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The Effect of Web-based Sedation Management Education on the Knowledge and Practices of Intensive Care Nurses

Web Tabanlı Eğitimin Yoğun Bakım Hemşirelerinin Sedasyon Yönetimi Bilgi ve Uygulamalarına Etkisi

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** "The Effect of Web-Based Education on Sedation Management Knowledge and Practices of Intensive Care Nurses" is derived from doctoral dissertation study.

ABSTRACT

Aim: *The research was conducted to evaluate the effect of web-based education on the knowledge and practices of intensive care nurses about sedation management*

Material and Method: *In this study, which was carried out in a single group, pre-test-post-test design, the knowledge levels and practices of 62 intensive care nurses on sedation management were evaluated. The nurses were given web-based sedation management education, one month after the education, the knowledge levels and practices of the nurses participating in the study on sedation management in intensive care patients were re-evaluated, and the effectiveness of the education was evaluated by analyzing the data before and after the education.*

Results: *After the web-based education, it was determined that there was a significant increase in the rate of correct answers to the statements about sedation management by nurses. It was determined that the rate of nurses applying nursing interventions to prevent agitation and reduce the sedation need of patients increased significantly after the education.*

Conclusion: *It has been determined that web-based education is an approach that supports increasing the knowledge and practices of intensive care nurses on sedation management. It is recommended that web-based education programs be supported in order for intensive care nurses to perform effective agitation-sedation management.*

Keywords: *Critical care nursing, Sedation, Distance education*

ÖZET

Amaç: *Araştırma, web tabanlı eğitimin, yoğun bakım hemşirelerinin sedasyon yönetimi hakkındaki bilgi ve uygulamalarına etkisini değerlendirmek amacıyla yapılmıştır.*

Gereç ve Yöntem: *Tek grup, ön test-son test desende gerçekleştirilen çalışmada, 62 yoğun bakım hemşiresinin, sedasyon yönetimi konusundaki bilgi düzeyleri ve uygulamaları değerlendirilmiştir. Hemşirelere web tabanlı sedasyon yönetim eğitimi verilmiş, eğitimden bir ay sonra araştırmaya katılan hemşirelerin yoğun bakım hastasında sedasyon yönetimi konusundaki bilgi düzeyleri ve uygulamaları tekrar değerlendirilmiş, eğitim öncesi ve sonrası veriler analiz edilerek eğitimin etkinliği değerlendirilmiştir.*

Bulgular: *Web tabanlı eğitim sonrasında, hemşirelerin sedasyon yönetimine ilişkin ifadeleri doğru yanıtlama oranlarında anlamlı artış olduğu belirlenmiştir. Hemşirelerin ajitasyonu önlemeye ve hastaların sedasyon ihtiyacını azaltmaya yönelik hemşirelik girişimlerini uygulama oranlarının eğitim sonrasında anlamlı şekilde arttığı saptanmıştır.*

Sonuç: *Web tabanlı eğitimin, yoğun bakım hemşirelerinin sedasyon yönetimi konusundaki bilgi ve uygulamalarının arttırılmasını destekleyen bir yaklaşım olduğu belirlenmiştir. Yoğun bakım hemşirelerinin etkili ajitasyon-sedasyon yönetimi gerçekleştirebilmelerinde web tabanlı eğitim programlarının desteklenmesi önerilmektedir.*

