with a high incidence of malnutrition.[1] In this research, IBD participants were subgroup analyzed, and found that CMI and DRG hospital internal control standards were both significantly raised. Most patients with IBD have various degrees of nutritional problems, it has been well documented that the incidence of malnutrition in IBD can be up to 85%, and the prevalence of weight loss is about 18-75%.[18, 26] Besides, high attention should be paid to diseases those with the obvious risk of malnutrition, such as gastrointestinal diseases, tumors, and perioperative diseases which affecting individual's metabolism, absorption, and digestive functions.[27, 28]

Effective nutritional screening, assessment, and appropriate interventions all call for expanding the team of dietitians and improving nutritional training for health professionals.[29] Physicians' nutritional awareness needs to be emphasized and they are expected to refer malnourished patients to the clinical nutritionists. Although, physicians and medical educators all believed that nutritional topic such as malnutrition was important and should be integrated into undergraduate medical education,[30] unfortunately, nearly two-thirds of the internal medicine residents reported receiving little or no nutritional education according to a US survey.[31] The situation may be even worse in China, especially in rural areas. Thus, healthcare providers still have challenges in identifying malnutrition under the DRG model.

Strengths and limitations

The study had several highlights. Since developing and using the DRG system is at an early stage, this research was the first study in China to detect the relationship between coding diagnosis of malnutrition and cost reimbursement for hospitals. It could be a reference for other healthcare institutes using the DRG system in China. Routinely carry out proper nutritional screening and code diagnosis clearly to avoid unnecessary losses to medical healthcare providers. Additionally, simulations were calculated by the official DRG system, and CMI was also identified in this report, which represents the comprehensive ability of a healthcare institute to treat difficult severe diseases.

The main limitation of the study was that the patient population was enrolled only from specific medical groups where nutritional assessments were routinely done by registered dietitians. Furthermore, among these diseases, only IBD was subgroup analyzed, because it had a relatively larger sample size compared with other diseases such as liver cirrhosis, cholangiocarcinoma, and esophageal cancers. Another limitation was that this research was a single-center retrospective study administered in China. The compensation calculation mode of DRG payment in different countries might vary, which might prevent the extrapolation of the results to hospitals outside China.

Conclusion

In conclusion, systematic nutritional screening and diagnosis of malnutrition should become parts of a standardized nutritional care process, which is inseparable from a professional and trained nutritional support team. Hospitalized patients who are malnourished should be fully identified and correctly coded aiming to conduct effective nutritional support as early as possible and reduce healthcare costs. Correctly assigning a diagnosis code for malnutrition contributes to proper hospital reimbursements, which is beneficial to improve the medical quality and the economic sustainability of hospitals.

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AUTHOR DISCLOSURES

The authors declare no conflict of interest.

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REFERENCES

1. Cass AR, Charlton KE. Prevalence of hospital-acquired malnutrition and modifiable determinants of nutritional deterioration during inpatient admissions: A systematic review of the evidence. J Hum Nutr Diet. 2022;35:1043-58. doi:10.1111/jhn.13009
2. Schuetz P, Seres D, Lobo DN, Gomes F, Kaegi-Braun N, Stanga Z. Management of disease-related malnutrition for patients being treated in hospital. Lancet. 2021;398:1927-38. doi:10.1016/s0140-6736(21)01451-3
3. Ruiz AJ, Buitrago G, Rodríguez N, Gómez G, Sulo S, Gómez C et al. Clinical and economic outcomes associated with malnutrition in hospitalized patients. Clin Nutr. 2019;38:1310-6. doi:10.1016/j.clnu.2018.05.016
4. Ockenga J, Freudenreich M, Zakonsky R, Norman K, Pirlich M, Lochs H. Nutritional assessment and management in hospitalised patients: implication for DRG-based reimbursement and health care quality. Clin Nutr. 2005;24:913-9. doi:10.1016/j.clnu.2005.05.019
5. Thomas MN, Kufeldt J, Kisser U, Hornung HM, Hoffmann J, Andraschko M, Werner J, Rittler P. Effects of malnutrition on complication rates, length of hospital stay, and revenue in elective surgical patients in the G-DRG-system. Nutrition. 2016;32:249-54. doi:10.1016/j.nut.2015.08.021
6. Buitrago G, Vargas J, Sulo S, Partridge JS, Guevara-Nieto M, Gomez G, Misas JD, Correia MITD. Targeting malnutrition: Nutrition programs yield cost savings for hospitalized patients. Clin Nutr. 2020;39:2896-901. doi:10.1016/j.clnu.2019.12.025
7. Toulson Davisson Correia MI, Castro M, de Oliveira Toledo D, Farah D, Sansone D, de Morais Andrade TR, Tannus Branco de Araújo G, Fonseca MCM. Nutrition Therapy Cost-Effectiveness Model Indicating How Nutrition May Contribute to the Efficiency and Financial Sustainability of the Health Systems. JPEN J Parenter Enteral Nutr. 2021;45:1542-50. doi:10.1002/jpen.2052
8. Ruiz-García I, Contreras-Bolívar V, Sánchez-Torralvo FJ, Ulloa-Díaz O, Ruiz-Vico M, Abuín-Fernández J, Barrios-García M, Alba-Conejo E, Olveira G. The economic cost of not coding disease-related malnutrition: A study in cancer

