CLINICAL SCIENCE OF NUTRITION

Original Article

Clin Sci Nutr 2022;4(1):1-7 • DOI: 10.54614/ClinSciNutr.2022.21515

Investigation of Gastrointestinal Complications in Patients Given Enteral Nutrition

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Cite this article as: Gönderen K, Er Döngel H, Öztoprak Kol E. Investigation of gastrointestinal complications in patients given enteral nutrition. *Clin Sci Nutr* 2022;4(1):1-7.

ABSTRACT

Objective: While deciding on the route of nutritional support therapy, the cost-effective enteral route that preserves the integrity of the gastrointestinal system and supports immune functions should be the first choice. During enteral nutrition, many complications that may lead to the interruption of nutrition may develop. This study was conducted to examine the gastrointestinal complications that developed in patients who received enteral nutrition.

Methods: 300 enterally fed patients who were treated in intensive care unit and wards were included in the study. Patients' age, gender, concomitant disease, diet, duration, type and amount of product, energy value, feeding route and developing gastrointestinal complications were recorded. Gastrointestinal complications and related factors in patients were investigated.

Results: Of the patients included in the study, 53.7% (n=161) were male, 35.7% (n=107) were between the ages of 66-79 years, and 92% (n=276) had at least one diagnosed disease. 77.7% (n=233) of the patients were fed by nasogastric (NG) tube, 50.6% (n=152) were fed by continuous infusion. It was determined that gastrointestinal complications developed in 40.7% (n=122) of the patients during the enteral feeding process, and diarrhea and high gastric residual volume were the most common complications. Aspiration and ileus did not develop in any of the patients. A significant difference was found between feeding time, daily amount, route of administration and infusion method, and gastrointestinal complications ($P < .001$; $P = .041$; $P = .003$; $P = .005$). No relationship was found between gastrointestinal complications and gender, age group, comorbid disease status, and the type of nutritional product according to energy content.

Conclusion: Gastrointestinal complications may frequently develop while patients are given enteral nutrition, which should be the first choice of nutritional support. The most common gastrointestinal complications encountered in this study were diarrhea and high gastric residual volume. It is thought that the duration of feeding, the amount, the route of administration and the infusion method may affect the development of gastrointestinal complications. Patients should be followed closely for complications.

Keywords: Complication, enteral nutrition, gastrointestinal system, nutritional support.

INTRODUCTION

Malnutrition is a common clinical condition that causes measurable adverse effects on the body as a result of a lack of nutrients such as protein and energy.[1] Malnutrition causes many negative consequences such as prolonged hospitalization, increased costs, and increased mortality and morbidity rates.[2] It is known that adequate nutrition has a significant effect on patients' response to medical treatment.[3,4] Although enteral nutrition is a cost-effective way that preserves the integrity of the gastrointestinal tract, supports immune functions, and prevents malnutrition, various complications may develop during the feeding process.[5,6]

Complications that may develop during the enteral feeding process are divided into three groups as mechanical, gastrointestinal and metabolic. The most common complications are thought to be related to gastrointestinal function.[7] Gastrointestinal complications are diarrhea, nausea, vomiting, abdominal distention, aspiration, high gastric residual volume, constipation, and ileus.[7-10] Factors such as the product used, the route and duration of administration, the number and amount of doses may affect the incidence of gastrointestinal complications.[11] This study was conducted to evaluate the gastrointestinal complications and related factors in patients undergoing tube enteral nutrition.

METHODS

This descriptive and retrospective study was conducted in order to evaluate the gastrointestinal complications developed in patients fed with enteral tubes and followed by the nutrition support unit of Kutahya Health Sciences

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Submitted: July 5, 2021 **Accepted:** April 6, 2022

University Evliya Celebi Training and Research Hospital. Ethics committee approval was received from the Kutahya Health Sciences University Non-Invasive Clinical Research Ethics Committee (Date: December 16, 2020, Decision No: 2020/17-12).

The study included 300 patients older than 18 years, who were followed by the nutrition support unit of Kütahya Health Sciences University Evliya Çelebi Training and Research Hospital between November 2018 and November 2020 and fed with enteral tube in the intensive care unit (intensive care units for internal medicine, general, coronary, cardiovascular surgery) and wards (palliative care, internal medicine, general surgery, cardiac and vascular surgery). Patients younger than 18 years of age, who received oral enteral nutrition support and who were fed in combination with enteral and parenteral routes, were excluded from the study.

