



Original Article

Auditing of enteral nutrition nursing care in critical care patients

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ABSTRACT

Background & Aim: Enteral nutrition standards noncompliance is one of the factors that threatens patient safety. Auditing is an important part in quality improvement processes. The aim of this study was to determine enteral nutrition nursing care conformity rate with standards in the critical care units.

Methods & Materials: In this descriptive study, 400 enteral feeding nursing care were assessed via time and event sampling methods. The tool was a researcher made check list in three fields: pre-feeding, feeding, and post feeding nursing care. Content validity and inter-rater coefficient reliability were calculated for checklist. The obtained data were analyzed using descriptive statistics.

Results: The most conformity rate with standards was in feeding (86%), pre-feeding (3/8 %) and post feeding (2/3%) field, respectively. Determination of PH (100%) and accurate gastric residual volume (99.8%) in pre-feeding field, disconnection of the syringe from catheter after feeding, in feeding filed and accurate documentation of the care (99.3%) in post feeding field, were not implemented in the most of cases.

Conclusion: Enteral nutrition nursing care is far from standards in the pre and post feeding fields. Lack of the clear clinical guidelines, shortage of nursing staff and equipment and inadequate training are relating factors.

Introduction

The human body needs adequate food combinations for cell function (1), and the nutritional needs of individuals change with hospitalization. Intensive care patients are the patients whose nutritional status undergoes some changes (2). During the period of hospitalization in the intensive care unit, factors such as changes in appetite due to disease severity, difficulty in the ingestion and absorption of food, inappropriate activity of the digestive system, as well as increasing need for food due to stress lead to the development of

malnutrition (3). Studies have estimated the malnutrition rate for intensive care patients to be 30-55%, which leads to delay in wound healing and immune deficiency, followed by an increased risk of infection, weakness of the respiratory muscles, and problems in weaning of the patient from mechanical ventilation and finally, increased hospitalization time (2).

Malnutrition is a major concern in the intensive care unit, which is associated with an increase in the mortality rate of patients hospitalized in this unit (4). Nutrition support is an adjuvant treatment with the primary aim of preventing malnutrition (5). For this reason, specialized nutritional care is recognized as a key factor in increasing survival and health status in patients requiring special care (6).

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Due to the inability of intensive care patients to meet their nutritional needs, nutritional replacement methods are used for them, including enteral and parenteral nutrition. Different studies confirm the preference of enteral nutrition over parenteral method (2). According to regulations, American Society for Parenteral and Enteral Nutrition (ASPEN) also prefers enteral nutrition method for patients who need support and nutrition treatment in the first 24-48 hours after admission (7).

Nasogastric tubes care is a procedure that requires the use of evidence-based standard skills and care (8). Poor management of this type of nutrition may cause or exacerbate a number of complications, including aspiration, intolerance to nutrition, mechanical obstruction, and infection. In previous studies, the prevalence of pulmonary aspiration, intolerance to nutrition, and mechanical obstruction was 1-77%, 63%, and 14%, respectively (8). Therefore the observation of time, amount and proper method of nutrition start, accurate determination of patient's needs, nutritional content, and follow-up of patients are of high importance (9).

Nurses should better evaluate the nutritional and general status of the patients through knowledge about the effects of undesirable nutrition on the digestive system, nutritional needs of intensive care patients, and standard nutrition practices preventing adverse effects of nutrition. In this regard, nurses should have adequate knowledge and proper practice in relation to enteral nutrition standards in the intensive care units to enhance the quality of nursing care. Auditing is one of the ways to promote and evaluate the quality of care, which is also an important part of the clinical governance process as well as an approach to improve the quality of care and compliance with standards in the healthcare systems (10, 11). Auditing is a process consisting of a set of related activities in which the standard of care is developed, the status quo of the care is assessed, and cases that are not in accordance with the standards are determined (12).

Comparison of the patient's care with current standards can lead to the development of plans to improve the quality of nursing care and patient's safety (10). Accordingly, it is necessary to assess the status of nutritional care of patients in the intensive care units by means of the developed standards. Then, by identifying the status quo and its distance with standards, care problems are identified, according to which educational planning is provided to improve the quality of care and prevent nutritional complications in the intensive care unit.

The aim of this study was to determine the conformity of enteral nutritional care in three areas of nursing care before enteral nutrition, during enteral nutrition, and after enteral nutrition in patients of intensive care units with standards in the intensive care units of hospitals in Bojnurd, North Khorasan Province of Iran in 2016.