Anahtar kelimeler: *Yoğun bakım hemşireliği, Sedasyon, Uzaktan eğitim*

INTRODUCTION

Intensive care units are specialized areas with high technology equipment, where the support and treatment required for the continuity of their vital functions are applied to patients with serious and life-threatening health problems (Choi et al., 2016; Inoue et al., 2019). Many factors such as the life-threatening danger of patients followed up in intensive care units, physical conditions, numerous routine nursing care practices, invasive interventions for diagnostic and therapeutic purposes cause physical and emotional stress (Alasad et al., 2015; Ayasrah, 2016). Pain and anxiety are the most stressful and common symptoms experienced by patients in the intensive care unit and are closely related to agitation (Perpina-Galvan and Richart-Martinez, 2009; Barr et al., 2013).Agitation is a common condition in patients hospitalized in intensive care units due to many factors such as pain, anxiety, sleep deprivation, sedative drug use, electrolyte disturbances, changes in vital signs, and drug side effects (Grounds et al., 2014; Burk et al., 2014; Almeida et al., 2016). The Pain, Agitation, Delirium Guideline emphasises the importance of rapid identification and treatment of possible underlying causes of agitation (Barr et al., 2013).

Reducing pain and agitation in intensive care patients is of great importance in terms of preventing patient behaviors that may adversely affect the continuation of care and treatment. One of the approaches frequently used for this purpose is sedation (Sneyers et al., 2014; Zhang et al., 2017). The purpose of sedation application is to provide stabilization of the physiological state and patient comfort (Shetty et al., 2018). However, it is stated that the sedation applied to the patients is often different from the sedation level required by the individual patient (Jackson et al., 2009). Therefore, providing ideal sedation for intensive care unit patients is the most basic issue in sedation management. There are several objective and subjective measures to facilitate the assessment of patient sedation requirements (Abbott, 2004; Barr et al., 2013). Objective measures include plasma drug concentration, electroencephalography and brain function monitoring. These measurements used to monitor the depth of sedation are complex indices and vary depending on many factors such as the type of anaesthetic agent, neurological disease, encephalopathy, cerebral ischaemia, hypothermia, movement and muscle activity (Oliveira et al., 2017). Therefore, they are rarely used for routine monitoring in the critical care setting. Alternative subjective measures consist of scoring systems that allow the clinician to most appropriately reflect the patient's level of sedation. Optimal clinical decision making for sedation management by intensive care nurses may be possible by monitoring the patient's agitation-sedation level using routine, reliable and valid assessment tools (Schweickert & Kress, 2008; Barr et al., 2013). The consistent use of measurement tools in sedation management and the ability of intensive care nurses to participate in the clinical judgment process play an important role in the formation of a qualified, standardized nursing care process (Randen & Bjork, 2010). The 2013 PAD guideline states that the Richmond Agitation-Sedation Scale (RASS) and Sedation-Agitation Scale (SAS) are the most useful and reliable sedation assessment tools for adult intensive care patients at the B level of evidence (Barr et al., 2013).

Intensive care nurses have a key role in assessing and managing the sedation needs of patients, as they can easily identify conditions that are considered important targets for sedation management such as patient-ventilator compliance, endotracheal tube tolerance, pain control, anxiety and agitation, sleep deprivation and related risk factors within nursing care activities (Aitken et al., 2009). In studies on the sedation management process, it has been reported that although nurses are trusted, there are cases where patients are exposed to inadequate or excessive sedation (Tshibha, 2018), nurses with insufficient knowledge and experience only administer medications deemed appropriate by the physician in the sedation management of patients, but experienced nurses perform critical practices such as assessing the patient, determining the level of sedation needs of patients and identifying factors causing agitation (Guttormson et al. 2010).

In order for intensive care nurses to make accurate and effective decisions in sedation management, they should have sufficient knowledge about the duration of action, side effects, indications and contraindications of sedative drugs, identify risk factors causing agitation, recognize patient behaviors associated with agitation, use nonpharmacological methods to prevent pain and agitation, improve their knowledge about scales that can be used to determine the level of pain, agitation and sedation, and regularly evaluate and

monitor patients (Burk et al., 2014; Erden, 2015; Aktaş et al., 2017).