The data were obtained retrospectively from the existing records with the "Information form for patients with tube enteral feeding" prepared by the researcher in line with the literature. This form contains information on the general characteristics of individuals (age, gender, diagnosis of disease), tube feeding (duration of enteral nutrition, type, amount and energy value of enteral nutrition product, feeding route, infusion method) and developing gastrointestinal complications.

Enteral nutrition products are divided into three groups in terms of energy content in the form. Those containing less than 0.9 kilocalories (kcal) of energy in one milliliter (mL) of nutritional solution are classified as hypocaloric, those containing energy of 0.9-1.2 kcal in one mL as isocaloric, and those containing more than 1.2 kcal in one mL as a hypercaloric product.[12]

Main Points

- Enteral nutrition is the first way to be preferred in patients who cannot be adequately fed orally.
- Some complications may develop in the patient during the enteral feeding process. One of them is the complications of the gastrointestinal system.
- In this study, gastrointestinal complications in patients fed enterally with tubes were examined.
- It was determined that gastrointestinal complications developed in 40.7% of the patients during the enteral feeding process, and diarrhea and high gastric residual volume were the most common complications.
- Patients given enteral nutritional support should be followed closely for gastrointestinal complications.

Enteral feeding applications are divided into four as continuous, intermittent, overnight and bolus feeding. Nutrition solution is given continuously in continuous feeding; in 24 hours with rest intervals in intermittent feeding; during whole night in overnight feeding; and at certain time intervals in bolus feeding for 6-8 times a day with the help of an injector.[13] This option was not included in the form as there was no overnight feeding in our hospital. Nutritional solution was given by feeding bag and pump in continuous and intermittent feeding.

When the patient had >200 g/day (or >250 mL/day volume) liquid or soft stool mass and at least 3 stools per day,[14] it was accepted as diarrhea; When there was no stool output for 3 days, it was considered as constipation.[15]

Since the European Society for Parenteral and Enteral Nutrition (ESPEN) recommends delaying enteral feeding when the gastric residual volume is above 500 mL/6 hours in enterally fed patients,[16] the high gastric residual volume limit was accepted as 500 mL/6 hours in this study.

Data were evaluated via the Statistical Package for the Social Sciences version 22.0 (IBM SPSS Corp.; Armonk, NY, USA) using the chi-square and Mann-Whitney U tests. Descriptive statistics were given as number, percentage, median, and minimum-maximum. A $P < .05$ was considered statistically significant in all evaluations.

RESULTS

Data on the general characteristics of the patients are given in Table 1. The median age of the patients (min-max) was 74 (19-99) years, 53.7% were male, 35.7% were 66-79 years old, and 92% had at least one diagnosed disease, and the most commonly encountered diseases were hypertension (26.7%) and diabetes (20.7%), respectively. Other diseases include Alzheimer's, coronary artery disease, epilepsy, Parkinson's, cerebral palsy, liver cirrhosis, Behçet's, rheumatoid arthritis, short bowel syndrome, and amyotrophic lateral sclerosis.

The median of the amount of nutritional product given in the first 24 hours after the start of feeding and the enteral feeding time are given in Table 2.

Isocaloric product was used in 79.3% of the patients, and it was determined that 23.3% were fed enterally for 4-7 days and 8-14 days. 77.7% of the patients were fed by nasogastric tube and 50.6% by continuous infusion. It was reported that gastrointestinal complications developed in 40.7% (122 patients) of the patients during the enter-

Table 1. General Characteristics of Patients (n=300)

General characteristics of patients	Number (n)	Percentage (%)
Gender		
Female	139	46.3
Male	161	53.7
Age (year) median (minimum-maximum)	74 (19-99)	
Age group		
18-65 years	90	30.0
66-79 years	107	35.7
80 years and above	103	34.3
Disease status		
Yes	276	92.0
None	24	8.0
Diagnosed chronic diseases*		
Hypertension	144	26.7
Diabetes	112	20.7
Renal failure	69	12.8
Chronic obstructive pulmonary disease	67	12.4
Heart failure	46	8.5
Cancer	46	8.5
Cerebrovascular diseases	40	7.4
Other	16	3.0

