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THE EFFECT OF ENTERAL NUTRITION EDUCATION GIVEN TO INTENSIVE CARE NURSES ON THEIR LEVEL OF KNOWLEDGE
YOĞUN BAKIM HEMŞİRELERİNE VERİLEN ENTERAL BESLENME EĞİTİMİNİN BİLGİ DÜZEYLERİNE ETKİSİ

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ABSTRACT

This research was experimentally designed as a pre-test and post-test in order to determine the effect of enteral nutrition education given to intensive care nurses on their knowledge levels. The study was conducted with 100 nurses working in the intensive care units of a training and research hospital. Before training (pre-test), it was determined that the mean knowledge score of the nurses was 42.04±22.55. It was determined that it increased to 80.12±12.51 after training (post-test) and this score difference was statistically significant at an advanced level ($p<0.001$). In addition, post-training knowledge score averages increased in all groups. The increase in nurses' knowledge scores for each sub-dimension of the test is statistically significant. Based on these results, it is recommended to develop nurses with in-service training programs on enteral nutrition and nursing care and to keep the information up-to-date by periodically repeating the training.

Keywords: Enteral nutrition, intensive care, intensive care nurse, knowledge level

ÖZ

Bu araştırma, yoğun bakım hemşirelerine verilen enteral beslenme eğitiminin bilgi düzeylerine etkisini belirlemek amacıyla ön test ve son test düzeninde deneysel olarak tasarlanmıştır. Çalışma, bir eğitim ve araştırma hastanesinin yoğun bakım ünitelerinde çalışan 100 hemşire ile yapılmıştır. Eğitim öncesinde (ön-test) hemşirelerin bilgi puan ortalamasının 42.04±22.55 olduğu belirlenmiştir. Eğitim sonrasında (son-test) bilgi puan ortalamasının 80.12±12.51'e yükseldiği ve bu puan farkının ileri düzeyde istatistiksel olarak anlamlı olduğu belirlenmiştir ($p<0,001$). Ayrıca eğitim sonrası bilgi puan ortalamaları tüm gruplarda yükselmiştir. Testin her bir alt boyutu için hemşirelerin bilgi puanlarındaki artış istatistiksel olarak anlamlıdır. Bu sonuçlara dayalı olarak hemşirelerin enteral beslenme ve hemşirelik bakımı konusunda hizmet içi eğitim programları ile geliştirilmesi ve eğitimlerin periyodik olarak tekrarlanarak bilgilerin güncellenmesi önerilmektedir.

Anahtar kelimeler: Bilgi düzeyi, enteral beslenme, yoğun bakım, yoğun bakım hemşiresi

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INTRODUCTION

Nutrition has an important role in intensive care units where special treatment and care practices are provided and critical patient care is provided (1,2). Especially critically ill patients are often at risk of malnutrition (3). Studies conducted on this subject have reported that approximately 40% of the patients admitted to the intensive care unit are malnourished (4) and 70% develop iatrogenic malnutrition while hospitalized in the intensive care unit (5).Also, it is known that the treatment and recovery period of patients with malnutrition or at risk take longer than those without malnutrition (6). Malnutrition leads to susceptibility to infection, delayed wound healing, prolongation of hospital stay, and mortality in patients (3). Considering all these, it is predicted that clinical outcomes can be improved and so various complications can be reduced with nutritional support therapy (7, 8).