In order for intensive care nurses, who have important responsibilities in sedation management, to manage the sedation process safely, their information needs on this subject should be met with effective methods. For this purpose, it is important for intensive care nurses to participate in orientation and in-service education programs based on continuous education approach (Feeley and Gardner, 2006; Aitken et al., 2009; Aktaş et al., 2017). Today, it is gaining importance to use current learning models that allow individualized learning such as web-based learning instead of traditional methods that are more time-consuming and costly in professional development educations (Tung et al., 2014; Barisone et al., 2019; Çelik and Çelik, 2022). It is also stated that web-based education is a more appropriate option compared to other education programs such as face-to-face in-service trainings, courses in terms of cost-effectiveness, access to education materials at any time, helping institutions in evidence-based practices and providing in-service education and continuous professional development of health professionals (Tung et al., 2014). Chang et al. (2016) stated in their study that web-based learning is worth making available for nurses and that it is a very good method to meet the educational needs of nurses within the constraints of their busy professional lives in future in-service educations. Chuang and Tsao (2013), in their study with nursing students, stated that web-based learning can effectively shorten learning times, improve knowledge and skills, and provide high satisfaction. When the literature in our country is examined, there are studies evaluating the effect of web-based education on the protection and improvement of people's health, disease activity, behavior, symptom management and quality of life (Karakuş Selçuk, 2019; Ateş, 2018; Terkeş, 2018; Özgürsoy Uran, 2017; Çömez, 2016) and the effectiveness of nurses on learning cognitive (Öztürk and Dinç 2014; Karabağ Aydın, 2013). However, no study has been found on how web-based education models affect nurses' knowledge and practices about sedation management in the process of providing continuous professional development and in-service education of nurses. The aim of this study is to evaluate the effect of web-based education on the knowledge and practices of intensive care nurses about sedation management.

MATERIALS AND METHODS

Research Type

The research was conducted as a single group, pre-test-post-test design, and quasi-experimental.

Research Hypotheses:

$H_1$1: Web-based sedation management training increases nurses' knowledge in sedation management

$H_0$1: Web-based sedation management training does not change nurses' knowledge in sedation management

$H_1$2: Web-based sedation management training increases nurses' practices in sedation management

$H_0$2: Web-based sedation management training does not change nurses' practices in sedation management

Setting

The research was carried out with nurses working in three different intensive care units serving as tertiary intensive care units of a state hospital between June 2018 and March 2019.

Study Population and Sample

The intensive care units where the research was conducted have a total of 32 beds, serving as tertiary intensive care units, and adult patients who need mechanical ventilation support and sedation are followed. In the three intensive care units where the study was conducted, a total of 65 nurses, including intensive care unit charge nurses, were working. Three nurses who were the charge nurses of the intensive care units were not included in the study sample because they did not take primary patient care responsibility. The study sample consisted of 62 intensive care nurses who cared for patients undergoing mechanical ventilation and sedation between June 2018 and March 2019 and who agreed to participate in the study. The inclusion criteria for all nurses working in the three intensive care units where the study was conducted were determined as: intensive care unit nurses who provided care to sedated patients followed up on mechanical ventilators and who agreed to participate in the study; the exclusion criteria were determined as: anaesthesia intensive care unit charge nurses and nurses working in the unit where the pre-application was performed. The nurses participating in the study work in shifts and their

working hours are 08-16, 08-08 or 16-08.

Data Collection Tools

Nurse Identification Form: The form was consisting of 12 questions in total to determine the sociodemographic characteristics (age, gender, the intensive care unit in which they work in and duration of their work in the unit, whether they use a scale to assess the level of sedation, their thoughts about whether nurses have responsibilities in sedation management and what their responsibilities are, if any, their status of receiving training on the responsibilities of nurses in sedation management, and the situations that they think prevent nurses from taking responsibility in sedation management) of nurses.