*More than one choice was marked

Table 2. Enteral Nutrition Product Amount, Energy and Feeding Time

	Median	Minimum-maximum
The amount of product given in the first 24 hours (mL/day)	400	160-960
Amount of product delivered in 24 hours (mL/day)	1500	200-2400
Daily energy (kilocalories) delivered by enteral nutrition	1600	200-2400
Enteral feeding duration (day)	9,5	1-130

mL: milliliter

Table 3. Enteral Feeding Features

	Number (n)	Percentage (%)
Type of nutritional product by energy content		
Hypocaloric	2	0.7
Isocaloric	238	79.3
Hypercaloric	60	20.0
Enteral feeding time distribution		
1-3 days	56	18.7
4-7 days	70	23.3
8-14 days	70	23.3
15-21 days	43	14.3
22 days and above	61	20.4
Route of administration of enteral nutrition product		
Nasogastric tube	233	77.7
Percutaneous endoscopic gastrostomy tube	60	20.0
Nasojejunal tube	1	0.3
Percutaneous endoscopic jejunostomy tube	6	2.0
Enteral nutrition infusion way		
Continuous infusion	152	50.6
Intermittent infusion	65	21.7
Bolus feeding	83	27.7
Gastrointestinal complication during enteral feeding process		
Yes	122	40.7
None	178	59.3
Complications that developed*		
Diarrhea	65	46.1
High gastric residual volume	36	25.5
Nausea-vomiting	25	17.7
Abdominal distention	10	7.1
Constipation	5	3.6

*More than one choice was marked.

al feeding process, and diarrhea (46.1%) and high gastric residual volume (25.5%) were the most common complications. Aspiration and ileus did not develop in any of the patients (Table 3).

When the general characteristics and enteral nutrition status of the patients were evaluated according to the development of gastrointestinal complications, no significant relationship was found between the type of nutritional

Table 4. Comparison of Patients According to The Presence of Complications

Variables	No complication		Complication available		X^2	*P*
	n	%	n	%		
Gender					0.340	.560
Female	80	57.6	59	42.4		
Male	98	60.9	63	39.1		
Age group					1.233	.540
18-65 years	55	61.1	35	38.9		
66-79 years	59	55.1	48	44.9		
80 years and above	64	62.1	39	37.9		
Disease status					2.654	.103
Yes	160	58.0	116	42.0		
None	18	75.0	6	25.0		
Type of nutritional product by energy content					0.108	.948
Hypocaloric	1	50.0	1	50.0		
Isocaloric	142	59.7	96	40.3		
Hypercaloric	35	58.3	25	41.7		
Enteral feeding time distribution					24.777	< .001**
1-3 days	42	75.0	14	25.0		
4-7 days	47	67.1	23	32.9		
8-14 days	47	67.1	23	32.9		
15-21 days	18	41.9	25	58.1		
22 days and above	24	39.3	37	60.7		
Route of administration					11.934	.003*
Nasogastric tube	149	63.9	84	36.1		
Percutaneous endoscopic gastrostomy tube	28	46.7	32	53.3		
Nasojejunal tube and percutaneous endoscopic jejunostomy tube	1	14.2	6	85.8		
Infusion way					10.802	.005*
Continuous infusion	104	68.4	48	31.6		
Intermittent infusion	31	47.7	34	52.3		
Bolus feeding	43	51.8	40	48.2		
Chi-square test was performed.						

*P < .05, **P < .001

Table-5. The Relationship Between the Development of Gastrointestinal Complications and Nutritional Characteristics

Variables	No complication		Complication available		Z	*P*
	Median	Min-max	Median	Min-max		
Feeding day	8	1-55	15	1-130	-4.537	< .001**
Amount given on the first day (mL/day)	400	160-960	390	160-840	-1.255	.210
Daily amount of feeding (mL/day)	1525	200-2200	1440	240-2400	-2.047	.041*
Daily amount of energy (kilocalorie/day)	1600	200-2340	1572	240-2400	-1.828	.067

Mann-whitney U test was performed.
Min-max: Minimum-maximum, mL: milliliter
*$P < .05$, **$P < .001$

product and the development of complications according to gender, age group, disease status, and energy content ($P > .05$).