The European Society for Clinical Nutrition and Metabolism (ESPEN) and the American Society for Parenteral the Enteral Nutrition (ASPEN) that enteral nutrition should always be the first choice in nutritional support treatment (1,2). Enteral nutrition provides the use of the gastrointestinal system (GIS), both supporting immunity and facilitating the transition to oral nutrition (9). Enteral nutrition, which is the delivery of nutrients to the patient's GIS, can be done with different methods (2, 10).The administration of enteral nutrition to the patient is continuous, intermittent, or bolus feeding (11). However, as with any treatment, complications can also be encountered in enteral nutrition (12). These are conditions such as aspiration, diarrhea, nausea, vomiting, bloating, constipation, tube dislocation, tube occlusion, ostomy infection, and re-feeding syndrome (13,14). Complications that occur with enteral nutrition often lead to pausing or stopping of enteral nutrition (14). In this process, duties such as preventing complications and ensuring the continuity of enteral nutrition belong to the intensive care nurse (15). The duties of the intensive care nurse during the patient's nutrition process can be listed as diagnosing malnutrition, creating, applying, and maintaining nutritional support therapy (15,16). Studies show that the intensive nurse treats patients with enteral nutrition earlier than doctors and dietitians (17,18). In addition, intensive care nurses have an important role in the application of enteral nutrition and the prevention of complications that may occur(15,19). Among the practices undertaken by the nurse are also; body positioning during nutrition, correct application of nutrients, replacement of nutrition injectors/sets, and monitoring of storage conditions of nutritional solutions (11,20). In addition to all these, ostomy care is included in the nursing care of enteral nutrition, preventing dislocation and clogging of the tube (19-21).

Intensive care nurses, who are responsible for the enteral nutrition of critically ill patients, need to guide their practices with evidence-based information (22,23). Because in today's conditions, it is only possible to provide quality care and increase patient satisfaction, only thanks to nurses equipped with up-to-date information (23). In a study, it was determined that the incidence of enteral nutrition complications was less in the patients of nurses who performed evidence-based practices (24). In another study, it was determined that nurses with higher education levels had higher patient satisfaction (25).However, studies show that intensive care nurses have low or moderate knowledge about enteral nutrition (21,26). It is also reported that nurses who do not have sufficient knowledge about enteral nutrition cause undesirable patient outcomes (14). Gimenes et al. (27) found that 36% of nurses' mistakes in the preparation and administration of drugs resulted in tube obstruction. Renewal of the tube as a result of occlusion causes the interruption of nutrition for the patient, as well as increases the cost (27). Uysal et al. (28) found that nurses could not use care guidelines and protocols in enteral nutrition practices. Also, Darawad et al., (29) stated in their study that nurses obtained enteral nutrition information during their undergraduate education or from the internet. As a result, in intensive care units where enteral nutrition is most frequently applied, it is important to determine the knowledge level of nurses and to organize training to eliminate deficiencies in providing quality nursing care (30,31). The purpose of this study is to determine the knowledge levels of intensive care nurses and to determine the effect of enteral nutrition education given in the light of evidence-based guidelines on their knowledge levels. Thus, it is thought that it will contribute to improving enteral nutrition, preventing medical errors, increasing patient satisfaction, and reducing costs (17,25,32).

MATERIAL AND METHOD

Design of Research

The research was designed in a single group pretest-posttest experimental model.

Population and Sample of the Research

The population of the research consists of nurses working in the adult intensive care units of the training and research hospital affiliated with the Ministry of Health, which is a regional hospital in a city. The sample of the study consists of 118 nurses working in all intensive care units of the hospital. However, 100 nurses voluntarily participated in the study (seven on leave and report, 11 non-volunteers).

Tools for Data Collection

The data of the research; was collected with a "questionnaire form", which was created by the researcher by scanning the literature, including questions to determine the introductory characteristics of nurses, and their knowledge about enteral nutrition and nursing care.

Questionnaire

The questionnaire consists of two parts. The first part consists of 19 questions related to the status of nurses such as gender, age groups, intensive care unit where they work, education status, total year of service, year of service in intensive care, enteral nutrition course, or in-service training. The questions in the second part are prepared to evaluate knowledge. These questions are based on dietary guidelines and a literature review (1-3, 10, 11, 14, 15, 19, and 22) and consist of 25 multiple-choice questions prepared by the researcher.