Methods

This research is a descriptive study conducted in two Intensive Care Units (neurosurgery and general) of hospitals of North Khorasan University of Medical Sciences in Bojnourd, North Khorasan, Iran, from January to June 2016. The research population included all nursing care related to enteral nutrition in intensive care unit patients (only oropharyngeal and nasopharyngeal tubes).

Using the following formula, the sample size was 384 with 95% confidence level and a marginal error of 5%. Finally, 400 cases of care were examined using time and event sampling methods.

$$n = \frac{\left(z_{1-\frac{\alpha}{2}}\right)^2 p(1-p)}{d^2}$$

Checklist was used to collect data on nursing care associated with enteral nutrition, which consists of three separate parts: dealing with the standard care in relation to before, during, and after enteral nutrition. The checklist was initially designed based on nursing and medical literature as well as available enteral nutrition guidelines (13).

Part 1 was in relation to nursing care before starting enteral nutrition, which includes 14 items such as "washing hands before feeding" or "placing the patient in the semi-sitting position before starting to feed". Part 2 was related to nursing care during enteral nutritional care, which includes 12 items such as "water gavage before the main food gavage" or "whether the height of the gavage container from the patient's bed is correct". Part 3 was concerned with post-enteral nutrition, which contains 4 items such as "after feeding, the patient would be in semi-sitting position". Each phrase assigns one of the options "truly done", "not truly done", or "not done" to itself. In this research, the validity of checklist was evaluated both qualitative and quantitative and Content Validity Index (CVI) was used to determine the validity of checklists. For this purpose, the checklist were assessed by ten faculty members of nursing as well as anesthetist and intensive care specialists in terms, and their comments were applied in the checklist. All the items have Content Validity Ratio $CVR > 0.8$ and the CVI of checklist was 0.82. To verify the reliability of checklist, inter-rater reliability method was used. For this reason, the checklist was provided to the second observer, and according to inter-rater reliability method, the two observers completed a checklist for ten nursing care at the same time; then, the Intraclass Correlation Coefficient was calculated between the scores obtained from their checklists ($ICC = 0.96$). The research was approved in the ethics committee of North Khorasan University of Medical Sciences dated 15/03/2016 with the code IR.NKUMS.REC.1394.134. After receiving permission from authorities, in all three working shifts of the morning, evening, and night, the enteral nutritional care was observed and the checklists were completed. The informed consent was

obtained from all the participants. Data were entered into SPSS software version 16. For data analysis, descriptive statistics (frequency and percentage) was used, and the results were presented in frequency distribution tables.

Results

The compliance of enteral nutrition-related nursing care with standards was assessed in three areas of nursing care before enteral nutrition, during enteral nutrition, and after enteral nutrition in intensive care units. Demographic and clinical characteristics of patients were shown in table 1.

Table 2 shows the extent to which standards are met before starting enteral nutrition. The care that was not performed was related to the control of nasogastric tube, i.e., to measure the PH of 400 (100%) cases and make decision on 399 cases (99.8%) about continuing the feeding. Also, the most commonly performed care items included the appropriate collection of 398 items (99.5%) and wearing non-sterile gloves (278 cases) (69.5%).

Table 3 and 4 shows the observance of standards during and after the enteral nutrition. In the majority of cases, [i.e. 355 cases (88.8%)] before gavage of the main nutritional fluid, water was not gavaged and in most cases [i.e. 399 cases (99.8%)], the gavage syringes had not been separated from the nutritional tube. Also, most of the cases included 30-60 mL of lukewarm water after the gavage of 366 cases (91.5%). The highest level of post-enteral nutrition care has been associated with 397 cases (99.3%), which have been related to the correct recording of the procedure and the resolution of the patient's problems. Also, the highest level of care was elevating the patient's head in the position of 30-45 degrees in 255 cases (38.8%).

Table 1. Demographic and clinical characteristics of patient among 400 enteral nutrition cares Intensive Care Units

Characteristic	N (%) / Mean±SD
Male	172 (43)
Female	228 (57)
Age	56.9 ± 19.6
Duration of admission (days)	17.5 ± 16.8

Table 2. The status of pre enteral nutrition care among 400 cares in Intensive Care Units