The duration of feeding was found to be associated with the development of gastrointestinal complications ($X^2=24.777$, $P < .001$). It was determined that the risk of developing gastrointestinal complications was higher in patients who were given nutritional support for 22 days or more (60.7%).

In terms of the route and speed of administration of the nutritional solution, the incidence of gastrointestinal complications in patients given nutritional support with NG tube is lower than in those fed with percutaneous endoscopic gastrostomy (PEG) tube, percutaneous endoscopic jejunostomy (PEJ) tube, and nasojejunal (NJ) tube ($X^2=11.934$, $P < .01$), the incidence of complications was found to be lower in the group given nutritional support with continuous infusion ($X^2=10.802$, $P < .01$) (Table 4).

A significant correlation was found between the development of gastrointestinal complications in the patients and the number of days on which nutritional support was given and the maximum amount of enteral product given in 24 hours ($Z=4.537$, $P < .001$; $Z=2.047$, $P < .05$). The number of days on which nutritional support was given was higher in the group developing complication and the maximum amount of enteral product given in 24 hours was less (Table 5).

DISCUSSION

In this study, it was determined that gastrointestinal complications developed in approximately half of the patients during enteral feeding, and diarrhea and high gastric residual volume were the most common complications. Aspiration and ileus did not develop in any of the patients. Enteral nutrition is the route that should be preferred because it ensures the continuity of the gastrointestinal system function.[17] In the study of Gök Metin and Özdemir[18] on enterally fed individuals, the incidence of complication development was found to be 27.5%. The most common complication was abdominal distension, while diarrhea and aspiration were reported to be the least.[18] Reintam et al.[19] reported that gastrointestinal complications developed in 59.1% of the patients, Demiray et al.[20] reported that none of the patients given enteral nutrition support developed any complications. This may be because the study only covered the three-day feeding period. The risk of developing complications during enteral nutrition varies depending on the selection of the nutritional product, its temperature, application rate and amount, and the expertise of the person who administers it.[8] Gök Metin and Özdemir[18] reported in their study that there was no relationship between age, gender, feeding time, amount, enteral feeding way and complication development. Parallel to this, in our study, it was determined that there was no relationship between gender, age, concomitant disease status, type of nutritional product and complication development status.

The possibility of change of the NG tube location is higher compared to the PEG tube, and this may lead to the interruption of feeding.[21] In addition, there are studies reporting that giving enteral nutritional support through NG tube has a higher risk of aspiration compared to giving with a PEG tube.[17,22] Unrelated to the feeding route, aspiration was not observed in any patient in our study. Contrary to the literature, it was found that the incidence of gastrointestinal complications was lower in patients fed with NG tube. It is known that post pyloric feeding reduces gastrointestinal complications such as aspiration risk and gastric intolerance.[16] Post pyloric placement of NG feeding tube in some patients may have reduced the rate of complication development in this patient group.

It is also thought that some patients with PEG may have developed more complications since the PEG tube was surgically placed.

In this study, it was determined that the rate of development of gastrointestinal complications was higher in patients who were given enteral nutrition support for 22 days or more. In a study, it was shown that the rate of complication development increased as the number of days given nutritional support increased.[18] In addition, it was determined that the maximum amount of nutritional product given in 24 hours to the group with complications was less. The reason for this may be the interruption of enteral nutrition due to complications and inadequate increases of nutritional dose.

It has been reported in the literature that the administration of enteral nutritional support by continuous infusion may be associated with less complication development.[23] In a meta-analysis, it was reported that the risk of feeding intolerance was lower in patients fed with continuous infusion compared to those fed with intermittent infusions.[24] In other studies, it has been reported that continuous or bolus administration of nutritional support does not make a significant difference in terms of aspiration, vomiting, diarrhea, and high gastric residual volume development.[25,26] In our study, fewer gastrointestinal complications were observed in the group fed with continuous infusion. This result is thought to be due to the fact that continuous administration of the nutritional product at low doses via the infusion pump increases patient tolerance.

In addition to the beneficial effects of enteral nutrition, close follow-up of patients is of great importance due to complications that may develop during the feeding process.[27] Although gastrointestinal complications may develop in a successful enteral feeding, it has been reported in studies to ensure that the patient continues enteral feeding for as long as possible without interruption by taking appropriate precautions.[28,29] After excluding infectious causes and deciding that diarrhea is related to nutrition in patients who develop diarrhea, antidiarrheal drugs[14,30] are recommended and initiation of motility-enhancing drugs is offered to patients with high gastric residual volume.[31]

The main limitations of the study are that it was conducted in a single-center, it was retrospective, and sufficient information was not available on the use of drugs, mobilizations, and operations of the patients.