Each question has five options and one correct answer. All options marked except the correct option were considered incorrect. The sub-dimensions of the second

section are as follows. First sub-dimension; nutrients, enteral nutrition access methods, stoma site infection, nasoenteric tube site verification, and correct feeding. Second sub-dimension: malnutrition risk screening, malnutrition assessment, enteral nutrition indication, priority feature of enteral nutrition, and follow-up of patients receiving enteral nutrition. Third sub-dimension; control of pre-feeding place with NG tube, administering drugs through the enteral tube, food storage conditions, patient position in feeding, food temperature, and delivery rate. Fourth sub-dimension: enteral feeding tube care, oral care in the patient with NG tube, feeding injector replacement time, tube occlusion status, and stoma care. Fifth sub-dimension; patients with NG tube have skin problems, gastrostomy/ jejunostomy complications, GIS complications, tube occlusion problems, and enteral nutrition problems. Each question was given four points in the questionnaire, and a total of 25 questions were evaluated out of 100 points. The knowledge status of the nurses was evaluated as the knowledge score average of the five basic sub-dimensions and the general knowledge score average. Sub-dimensions and questions were reviewed by a clinical nutritionist, a clinical nutrition nutritionist, and six specialist nurses and were finalized.

Pilot Study

Before starting the study, a preliminary application was made to 10 nurses working in the "palliative care center", which is the service where enteral nutrition and nursing care are frequently performed, in order to determine the intelligibility of the questionnaire and the application period of the data collection tools. After the pre-application, the final adjustments were made to the questionnaire and the individuals who were taken into the pre-application were not included in the sample.

Data Collection

Among the nurses working in the intensive care units, who agreed to participate in the study, the researcher went to the clinics during working hours and administered a pre-test in approximately 20-25 minutes by face -to-face interview method. Based on the learning transfer models in the literature, the evaluation of knowledge acquisition and educational outcomes should be done at least 30 days later (33-35). In similar studies, it is seen that the applications and evaluations are made in the same way (36,37).For this reason, 30 days after the training was completed, the nurses went to the clinics during working hours and applied the post-test by the researcher through face-to-face interviews. In order to prevent the nurses from affecting each other, data were collected by interviewing each nurse separately in the clinics during working hours (In a day and night shifts).

Educational Program

The subject order of the Ministry of Health "Nutritional Nursing Certificate Program" training was created by taking the subject order in the learning content as a guide. ESPEN and ASPEN guidelines were taken as the main source. In addition, the training content was prepared by taking the learning objectives of the Ministry of Health "Nutrition Nursing Certificate Program" training and the subjects included in the training content as a guide. Basic principles in enteral nutrition, evaluation of enteral nutrition, application steps in enteral nutrition, nursing care in enteral nutrition, complications of enteral nutrition education were included. The researcher participated in certificate programs organized by various institutions and organizations before and after the training. The training was carried out in groups of 10-20 people. Nurses participating in the study received 45 minutes of training. The announcement of the training was made with information cards and posters prepared by the researcher. The nurses who will participate in the training were contacted by the researcher two days in advance and reminded to attend the training. The signatures of the nurses who participated in the training were obtained at the end of the training. In the training program; Oral presentation with a powerpoint presentation, video presentation, question-answer, and interactive presentation techniques were used. In addition, tools and equipment used in enteral nutrition (enteral nutrition pump, enteral nutrition bag, nasogastric tube, nasoduodenal tube, and some of the enteral nutrition products) were used during the presentation (FigureI).

Ethical Issues

Prior to the research, the Academic Committee Decision and the approval of the Ethics Committee