Care before starting enteral feeding	Done properly N (%)	Done not properly N (%)	Not done N (%)
Appropriate collection of equipment.	398 (99.5)	2 (5)	0
Wearing non-sterile gloves.	278 (69.5)	50 (12.5)	72 (18)
Review of physician's order for volume, type, and frequency of tubing feed by checking the patient's medical record.	181 (45.3)	184 (46)	35 (8.8)
Attaching syringe and aspirating gastric contents.	149 (37.3)	7 (1.8)	244 (61)
Observing the appearance of aspirated content.	60 (10)	51 (12.8)	289 (72.3)
Perfume hands hygiene.	56 (14)	7 (1.8)	337 (84.3)
Placing patient in 30-45 degree head elevation position.	34 (8.5)	7 (1.8)	359 (89.8)
Checking the position of the marked point of the tube in the nose.	23 (5.8)	1 (0.3)	376 (94)
Identifying the conscious patient by asking the name and unconscious patient by the bracelet.	7 (1.8)	4 (1)	389 (97.3)
Listening to the bowel sounds by stethoscope (physical assessment of abdomen).	5 (1.3)	0	395 (98.8)
Checking PH of the aspirated contents.	0	0	400 (100)
Drawing up 30 mL air into the syringe and auscultating the epigastrium area.	1 (0.3)	15 (3.8)	383 (96)
Checking for gastric residual volume	0	393 (98.3)	7 (1.8)
Not administering the feeding when gastric residual volume is >400 mL and informing the physician.	0	1 (0.3)	399 (99.8)

Table 3. The status of cares during enteral nutrition care among 400 cares in Intensive Care Units

Cares during and after enteral feeding	Done properly N (%)	Done not properly N (%)	Not done N (%)
Upon completion of the gavage, flushing the tubing with 30 mL water.	366 (91.5)	28 (7)	6 (1.5)
Not using the piston to gavage the formula.	360 (90)	13 (3.3)	27 (6.8)
Clamping the feeding tube.	335 (83.8)	10 (2.5)	55 (13.8)
Clamping the feeding tube, removing the syringe from the tube, removing the piston, and attaching the syringe to the feeding tube.	325 (81.3)	73 (18.3)	2 (0.5)
Taking care of not entering excess air into the stomach.	310 (77.5)	76 (19)	14 (3.5)
Placing patient in 30-45 degree head elevation position after feeding for at least one hour.	255 (63.8)	2 (0.5)	143 (35.8)
After the completion of the water, again clamping the tube and pouring some of the measured food into the syringe. Opening the clamp and allowing the food to enter the tube.	237 (59.3)	160 (40)	3 (0.8)
The amount of gavigated formula being equal to the amount of formula in the physician order.	169 (42.3)	229 (57.3)	2 (0.8)
Adjusting the flow rate by changing the syringe height.	127 (31.8)	261 (65.3)	12 (3)
Flush tubing with 30 mL water.	36 (9)	9 (2.3)	355 (88.8)
Keeping the syringe at a height of 30 centimeters.	17 (4.3)	298 (74.5)	85 (21.3)
Assessing the patient's response during and after tube feeding.	10 (2.5)	4 (1)	386 (96.5)
Removing the syringe from the end of the feeding tube.	1 (0.3)	0	399 (99.8)
Disposing of supplies and perfume hand hygiene.	1 (0.3)	3 (0.8)	396 (99)
Documenting tube feeding procedure and the observations (gastric residual volume and patient's tolerance) in the patient's record. Monitoring abnormal cases after documentation.	1 (0.3)	2 (0.5)	397 (99.3)
Covering the end of tube.	0	400 (100)	0

Table 4. The status of cares after enteral nutrition care among 400 cares in Intensive Care Units

Cares after enteral feeding	Done properly	Done not properly	Not done
	N (%)	N (%)	N (%)
Placing patient in 30-45 degree head elevation position after feeding for at least one hour.	255 (63.8)	2 (0.5)	143 (35.8)
Assessing the patient's response during and after tube feeding.	10 (2.5)	4 (1)	386 (96.5)
Disposing of supplies and perfume hand hygiene.	1 (0.3)	3 (0.8)	396 (99)
Documenting tube feeding procedure and the observations (gastric residual volume and patient's tolerance) in the patient's record. Monitoring abnormal cases after documentation.	1 (0.3)	2 (0.5)	397 (99.3)

Discussion

As one of the groups involved in providing patient care, intensive care nurses are engaged in assessment and participation in the implementation of evidence-based care programs, as well as monitoring and evaluating the patient's response to the care provided, including nutrition in the intensive care unit, which is no exception to this rule as an important nursing care (14).

The results of this study indicate that the care provided for enteral nutrition is far from the current standards, the study of Dehghani et al. showed that the performance of nurses in the field of gavage was lower than standard, which was in agreement with the results of this study (6). The results of Ashouri and Fatchi's study have also shown that the performance of nurses before, during, and after parenteral nutrition was lower than the standard (15).