In conclusion, enteral nutrition is the first choice for all hospitalized patients. In terms of complications that may develop, patients should be followed closely and tried to be prevented, and when they develop, they should be treated in the early period.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Kutahya Health Sciences University Non-Invasive Clinical Research Ethics Committee (Date: December 16, 2020, Decision No. 2020/17-12).

Informed Consent: N/A.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – H.E.D.; Design - H.E.D., E.Ö.K.; Supervision – K.G.; Resources - H.E.D., E.Ö.K.; Materials - H.E.D., E.Ö.K.; Data Collection and/or Processing - H.E.D., E.Ö.K.; Analysis and/or Interpretation – K.G., H.E.D., E.Ö.K.; Literature Search - K.G., H.E.D., E.Ö.K.; Writing Manuscript - K.G., H.E.D., E.Ö.K; Critical Review - K.G.

Declaration of Interests: The authors have no conflicts of interest to declare.

Funding: The authors declared that this study has received no financial support.

REFERENCES

1. National Collaborating Centre for Acute Care. *Nutrition support for adults: Oral nutrition support, enteral tube feeding and parenteral nutrition*. London: The Royal College of Surgeons of England; 2006:20. Accessed April 12, 2022. https://www.ncbi.nlm.nih.gov/books/NBK49269/pdf/Bookshelf_NBK49269.pdf.
2. Kozeniecki M, Fritzshall R. Enteral nutrition for adults in the hospital setting. *Nutr Clin Pract.* 2015;(30):634-651. [Crossref]
3. O'Leary-Kelley C, Bawel-Brinkley K. Nutrition support protocols: enhancing delivery of enteral nutrition. *Crit Care Nurse.* 2017;37(2):15-23. [Crossref]
4. Elke G, Felbinger TW, Heyland DK. Gastric residual volume in critically ill patients: a dead marker orstillalive? *Nutr Clin Pract.* 2015;30(1):59-71. [Crossref]
5. Delgado SA. Nutrition is critical. *Am J Crit Care.* 2018;27(2):144. [Crossref]
6. Aktaş H, Bozbay S, Kayhan O, Demirkıran O. Yoğun bakım ünitesindeki kritik hastalarda enteral beslenme hedefi. *Cerrahpaşa Med J.* 2019;43(3):92-96.
7. Bodoky G, Kent-Smith L. Basics in clinical nutrition: Complications of enteral nutrition. e-SPEN. *Eur E J Clin Nutr Metab.* 2009;4:e209-211. [Crossref]
8. Blumenstein I, Shastri YM, Stein J. Gastroenteric tube feeding: Techniques, problems and solutions. *World J Gastroenterol.* 2014;(20):8505-8524. [Crossref]
9. Özyurt Y, Erkal KH, Yıldırım M, Arıkan Z. Total enteral beslenme. *Kartal Eğit. Araşt. Hast. Tıp Derg.* 2000;11(3):950-953.
10. Metin ZG, Özdemir L. Enteral beslenme komplikasyonları ve hemşirelik bakım uygulamaları. *Sağlık ve Toplum Dergisi.* 2015;25(3):28-32.