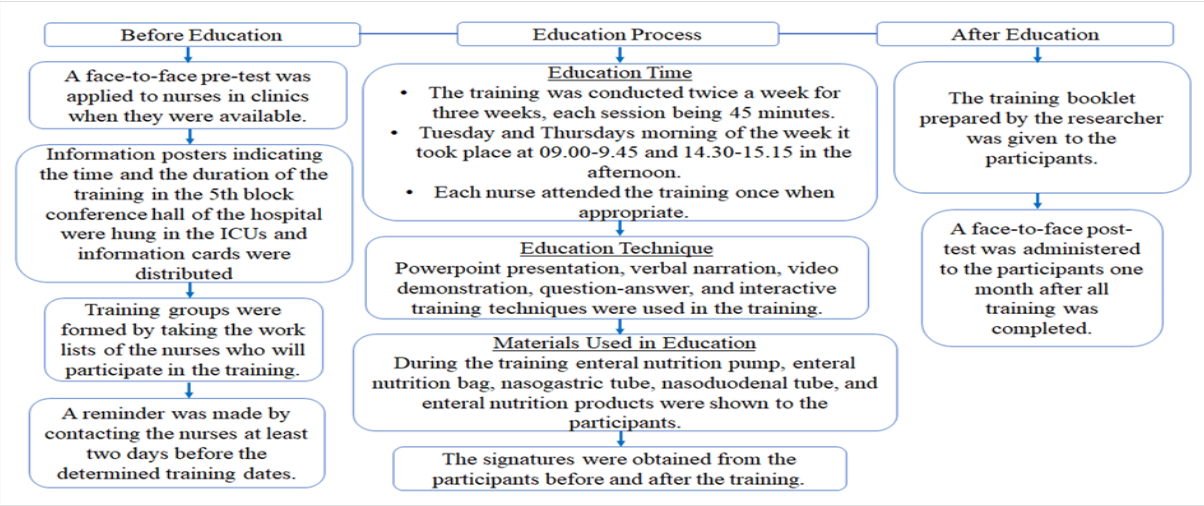

Figure I Education process of nurses.

(2016/650) and institutional permission were obtained. The purpose of the research was explained to the participants, their written and dictionary approvals were obtained, and the informed consent (assent) form was signed.

Statistical Analysis and Evaluation of Data

Histogram, q-q plots and Shapiro-Wilk's test was performed to assess the data normality and Levene's test was applied to test variance homojenity. To compare differences between pre-test and post-test, Mc Nemar test and paired-samples t-test were used for categorical and continuous variables, respectively. Independent sample t-test and one-way analysis of variance were used to determine the difference between groups. Post-hoc tests were applied for statistically different groups. Post-power analysis was performed using the PASS program after the analysis. While applying this analysis, t-test for dependent samples was performed with an effect size of 0.5 and analpha value of 0.05, while the sample size was 100, and the power of the test was 0.9986. Data analysis was evaluated with software R-3.2.0 (www.r-project.org). The $p<0.05$ level was considered significant in the study.

RESULTS

In the research, nurses; from Table I, it was determined that 65.0% were women, 32.0% were in the 36-40 age group, 58.0% had a bachelor's degree, 26.0% worked in the anesthesia intensive care unit and 20.0% worked in the cardiology intensive care unit. 48.0% of the nurses worked in the intensive care unit for 6-10 years, 55.0% worked 49 hours or more per week, 39.0% worked for 2-3 patients during the day, and 75.0% of them provide care for three or more patients at night. Also, it was determined that 66.0% of the nurses did not have an intensive care nursing certificate, 15% took enteral nutrition courses or in-service training, and 78.0% saw their colleagues as a source of information about enteral nutrition (Table I).

The level of enteral nutrition knowledge of nurses before and after education is given in Table II. While 38.0% of nurses gave the correct answer to the question of access methods of enteral nutrition regarding the basic principle of entreat nutrition before the education, 94% of the correct answers were correct after the education, and the difference was statistically significant ($p<0.001$). The percentage of correct answers to the question on malnutrition risk screening for the title of status assessment in entreat nutrition was 48.0% before the training and 91.0% after the education, and it was statistically highly significant ($p<0.001$).

In the title of application steps in entreat nutrition, the correct answer to the question of food temperature and feeding rate was 65.0% before the training, while it was 96.0% after the education, and the difference was highly significant ($p<0.001$). In the topic of nursing care in entreat nutrition, 13.0% gave the correct answer to the question of stoma care before the education, while 94.0% gave the correct answer after the education. Statistically, the difference is highly significant ($p<0.001$). On the topic of enteral feeding complications, the number of correct answers to the question on entreatf eeding problems was 53.0% before the education, while it was 93.0% after the training and it shows a high degree of significance ($p<0.001$).