The results Xu et al. showed that 43% of nurses checked the location of the tube before feeding after intervention. Also, the majority of nurses controlled the patient's head to be placed in 30-45 degree positions before feeding (8). In our study, these nursing care has not been performed in most cases. In study of Shayeste et al. in all sections ensured proper placement of the enteral nutrition tube in the patients before the gavage, and their heads were placed at 30-45 degrees, which was different from the results of this study.

Also, in their study, a flush of 20-30 ml of water was performed after feeding and after medications. However, none of the patients had a flush of water before feeding and before the medication, which was consistent with the results of the present study (16). Lack of a clear and consistent evidence-based guideline for feeding tubes in the Intensive Care Units was among the reasons for the gap between the standard guidelines and the real nursing care in the patient's bedside, which was similar in the current study and other related studies. On the other hand, there are currently at least six enteral nutrition guidelines that can lead to confusion in nurses. In addition, many of these guidelines do not explicitly investigate the specialized nursing practices for feeding intensive care patients, which involve topics such as how to place the feeding tube, how to ensure that the tube is open and is in the correct place, how to check the patient's nutritional tolerance, etc. Lack of adequate knowledge about the importance of nutrition for an intensive care patient may be another reason for a low level of nursing care. Many intensive care nurses consider the nutrition topic as having a low priority in the care. On the other hand, the lack of interdisciplinary collaboration in the assessment and management of patient nutrition is one of the issues that can cause problems for patient's nutrition. Patient feeding is not the only responsibility of the nurse, and a high-quality care in this field requires the participation of physicians and

nutritionists (14). Failure of timely visit to a physician to start patient's nutrition and monitor the problems and complications of nutrition are examples that can lead to problems and non-observation of the adequate standard of patient feeding care by the nurse. The most important barriers to enteral nutrition by intensive care nurses in the study of Cahill et al. were as follows: higher importance of other nursing care than nutrition, lack of adequate equipment, lack of adequate gavage solution, difficulty in access to small intestine catheters in patients who do not tolerate feeding, lack of expert or nutritionist in the department (especially on holidays), physician's delay in starting a patient's nutrition and prescribing gastrointestinal drugs, and the nutritionist's delay in visiting the patient (17).

Studies show that despite the great benefits of nutrition in the intensive care unit, a significant number of these patients do not receive enough enteral nutrition and that the performance of nurses in the nutritional area of intensive care patients results in less calorie intake and malnutrition (18, 19). The results of the present study also show that nearly half of the patients with intensive care are not fed to the level specified in the index card (i.e. less than the prescribed volume). Twelve out of 77 patients studied in Yip et al. research were fed less than their prescribed amount during their hospitalization period in ICU, and the majority of patients in the study of Raid received 80% of their estimated calories and energy (20, 21). The majority of patients studied by Umayara et al. also received 50% of the estimated calorie intake (22). This nutritional deficiency can be correlated with a shortage of nursing staff, shortage of food available for gavage, lack of proper equipment, lack of priority in patient nutrition, and lack of specific guidelines for determining patient's intolerance (23).

Another challenging issue is the topic of controlling gastric residual volume and recognizing patient's tolerance. Determining the patient's tolerance level by measuring gastric residual volumes is

usually considered as one of the most important nursing cares associated with nutrition. However, the level of residual considered as excessive and the diagnosis of intolerance for the patient are still challenging (23). On the other hand, measurement of the total amount of the patient's gastric residual volume is difficult, or even impossible, due to the lack of sufficient facilities for lavage and measurement. Limited studies suggest the use of residual gastric volumes as a measure of nutritional tolerance (23). Currently, in the intensive care units examined in this study, the gastric residual volume -which is determined by tube aspiration before starting the gavage-, is considered as an important criterion for the next feeding. This amount is limited to a 60 mL syringe used in gavage due to the limited availability of testing equipment. The results of the present study show that in almost all related cares before the start of feeding, the volume less than 400 mL was considered as intolerance. However, according to academic sources, intolerance is defined as the amount of gastric residual contents between 150-500 mL times twice or the residual volume more than 500 mL times, or vomiting (24).