11. Wanden-Berghe C, Patino-Alonso MC, Galindo-Villardón P, Sanz-Valero J. Complications associated with enteral nutrition: CAFANE study. *Nutrients*. 2019;11(9):2041. [Crossref]
12. Lochs H, Allison SP, Meier R, et al. Introductory to the ESPEN Guidelines on Enteral Nutrition: Terminology, definitions and general topics. *Clin Nutr.* 2006;25(2):180-186. [Crossref]
13. De Van Der Schueren MAE. Enteral tüp ile beslenme uygulaması. In: Sobotka L, ed. *Klinik Nütrisyonun Temelleri*. Miki Matbaacılık; 2021:p.300-301.
14. Pirlich M, Bodoky G, Kent-Smith L. Enteral nütrisyonun komplikasyonları. In: Sobotka L, ed. *Klinik Nütrisyonun Temelleri*. Miki Matbaacılık; 2021:p.319-320.
15. Pancorbo-Hidalgo PL, García-Fernandez FP, Ramírez-Pérez C. Complications associated with enteral nutrition by nasogastric tube in an internal medicine unit. *J Clin Nurs*. 2001;10(4):482-490. [Crossref]
16. Singer P, Blaser AR, Berger MM, Alhazzani W, Calder PC, Casaer MP, et al. ESPEN guideline on clinical nutrition in the intensive care unit. *Clin Nutr.* 2019;38(1):48-79. [Crossref]
17. Akıncı İÖ, Özcan P, Tuğrul S, et al. Yoğun bakım ünitesinde perkutan endoskopik gastrostomi. *Ulus Travma Derg*. 2000;6(4):281-283.
18. Gök ZM, Özdemir L. Yoğun bakımda enteral pompa ile beslenen hastalarda gelişen komplikasyonlar ve etkileyen faktörlerin belirlenmesi. *HUHEMFAD*. 2015;2:20-29.
19. Reintam A, Parm P, Kitus R, Kern H, Starkopf J. Gastrointestinal symptoms in intensive care patients. *Acta Anesthesiologica Scandinavica*. 2009;(53):318-324. [Crossref]
20. Demiray A, Kuzyaka İ, Açıl A, İlaslan N. Enteral beslenen yoğun bakım hastalarının beslenme süreci ve gelişebilecek komplikasyonlar açısından değerlendirilmesi. *DÜ Sağ Bil Enst Derg*. 2020;10(3):289-96. [Crossref]
21. Pearce CB, Duncan HD. Enteral feding: Nasogastric, nasojejunal, percutaneous endoscopic gastrostomy, or jejunostomy: its indications and limitations. *PMJ*. 2002;78:198-204. [Crossref]
22. Ikenaga Y, Kusunoki T, Yamaguchi H. Percutaneous endoscopic gastrostomy reduces aspiration pneumonia rate in stroke patients with enteral feeding in convalescent rehabilitation wards. *Prog Rehabil Med*. 2021;7(6):1-10. [Crossref]
23. Williams TA, Leslie GD, Leen T, Mills L, Dobb GJ. Reducing interruptions to continuous enteral nutrition in the intensive care unit: a comparative study. *J. Clin. Nurs*. 2013;22(19):2838-2848. [Crossref]
24. Ma Y, Cheng J, Liu L, et al. Intermittent versus continuous enteral nutrition on feding intolerance in critically ill adults: A meta-analysis of randomized controlled trials. *Int J Nurs Stud*. 2021;113:1-29. [Crossref]
25. Kadamani I, Itani M, Zahran E, Taha N. Incidence of aspiration and gastrointestinal complications in critically ill patients using continuous versus bolus infusion of enteral nutrition: A pseudo-randomised controlled trial. *Aust Crit Care*. 2014;24(4):188-193. [Crossref]
26. Serpa LF, Kimura M, Faintuch J, Ceconello I. Effects of continuous versus bolus infusion of enteral nutrition in critical patients. *Rev Hosp Clin*. 2003;58(1):9-14. [Crossref]
27. Çelebi D, Yılmaz E. Cerrahi hastalarda enteral ve parenteral beslenmede kanıta dayalı uygulamalar ve hemşirelik bakımı. *IGUSABDER*. 2019;7:714-731. [Crossref]
28. Tatsumi H. Enteral tolerance in critically ill patients. *J Intensive Care*. 2019;7(30):1-10. [Crossref]
29. Maltseva LO, Mishchenko OO, Kutovyi AB, Mosentsev MF, Lisnycha VM, Kazimirova NA. Enteral tolerance in critically ill patients (literature review). *Emerg Med*. 2020;16(1):36-44. [Crossref]
30. Majid HA, Emery PW, Whelan K. Definitions, attitudes, and management practices in relation to diarrhea during enteral nutrition: A survey of patients, nurses, and dietitians. *Nutr Clin Pract*. 2012;27(2):252-260 [Crossref]
31. Taylor BE, McClave SA, Martindale RG, et al. Guidelines for the provision and assessment of nutrition support therapy in the adult critically ill patient: society of critical care medicine (SCCM) and American society for parenteral and enteral nutrition (A.S.P.E.N.). *Crit Care Med*. 2016;44:390-438. [Crossref]