The mean scores of the sub-dimensions of the entreat nutrition knowledge of the nurses are given in Table III. The nurses' mean of basic principles in entreat nutrition was 34.60±33.13 before education and 84.00±19.70 after education ($p<0.001$). The mean of the condition assessment subheading in enteral nutrition was 29.80±25.81 before the education and 69.60±23.35 after the training ($p<0.001$). The mean of the application steps in enteral nutrition was 55.40±31.89 before theeducation and 87.80±18.18 after the education ($p<0.001$). The average of nursing care subheading in entreat nutrition was 51.80±22.94 before education and 91.80±15.07 after education ($p<0.001$). The mean of enteral nutrition complications subheading was 38.60±26.86 before the education and 67.40±21.21 after the education ($p<0.001$). The average score of general knowledge before the education of the nurses in the study was 42.04±22.55, and the mean score of knowledge after the education was determined as 80.12±12.51, statistically significant ($p<0.001$).

When the knowledge score averages of the nurses were examined according to the units they worked in, it was determined that the knowledge score averages of the internal medicine intensive care workers were 13.14±4.45 before the education and 79.42±9.91 after the education (Table IV). The knowledge point averages of the neurology intensive care workers were 61.25±16.95 before the training and 84.50±5.44 after the training.

The mean knowledge scores of all these intensive care nurses before and after education are quite significant ($p<0.001$). The mean knowledge score of those nurses working in general surgery was 58.22±20.01 before the training and 73.33±10.58 after the training. The difference in the mean knowledge score in this group was not statistically significant ($p>0.05$). While the within-group difference before the education was statistically significant ($p<0.001$) according to the units where the nurses work, the within-group difference after the education was not significant ($p>0.05$).

Considering the years of service of the nurses in the intensive care unit, the mean knowledge score of nurses working for 6-10 years before education is 36.92±19.91, and the mean knowledge score after education is 81.67±9.83. The mean difference between nurses' pre- and post-educational scores according to all years of service is statistically highly significant ($p<0.001$). The difference within the group between the years of service in the intensive care unit was not significant before and after the education ($p>0.05$).

The mean knowledge score of nurses with intensive care nursing certificates was 44.59±24.74 before education and 80.71±9.52 after education. The average knowledge score of the nurses without a certificate was 40.73±21.41 before the education and 79.82±13.86 after the education, and the mean knowledge score difference before and after the education was highly significant in both groups ($p<0.001$).

The difference between the groups according to the status of having an intensive care certificate was not significant before and after the training ($p>0.05$).

Table I. Descriptive Characteristics of Nurses (*n*=100).

Specifications	*n*	%
Gender		
Female	65	65.0
Male	35	35.0
Age		
20-25	8	8.0
26-30	24	24.0
31-35	28	28.0
36-40	32	32.0
≥41	8	8.0
Education		
Health High School	12	12.0
Associate degree program	25	25.0
Bachelor	58	58.0
Master	5	5.0
Intensive Care Unit (ICU)		
Anesthesia	26	26.0
Cardiology	20	20.0
Neurology	16	16.0
Cardiovascular surgeon	12	12.0
Brain surgeon	10	10.0
General Surgery	9	9.0
Internal diseases	7	7.0
Experience years of the nurse in ICU		
1-5	42	42.0
6-10	48	48.0
11-15	9	9.0
16-20	1	1.0
Working Hour In Week		
40-48	45	45.0
≥49	55	55.0
Number of patients in a day		
1-2	23	23.0
2-3	39	39.0
3-4	30	30.0
Number of Patients in a Night		
1-2	12	12.0
≥3	75	75.0
Having an Intensive Care Nursing Certificate		
There is	34	34.0
None	66	66.0
Enteral Nutrition Course or In-Service Education		
Yes	15	15.0
No	85	85.0
Information Resources in Enteral Nutrition *		
Health book, magazine (yes)	24	24.0
Internet (yes)	58	58.0
Colleagues (yes)	78	78.0
Other healthcare professionals (yes)	60	60.0
Postgraduate education(yes)	39	39.0