Sedation Management Information Evaluation Form for Nurses: The form was which was created by using the literature on the subject (Walker and Gillen, 2006; Aitken et al., 2009; Salgado et al., 2011; Barr et al., 2013; Abdar et al., 2013; Ramoo et al., 2016) and evaluated by 5 experts, who are academic and clinician experienced in the field of intensive care, and whose content validity was made. For the form, first, the purpose of the form, the number of items, the way of answering, and the target audience were determined, and a question pool was created. For the form prepared in line with the literature information, content validity analysis was performed using the Davis technique. Substances in the Davis technique; Four points are rated as “appropriate”, “item should be slightly revised”, “item should be seriously reviewed” and “item not suitable”. In this technique, the "content validity index (CGI)" for the item is obtained by dividing the number of experts who marked the appropriateness of the items and the options for the item to be slightly revised by the total number of experts. If the CGI index is 0.80 and greater, the item is sufficient for content validity. Substances with low CGI are eliminated (Davis, 1992; Taşkın and Akat, 2010). The questions in this form used in the study were arranged in accordance with the Davis technique; the opinions of five experts, two of them are specialists in anaesthesiology and reanimation, three of them are faculty members in internal medicine nursing, were obtained. When we evaluated the results for each item, it was determined that the CGI index was greater than 0.80. This form consisted of 30 questions (3 questions about the definition and purpose of sedation, 6 questions about the evaluation of sedation level, 3 questions about sedation strategies applied in the ICU before and after the implementation of web-based education, 5 questions about the effects of sedative drugs, 13 questions about the situations that cause agitation in patients and increase the need for sedation and their management) to evaluate nurses' knowledge about sedation management.

Nurses' Practices in Sedation Management Observation Form: The “Nurses' Practices in Sedation Management Observation Form” was used to evaluate the nursing practices aimed at preventing agitation and reducing the need for sedation in patients. The form was created by using the literature on the subject (Groot et al., 2011; Grap et al., 2012; Tate et al., 2012; Da Silva and Fonseca, 2012; Barr et al., 2013; Aktaş, 2017; Burk et al., 2014). With this form consisting of 23 questions, the nurses were evaluated on their ability to assess the risk factors that cause agitation in intensive care patients, perform nursing practices to prevent agitation and reduce the need for sedation, assess the level of sedation using a scale, record the results of the assessment in the patient file, share the results with team members, and monitor the hemodynamic effects of sedative drugs. Nursing practices of nurses in sedation management were evaluated by unattended observation method. Each of the observed nurse behaviors/practices was evaluated as "done" only if the behavior/practice was necessary for the patient and applied by the nurse, and as "not done" if the behavior was necessary for the patient but not applied by the nurse.

Data Collection

The research data were obtained in three stages: pre- education assessment, implementation of the education, and post- education assessment. The stages of the research are shown in Figure 1 as "research implementation table".

First phase: Pre-education assessment: Nurse Identification Form and Evaluation Form For Nurses’ Sedation Management Knowledge were applied to the nurses who agreed to participate in the study. After the application of the forms, the current sedation management behaviors/practices of the nurses for 3 months were evaluated by the researcher using the unattended observation method. Non-participant observation, one of the qualitative research methods, is an observation technique in which a standard data collection tool is not used, but the researcher does not become a member of the group he/she observes as in participant observation, maintains his/her

researcher personality and observes the subject of observation from the outside. In order for the obtained observation data to reflect all nursing practices, care was taken to make observations throughout the shift, starting from the moment the nurse first took over the patient. The observations in the study were conducted by a single researcher. The researcher collected the data by observing the nurses in their normal settings without any intervention. During the observations, the researcher did not disclose when the observations were initiated. Nursing care practices performed by the researcher during the observations were recorded with a short explanation and codes. These notes were transferred to the observation form after the observation period was completed. For each nurse, the time periods to be observed in 3 different days were determined and observations of 30 minutes were made 3 times each day. After the unattended observations were completed for all nurses, the web-based education phase of the study was applied.