Another post-enteral nutrition nursing care is the documentation of enteral nutrition procedure and nursing observations. Almost all the care done in this study was completely routine in the sheet and there was no explanation of the content and type of nutrition, the gastric residual volume, the patient's response to nutrition, potential problems and complications as well as measures taken to resolve the complications. In a study by Hanifi et al. about the lack of proper nursing documentation, the most important reasons for the lack of complete and correct nursing documentation from nurses' viewpoints are the weaknesses in the monitoring and control system, the lack of care by physicians in nursing documentation, the nurses' compliance with routine guidelines of wards in the lack of attention to basic documentation, the routine use of Nursing Department Report

(traditional and unproductive methods), the lack of appropriate nurse to patient ratio, and the heavy workload (25).

One of the pre-feeding nursing cares evaluated in this study was washing and disinfecting hands before care, which was properly done by 14%, inappropriately done by 1.8%, and was not done by 84.3%. In a study that aimed to sanitize nurses' hands in intensive care units, only 16.98% had taken hygienic measures, which was far less than expected (26). In Salemi et al. study, more than half of the nurses did not wash their hands before the extubation of the tracheal tube, which was consistent with the results of this study (27). Researchers mentioned crowded wards, getting used to conventional practices, lack of nurses' awareness, negligence, unavailability of hand sanitizers, and ultimately management weaknesses as reasons for improper hygienic practices of nurses (27).

The results of Tabrizi and Partovi showed that the rate of hand washing before infectious and noninfectious interventions was 77.2%, which was different from the results obtained in the present study probably due to the difference in sample size (28). The limitation of this research was changing behavior and performance of nurses due to the presence of the researcher, which was attempted to be avoided as much as possible, and, if the behavior change was observed, the performance registration was denied.

According to the results of this study, it appears that the quality of enteral nutrition care before and after enteral nutrition is far from standards, which is more critical in intensive care patients who are vulnerable to multiple causes. From the viewpoint of the researcher, this could suggest the need for the training of the above items to improve the quality of routine enteral nutrition care.

Since this study merely examines the conformity of enteral nutrition nursing care with standards, it is suggested to investigate barriers to standard care in

relation to enteral nutrition, the reasons for not providing standard care, and compare nurses' knowledge and practice in this area. Also, the development of native nutrition guidelines, its implementation in the intensive care units, and measuring its impact on the quality of nursing care can also be an effective step to improve the quality of enteral nutrition nursing care.

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Conflict of interest

The authors declare no conflict of interest.

References

1. Potter P, Perry G, Stockert P, Hall A. *Fundamentals of Nursing*. 8 ed. Philadelphia: Mosby; 2016. P. 996.
2. Mosazadeh S, Khaleghdoost Mohammadi T, Hasavari F, Kazem Nejad Leili E. Study the chance of respiratory aspiration in intermittent bolus tube feeding in ICU and Trauma ward patients. *Journal of Holistic Nursing And Midwifery*. 2011;21(2):40-6.
3. Abbasi Nazari M, Fariborz Farsad B, Mostafa Alavi S, Bakhshandeh H, Kharazmkia A, Ariaeinejad P. Comparison of Maastricht index between ICU admitted patients receiving a standard enteral feeding product or kitchen made enteral feeding in a teaching hospital of Iran. *Journal of Mazandaran University of Medical Sciences*. 2011; 21(81):54-60.
4. Kattelman KK, Hise M, Russell M, Charney P, Stokes M, Compher C. Preliminary evidence for a medical nutrition therapy protocol: enteral feedings for critically ill patients. *J Am Diet Assoc*. 2006; 106(8):1226-41.