**Multiple answers given (yes)*

The mean knowledge score of the nurses who took enteral nutrition course or in-service training before the training was 49.33±21.20, and it was 87.20±5.89 after the training. The average knowledge score of the nurses who did not take an enteral nutrition course or in-service training was 40.75±22.66 before the training and 78.87±12.97 after the training. In both groups, the difference in mean knowledge score before and after the education was statistically significant ($p<0.001$). While the nurses' enteral nutrition course or in-service training was not significant in the mean knowledge score before the education ($p>0.05$), the difference in the average knowledge score within the group after the education was significant ($p<0.05$).

DISCUSSION

Considering the patient profile in the intensive care units, the importance of nutritional support therapy in the prevention and treatment of malnutrition increases (1). Enteral nutrition, which is frequently used in intensive care units, is one of the important options of nutritional support therapy (14,15). Therefore, it is extremely important that nurses, who are the practitio-

Table II. Nurses' Knowledge Level Before and After Education (n=100).

Subjects	Before Education		After Education		
	n	%	n	%	*p**
Basic principles in entreat nutrition					
Food items	33	33.0	83	83.0	**<0.001**
Enteral nutrition access methods	38	38.0	94	94.0	**<0.001**
Stoma site infection	38	38.0	86	86.0	**<0.001**
Nasoenteric tube localization	28	28.0	77	77.0	**<0.001**
Giving the food right	36	36.0	80	80.0	**<0.001**
Enteral nutrition evaluation					
Malnutrition risk screening	48	48.0	91	91.0	**<0.001**
Malnutrition assessment	29	29.0	78	78.0	**<0.001**
Enteral nutrition indication	17	17.0	53	53.0	**<0.001**
Enteral nutrition priority feature	29	29.0	62	62.0	**<0.001**
Enteral feeding patient follow-up	26	26.0	64	64.0	**<0.001**
Application steps in entreat nutrition					
Ground control before feeding with NG tube	52	52.0	93	93.0	**<0.001**
Drug administration through the EN tube	37	37.0	77	77.0	**<0.001**
Food storage conditions	53	53.0	83	83.0	**<0.001**
Patient position in nutrition	70	70.0	90	90.0	**<0.001**
Food temperature and delivery rate	65	65.0	96	96.0	**<0.001**
Nursing care in entreat nutrition					
Enteral feeding tube care	73	73.0	96	96.0	**<0.001**
Oral care in the patient with NG tube	89	89.0	95	95.0	0.180
Nutrition injector change time	50	50.0	89	89.0	**<0.001**
Clogging of the tube	34	34.0	85	85.0	**<0.001**
Stoma care	13	13.0	94	94.0	**<0.001**
Enteral feeding complications					
Patient skin problem with NG tube	20	20.0	74	74.0	**<0.001**
Gastrostomy/jejunostomy comp.	41	41.0	25	25.0	**0.011**
GIS complication	34	34.0	75	75.0	**<0.001**
Tube clogging	45	45.0	70	70.0	**<0.001**
Enteral feeding problems	53	53.0	93	93.0	**<0.001**

**McNemar test statistics as applied. Significant p values are shown in bold.*

Table III. Nurses' Before Education and After Education Knowledge Scores Mean (n=100).

Chapters	Before Education	After Education	*p*
Basic principles in entreat nutrition	34.60±33.13	84.00±19.70	**<0.001**
Status assessment in entreat nutrition	29.80±25.81	69.60±23.35	**<0.001**
Application steps in entreat nutrition	55.40±31.89	87.80±18.18	**<0.001**
Nursing care in entreat nutrition	51.80±22.94	91.80±15.07	**<0.001**
Enteral feeding complications	38.60±26.86	67.40±21.21	**<0.001**
General Knowledge Score	42.04±22.55	80.12±12.51	**<0.001**

Paired-Samples t test applied. Values are expressed as mean±standard deviations. Significant p values are shown in bold.

ners of enteral nutrition therapy, have sufficient knowledge about this issue (15). Studies conducted so far show that nurses have a lack of knowledge on this subject and that those who have received training are insufficient (21).