Second phase: Implementation of education: A web page named "intensive care nursing education program (ICNEP)" was created for the apllication of web-based education. The education material was uploaded to the "ICNEP web page" in 7 sections as power point files. The education was designed to improve nurses' knowledge and skills in evaluating and managing patients receiving sedation therapy. The education content was developed by conducting a comprehensive literature search (Wit et al., 2008; Payen et al., 2009; Guttormson et al., 2010; Abdar et al., 2013; Barr et al., 2013; Barr et al., 2013; Hansen et al., 2015 Shahabi et al., 2016). The education material contained information about the purpose of sedation and its necessity for intensive care patients, current sedation strategies, pharmacology of sedative drugs, conditions that cause agitation in intensive care patients and increase the need for sedation, and nursing practices related to its management, current guideline and protocol information, and the Richmond Agitation and Sedation Scale (RASS), a sedation scale whose validity and reliability has been approved. In addition, the researcher coached nurses on how to assess, score, and document patients' sedation levels using RASS, and placed copies of the scale bedside of each patient for providing easy access and assessment by nurses.

All nurses participating in the study logged into the web page with their user name and personal password and viewed the content of the education material in sections. Each nurse was able to log into the system at their own convenient place and time. When the nurse finished reading the entire education material, she used the "I have completed the education " option and recorded the information that she completed the process of reading the education content in the system. The participant who states that he has completed the education on the web page cannot access the education content again. All of the participants completed the education content in about 2 months. Since it was entered with the personal data of the nurses, blinding was not done.

Third phase: Post-education assessment: A month later, the "Sedation Management Information Evaluation Form for Intensive Care Nurses" was applied again to the nurses who completed the web-based education process. As in the evaluation before the education, the sedation management behaviors/practices of all nurses were re-evaluated by the researcher using the unattended observation method for 3 months.

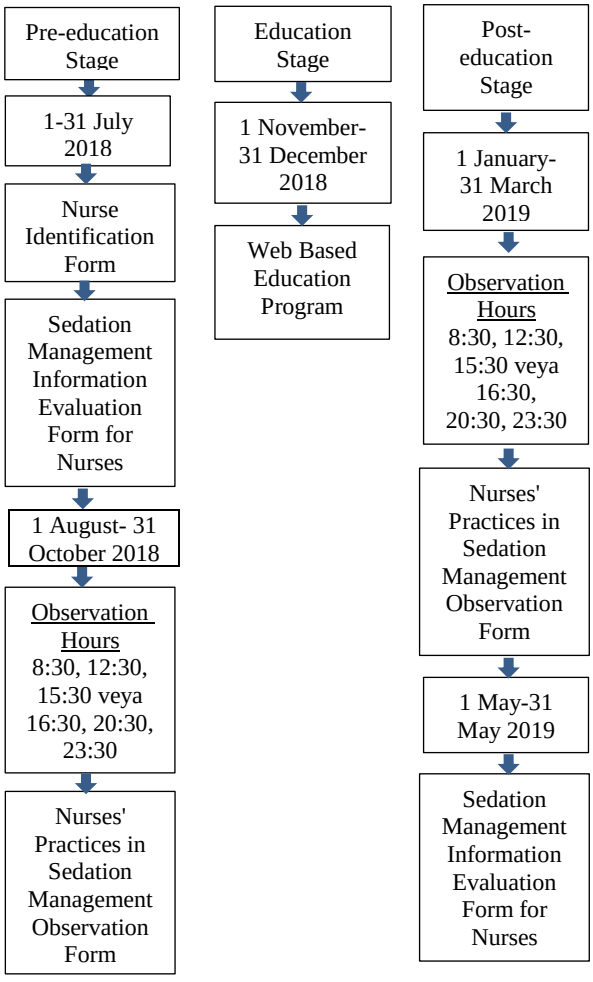

Figure 1. Research Application Chart

Ethics Consideration

Approval was obtained from the clinical research ethics committee of the university in the region where the study was conducted, stating that there was no ethical or scientific objection to the study (Date: 17.01.2018, and Approval No: XXX). Written consent was obtained from the nurses participating in the study using the "Informed Consent Form". At the same time, written permission was obtained from the Provincial Health Directorate of the hospital where the study was conducted.