5. Williams TA, Leslie GD. A review of the nursing care of enteral feeding tubes in critically ill adults: part I. *Intensive Crit Care Nurs.* 2004; 20(6):330-43.
6. Dehghani K, Nasiriani K, Mousavi T. [Investigating intensive care unit nurses' performance and its adjusting with standard. *Journal of Shahid Sadoughi University of Medical Sciences.* 2014; 21(6):808-15. [Persian]
7. Gupta B, Agrawal P, Soni KD, Yadav V, Dhakal R, Khurana S, et al. Enteral nutrition practices in the intensive care unit: Understanding of nursing practices and perspectives. *J Anaesthesiol Clin Pharmacol.* 2012; 28(1):41-4.
8. Xu Y, Ren X, Shi W, Jiang H. Implementation of the best practice in nasogastric tube feeding of critically ill patients in a neurosurgical intensive care unit. *Int J Evid Based Healthc.* 2013; 11(2):128-33.
9. Yousefzadeh S, Shabbidar S, Dehnadi Moghaddam A, Ahmadi Dafchahi M. Assessment of nutritional support in head trauma patients in Neurosurgery Intensive Care Unit. *Journal of Gorgan University of Medical Sciences.* 2007; 9(3):53-8. [Persian]
10. Razmara R, Masoumpoor A, Dabirian A, Pahlavanzadeh B. [Auditing of pre & postoperative nursing cares in neonates admitted at selected hospitals of shahid beheshti university of medical sciences]. *Journal of Urmia Nursing and Midwifery Faculty.* 2015; 13(8):718-27. [Persian]
11. Najafi Anari H, Rassouli M, Atashzadeh Shourideh F, Namdari M. [Auditing preterm neonatal nutrition nursing care]. *Quarterly Journal of Nursing Management.* 2014; 2(4) 29-37. (Persian)
12. Najafi Pur S, Rassouli M, Masoum Pur A, Kavousi A. [Auditing of preventive nursing care regarding neonatal hypothermia at Shahid Beheshti Medical Sciences University selected hospitals in 2011]. *Modern Care Journal.* 2012; 9 (2):104-13. [Persian]
13. Lynn P. *Taylor's Clinical Nursing Skills: A Nursing Process Approach.* 4 ed. Philadelphia Lippincott Williams & Wilkins; 2014; 578-587.
14. Marshall AP, Cahill NE, Gramlich L, MacDonald G, Alberda C, Heyland DK. Optimizing nutrition in intensive care units: empowering critical care nurses to be effective agents of change. *Am J Crit Care.* 2012; 21(3):186-94.
15. Ashouri E, Fatehi N. A comparison of performing tube feeding with the standard procedures at selected educational and treatment centers of Isfahan University of Medical Sciences, Iran. *J Nurs Midwifery Res.* 2012; 17(2 Suppl 1):S80-4.
16. Shayesteh F, Poudineh S, Mohammad Zadeh M, Pouryazdanpanah M, Ayoudi S, Norouzy A. [Assessment of nutritional intake in intensive care unit patients of Ghaem hospital]. *Medical Journal of Mashhad University of Medical Sciences.* 2015; 58(4):217-24. (Persian)
17. Cahill NE, Murch L, Cook D, Heyland DK. Barriers to feeding critically ill patients: a multicenter survey of critical care nurses. *J Crit Care.* 2012; 27(6):727-34.
18. Ros C, McNeill L, Bennett P. Review: nurses can improve patient nutrition in intensive care. *J Clin Nurs.* 2009; 18(17):2406-15.
19. Marshall AP, West SH. Enteral feeding in the critically ill: are nursing practices contributing to hypocaloric feeding? *Intensive Crit Care Nurs.* 2006; 22(2):95-105.
20. Yip KF, Rai V, Wong KK. Evaluation of delivery of enteral nutrition in mechanically ventilated Malaysian ICU patients. *BMC Anesthesiol.* 2014; 14:127.
21. Reid C. Frequency of under- and overfeeding in mechanically ventilated ICU patients: causes and possible consequences. *J Hum Nutr Diet.* 2006; 19(1):13-22.
22. O'Meara D, Mireles-Cabodevila E, Frame F, Hummell AC, Hammel J, Dweik RA, et al. Evaluation of delivery of enteral nutrition in critically ill patients receiving mechanical ventilation. *Am J Crit Care.* 2008; 17(1):53-61.
23. Marshall A, West S. Nutritional intake in the critically ill: improving practice through research. *Aust Crit Care.* 2004; 17(1):6-8, 10-5.
24. Elke G, Felbinger TW, Heyland DK. Gastric residual volume in critically ill patients: a dead marker or still alive? *Nutr Clin Pract.* 2015; 30(1):59-71.
25. Hanifi N, Mohamadi E. [Survey of causes of faculty nursing documentation]. *Journal of Hayat.* 2004; 10(2):39-46. [Persian]
26. Nazari R, Haji Ahmadi M, Dadashzade M, Asgari P. [Study of hand hygiene behavior among nurses in Critical Care Units]. *Journal of Critical Care Nursing.* 2011; 4(2):93-6. [Persian]
27. Salimi M, Masoumpoor A, Shirinabadi Farahani A, Shakeri N, Alae Karharoudy F, Shiri H. [Auditing nursing care related to weaning neonates from mechanical ventilation in neonatal intensive care units]. *Journal of Hayat.* 2016; 22(2):159-74. [Persian]
28. Tabrizi js, Partovi y. [Clinical Audit of Hand Hygiene Process of Nurses in a General Hospital in Tabriz city]. *Journal of Hospital.* 2015; 14(2)23-34. [Persian]