This study was conducted to determine the effect of enteral nutrition education given to intensive care nurses on their knowledge levels. It is seen that basic information about enteral nutrition is given during the nursing education process, but nurses do not attend trainings and courses on this subject during their working life (26). In addition to this, as a source of information to eliminate the lack of knowledge of nurses on this subject in the clinical environment; it has also been determined in studies that they see colleagues and doctor (19). In our study, similar to the literature, it was determined that 85% of the nurses did not receive in-service training or courses on enteral nutrition and care, and they saw their colleagues (yes) at the highest rate (78%) as the source of information. In Özbas's (30) study, it was determined that nurses mostly obtained information about enteral nutrition from their colleagues. Similarly, in Boztas's (31) study, it was determined that nurses stated clinical studies, education life and colleagues as the main source of information about enteral nutrition. It is believed that the reason why nurses consider their colleagues as a source of information is that they can easily reach them, they need to solve problems quickly, and they often get the right information.

In many studies, it is seen that in-service trainings and courses increase the knowledge and skills of nurses and contribute to the quality of nursing care in different dimensions (37). Ahmed et al. (38) in their study, the average score of the nurses according to a specified enteral nutrition instruction was 47.6 ±12.9, the average score of the nurses after the training given according to the enteral nutrition instruction increased to

Table IV. Before and After Education Knowledge Scores of Nurses According to Descriptive Characteristics

Descriptive Features	Before Education	After Education	*p*
Gender			
Female	45.78±23.41	81.91±10.30	**<0.001**
Male	35.09±19.31	76.80±15.46	**<0.001**
p*	**0. 016**	0.051	
Age			
20-25	33.50±23.12	74.50±19.24	**0.011**
26-30	41.33±21.71	79.17±15.87	**<0.001**
31-35	38.14±20.55	81.14±11.51	**<0.001**
36-40	46.88 ±24.56	81.50±9.41	**<0.001**
41 years and older	47.00±23.00	79.50±7.84	**0.006**
p*	0. 431	0.680	
Graduation			
Health High School	32.00±21.64	79.67±8.77	**<0.001**
Associate degree program	42.24±21.82	80.80±7.92	**<0.001**
Bachelor	44.35±22.14	79.72±15.11	**<0.001**
Master	38.40±32.57	82.40±4.56	**0.041**
p*	0.379	0.959	
In The Intensive Care Unit			
Anesthesia	43.08±15.19[ab]	80.46±13.87	**<0.001**
Cardiology	33.40±26.03[abce]	76.20±17.34	**<0.001**
Neurology	61.25±16.95[d]	84.50±5.44	**<0.001**
Cardiovascular surgeon	23.67±7.90[c]	81.00±11.58	**<0.001**
Brain surgeon	53.60±16.24[ad]	85.60±5.06	**<0.001**
General Surgery	58.22±20.01[ad]	73.33±10.58	0.079
Internal diseases	13.14±4.45[e]	79.43±9.91	**<0.001**
p*	**<0.001**	0. 196	
Years of Service in The Intensive Care			
1-5	45.33±23.88	78.19±15.68	**<0.001**
6-10	36.92±19.91	81.67±9.83	**<0.001**
11-15	51.56±25.80	80.0±8.25	**0.010**
16-20	64.00	88.00	-
p*	0.114	0.552	
Having an The Intensive Care Nursing Certificate			
To have	44.59±24.74	80.71±9.52	**<0.001**
Not to have	40.73±21.42	79.82±13.86	**<0.001**
p*	0.420	0.739	
Having Enteral Nutrition Course or In-Service Education			
Yes	49.33±21.20	87.20±5.89	**<0.001**
No	40.75±22.66	78.87±12.97	**<0.001**
p*	0.176	**<0.001**	

***p**: paired t-test*
p: Independent sample t-test and one-way analysis of variance*
Values are expressed as mean±standard deviations. Significant p values are shown in bold.