Data Analysis

The data obtained in the study were evaluated using SPSS (Statistical Package for Social Sciences) version 22.0. numerical data obtained in the analysis of the data, arithmetic mean, standard deviation, and verbal data are shown as frequency and percentages. The answers given to the information questions (30 propositions) in the "Nurses' Practices in Sedation Management Observation Form" were grouped into two groups as "true" and "false". Those who answered correctly received "1 point" and those who answered incorrectly received "0 point". A maximum of 30 points can be obtained from the form. Information scores were calculated by taking the average. In the comparison of the data obtained from evaluation form for nurses' sedation management knowledge applied to the nurses before and after the education, and the comparison of the nurses' practices regarding sedation management before and after the education, Chi-square test, which is the significance test of the difference between two percentages in dependent groups, and paired samples t-test were used in dependent groups to determine the significance of the difference between the means in the evaluation of sub-dimensions. The results were evaluated at the 95% confidence interval and the meaningfulness significance level of $p<0.05$.

RESULTS

Of the nurses participating in the study, 77.4% were female, 67.7% had a bachelor's degree, their average age was 29.54 ± 5.96, and 43.5% had been working in the intensive care unit for five years or more. It was determined that the average time of participating in the web-based education of the nurses participating in the study was 12.6 ± 7.4 minutes. Before the web-based education, the majority of the nurses (75.8%) stated that they did not use a scale to evaluate the sedation level of the patients, but all of the nurses who stated that they used a scale to evaluate the sedation levels (24.2%) stated that they used the Glasgow Coma Scale (GCS) for this purpose. A significant part of the participants (71.0%) stated that nurses have responsibilities in sedation management, and monitoring vital signs (63.6%), sedative drug administration (20.4%) and evaluating patients with GCS (16.0%) are nursing responsibilities in sedation management. Participants stated that the situations that prevent nurses from taking responsibility for sedation management are related to excessive workload (34.3%), anxiety about making wrong assessments (31.2%) and lack of knowledge (30.2%) (Table 1).

In the evaluation made after the web-based education, it was determined that there was an increase in the rate of correct answers to the statements about sedation management by nurses and this increase was statistically significant ($p<0.05$). (Table 2).

Nursing practices to prevent agitation and reduce the need for sedation before and after the web-based education, of the nurses participating in the study were examined. After the web-based education, it was determined that there was a significant increase in the rate of nurses performing nursing practices to prevent agitation and reduce the need for sedation, and the increase was statistically significant ($p<0.05$). It was determined that among the nursing practices aimed at providing orientation after the education, only the rate of "repeating the orientation information frequently in the confused patient" decreased (4.8%) in the post- education, evaluation (3.2%), and there was no change in the practice of "using earplugs", which is one of the sleep-supporting practices, after the education, (Table 3).

Table 1. Some Sociodemographic Characteristics of Nurses and Their Views on Sedation Management