inpatients. Clin Nutr. 2022;41:186-91. doi:10.1016/j.clnu.2021.11.028
9. Romeyke T, Noehammer E, Scheuer HC, Stummer H. Levels of Patient Satisfaction on Integrative Medicine Before and After Implementation of Diagnosis-related Groups. Glob Adv Health Med. 2018;7:2164956118759256. doi:10.1177/2164956118759256
10. Zou K, Li HY, Zhou D, Liao ZJ. The effects of diagnosis-related groups payment on hospital healthcare in China: a systematic review. BMC Health Serv Res. 2020;20:112. doi:10.1186/s12913-020-4957-5
11. Fernandes AC, Pessoa A, Vigário MA, Jager-Wittenaar H, Pinho J. Does malnutrition influence hospital reimbursement? A call for malnutrition diagnosis and coding. Nutrition. 2020;74:110750. doi:10.1016/j.nut.2020.110750
12. Liu J, Ge X, Ouyang C, Wang D, Zhang X, Liang J, Zhu W, Cao Q. Prevalence of Malnutrition, Its Risk Factors, and the Use of Nutrition Support in Patients with Inflammatory Bowel Disease. Inflamm Bowel Dis. 2022;28:S59-66. doi:10.1093/ibd/izab345
13. Zhang X, Tang M, Zhang Q, Zhang KP, Guo ZQ, Xu HX et al. The GLIM criteria as an effective tool for nutrition assessment and survival prediction in older adult cancer patients. Clin Nutr. 2021;40:1224-32. doi:10.1016/j.clnu.2020.08.004
14. Kondrup J, Rasmussen HH, Hamberg O, Stanga Z. Nutritional risk screening (NRS 2002): a new method based on an analysis of controlled clinical trials. Clin Nutr. 2003;22:321-36. doi:10.1016/s0261-5614(02)00214-5
15. Ottery FD. Rethinking nutritional support of the cancer patient: the new field of nutritional oncology. Semin Oncol. 1994;21:770-8.
16. Ottery FD. Definition of standardized nutritional assessment and interventional pathways in oncology. Nutrition. 1996;12:S15-9. doi:10.1016/0899-9007(96)90011-8
17. Bian D, Shi Y, Jiang Y, Zhong J, Sun J, Gu Y. Combined Patient-Generated Subjective Global Assessment and body composition facilitates nutritional support in inflammatory bowel disease: an ambulatory study in Shanghai. Asia Pac J Clin Nutr. 2018; 27: 1230-8. doi: 10.6133/apjcn.201811_27(6).0009
18. Balestrieri P, Ribolsi M, Guarino MPL, Emerenziani S, Altomare A, Cicala M. Nutritional Aspects in Inflammatory Bowel Diseases. Nutrients. 2020;12:372. doi:10.3390/ nu12020372
19. Jordan T, Mastnak DM, Palamar N, Kozjek NR. Nutritional Therapy for Patients with Esophageal Cancer. Nutr Cancer. 2018;70:23-9. doi:10.1080/01635581.2017.1374417
20. Barker LA, Gout BS, Crowe TC. Hospital malnutrition: prevalence, identification and impact on patients and the healthcare system. Int J Environ Res Public Health. 2011;8:514-27. doi:10.3390/ijerph8020514
21. Lim SL, Ong KC, Chan YH, Loke WC, Ferguson M, Daniels L. Malnutrition and its impact on cost of hospitalization, length of stay, readmission and 3-year mortality. Clin Nutr. 2012;31:345-50. doi:10.1016/j.clnu.2011.11.001
22. Norman K, Pichard C, Lochs H, Pirlich M. Prognostic impact of disease-related malnutrition. Clin Nutr. 2008;27:5-15. doi:10.1016/j.clnu.2007.10.007
23. Inciong JFB, Chaudhary A, Hsu HS, Joshi R, Seo JM, Trung LV et al. Economic burden of hospital malnutrition: A cost-of-illness model. Clin Nutr ESPEN. 2022;48:342-50. doi:10.1016/j.clnesp.2022.01.020
24. Doley J, Phillips W. Coding for Malnutrition in the Hospital: Does It Change Reimbursement? Nutr Clin Pract. 2019;34:823-31. doi:10.1002/ncp.10426
25. Kellett J, Kyle G, Itsiopoulos C, Naunton M, Luff N. Malnutrition: The Importance of Identification, Documentation, and Coding in the Acute Care Setting. J Nutr Metab. 2016;2016:9026098. doi:10.1155/2016/9026098
26. Cabré E, Gassull MA. Nutrition in inflammatory bowel disease: impact on disease and therapy. Curr Opin Gastroenterol. 2001;17:342-9. doi:10.1097/00001574-200107000-00008
27. Lobo DN, Gianotti L, Adiamah A, Barazzoni R, Deutz NEP, Dhatariya K et al. Perioperative nutrition: Recommendations from the ESPEN expert group. Clin Nutr. 2020;39:3211-27. doi:10.1016/j.clnu.2020.03.038
28. Arends J, Baracos V, Bertz H, Bozzetti F, Calder PC, Deutz NEP et al. ESPEN expert group recommendations for action against cancer-related malnutrition. Clin Nutr. 2017;36:1187-96. doi:10.1016/j.clnu.2017.06.017
29. Mundi MS, Mechanick JI, Mohamed Elfadil O, Patel JJ, Bonnes SL, Blackmer AB et al; ASPEN Physician Engagement Committee. Optimizing the nutrition support care model: Analysis of survey data. JPEN J Parenter Enteral Nutr. 2022;46:1709-24. doi:10.1002/jpen.2326
30. Hays E, Levine J, Rethi S, Smith EK, Upadhya S, Sobering AK, Weiler T. Reevaluating Biochemistry and Nutrition Education Through Opinions of Clinicians and Educators. Med Sci Educ. 2019;29:189-97. doi:10.1007/s40670-018-00652-7
31. Khandelwal S, Zemore SE, Hemmerling A. Nutrition Education in Internal Medicine Residency Programs and Predictors of Residents' Dietary Counseling Practices. J Med Educ Curric Dev. 2018;5:2382120518763360. doi:10.1177/2382120518763360.