70.6±16.4, and the mean score in the follow-up evaluation was 68.6±17.1, and long-term education has been found to contribute to the application. In this study, which is similar to the literature, it was determined that the mean score of knowledge of the nurses before the planned training on enteral nutrition for intensive care nurses was 42.04±22.55, and it increased to 80.12±12.51 after the training, and this score difference was statistically highly significant. Similarly, in Kochan's (26) study, it was determined that the knowledge of nurses who received nutrition practice training was statistically higher than those who did not. The study is similar to this user in literature.

In this study, it is observed that the knowledge point averages of the nurses with a bachelor's degree before education are higher than the nurses with other education levels, and it is seen that the knowledge level of the nurses who are high school graduates is lower than the others. In Kim's (37) study, it was found that the knowledge levels of undergraduate/master graduates were higher, and similar to our study, the knowledge level of high school graduate nurses was found to be low. This may be due to the fact that undergraduate education is a four-year comprehensive education process and the theoretical/practical education period is excessive. Studies show that both the trainings during the education process and the trainings received after graduation have a positive effect on increasing the knowledge of

nurses.

In this study, it was determined that the average knowledge score of the nurses aged 41 and over and the nurses who have been serving in the intensive care unit for 11-15 years had higher scores than the other groups before the education. In Özbas's (30) study, it was determined that the knowledge scores of those over the age of 36 and those who have been working for more than 10 years are higher. This situation shows that experience has a positive effect on increasing the knowledge of nurses. Our study showed similarity with the literature in this aspect as well. The difference between the pre-education and post-education knowledge point averages of the nurses according to the units they work in was found to be statistically highly significant. This suggests that the high use of nasogastric tube feeding and gastrostomy procedures due to surgical interventions and existing diseases in the general surgery intensive care units raises the awareness of nurses. In this study, it was determined that nurses with intensive care nursing certificates and those who received enteral nutrition course/in-service training had higher pre-education knowledge point averages than the nurses who did not have a certificate and did not receive training. In the study conducted by Ahmed et al. (38), it was determined that the average of knowledge of nurses who participated in a certificate program was higher. In the study conducted by Özbas (30) to determine the level of knowledge, it was determined that the nurses who participated in the training program had more knowledge than those who did not. In the study conducted by Kochan (26), it was observed that the level of knowledge of those who received nutrition education was higher than those who did not. Our study is similar to the literature. This shows that certificate and training programs are effective in increasing the knowledge level of nurses. In this study, post-education knowledge mean scores increased in all groups, thus eliminating the difference between groups in all variables. This shows the effectiveness of the training we have given and shows that the intensive care nurses have increased their knowledge level about enteral nutrition and made their education levels similar.

CONCLUSION

This study investigated the effects of a nutrition education program on nutrition knowledge among intensive care unit nurses participating in a 3-week nutrition education program. Results indicated that nurses mostly do not receive in-service training or courses for enteral nutrition. Also, it was determined that nurses mostly benefited from their colleagues as a source of information.The present study suggests that the planned training for enteral nutrition significantly increased the knowledge score averages and brought everyone to a similar level of knowledge despite all the variables.

The findings of this study suggest that similar programs in constructs potentially can improve nutrition knowledge in nurses. Educators or other hospital health officials, by implementing a similar nutrition education program, can positively influence the nutrition knowledge of nurses.

SUGGESTIONS

In line with these results, it can be recommended to organize in-service trainings prepared with up-to-date information in the institutions where nurses work after graduation, to repeat them at regular intervals, to establish enteral nutrition protocols and nursing care standards in institutions, and to ensure that care is provided in accordance with these standards.

Conflicts of Interest

No financial or material aid was received in this article. There is no conflict of interest regarding any person and/or institution.

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