Characteristics	**n**	**%**
Gender		
Female	48	77.4
Male	14	22.6
Age (*X*± SS) = 29.54 ± 5.96 /**(Min=21 Max=43)**		
21-30 years	37	59.7
31-40 years	21	33.9
41-43 years	4	6.4
Education Level		
High School	6	9.7
College	10	16.1
Bachelor degree	42	67.7
Master's degree	4	6.5
ICU		
Anesthesia ICU-1	20	32.3
Anesthesia ICU-2	19	30.6
Anesthesia ICU-3	23	37.1
Work Experience		
0-6 month	4	6.5
7 month-1 year	17	27.4
2-4 years	14	22.6
5 years and more	27	43.5
Time to Participate in Web Based Education /Minute (*X* ± SS = 12.6±7.4**) (Min=1.03 Max=40.00)**		
1-10 min	20	32.3
11-20 min	11	17.7
21-30 min	17	27.4
31-40 min	14	22.6
Use of scales in sedation assessment		
Users	15	24.2
Non-users	47	75.8
Scale used in sedation assessment (n=15) †		
Glasgow Coma Scale (GCS)	15	100.0
Nurse's role/responsibilities in sedation management		
Existing	44	71.0
Not existing	18	29.0
Nurse's responsibilities in sedation management (n=44) †		
Monitoring vital signs	28	63.6
Administering sedative medications	9	20.4
Patient evaluate with GCS	7	16.0
Situations preventing the nurse from taking responsibility in sedation management (n=96) †		
Too much workload	29	30.2
Worry about misjudgment	30	31.2
Lack of information	33	34.4
Unwillingness to use scale	4	4.2

X: Average; SS: Standard Deviation; Min: Minimum; Maks: Maksimum; †: Participants expressed more than one opinion and percentages were calculated over the total; ‡ GKS: Glasgow Coma Scale

Table 2. Distribution of the Mean Knowledge Scores of Nurses' Statements Related to Sedation Management Before and After Training

Pre-education-Post-education	**n**	***X***	**SS**	**Z**	**p***
Negative ranks	4	18.00	72.00		
Positive ranks	51	28.78	1468.00	-5.876	.000

* Wilcoxon paired two sample tes

Table 3. The Situation of Nurses to Practice Preventing Agitation and Reducing the Need for Sedation Before and After Web-Based Education

Nursing Practices	Pre-education				Post-education				$(X^2)^{‡}$	p*
	Done		Not Done		Done		Not Done			
	n	%†	n	%†	n	%†	n	%†		
Orientation Practices										
Making short and understandable sentences in communication with the patient	115	20.6	443	79.4	169	30.3	389	69.7	15.25	0.00
Addressing the patient by his/her name	91	16.3	467	83.7	121	21.7	437	783	91.30	0.00
Listening to the patient, trying to understand him/her	103	18.5	455	81.5	130	23.3	428	76.7	70.53	0.00
Supporting visits of family and friends	508	91	50	9	518	92.8	40	7.2	29.18	0.01
Frequent repetition of orientation information in the confused patients	27	4.8	531	95.2	18	3.2	540	96.8	26.08	0.21
Paying due care to patient privacy	481	86.2	77	13.8	500	89.6	58	10.4	79.67	0.00
Practices in environmental optimization										
Ensuring environmental temperature control	401	71.9	157	28.1	420	75.3	138	24.7	51.52	0.00
Controlling bedside alarms	52	9.3	506	90.7	107	19.2	451	80.8	61.34	0.00
Controlling the noise generated by talking loudly	121	21.7	437	78.3	158	28.3	400	71,7	34.12	0.00
Ensuring listening to soft music if possible	7	1.3	551	98.7	27	4.8	531	95.2	48.45	0.01
Sleep-Promoting Interventions										
Avoiding interruption of sleep hours with treatment and care	62	11.1	496	88.9	85	15.2	473	84.8	33.41	0.01
Providing appropriate lighting	105	16.9	453	81.2	158	28.3	400	71.7	89.92	0.04
Providing the patient a comfortable position	493	88.4	65	11.6	500	89.6	58	10.4	37.16	0.21
Using earplugs	0	0.0	558	100.0	0	0.0	558	100.0	28.45	0.49
Physiological Support Interventions										
Ensuring adequate oxygenation	531	95.2	27	4.8	553	99.1	5	.9	62.18	0.00
Monitoring perfusion adequacy	496	88.9	62	11.1	500	89.6	58	10.4	37.52	0.72
Regular blood sugar monitoring	474	84.9	84	15.1	514	92.1	44	7.9	105.18	0.00
Fever management	512	91.8	46	8.2	521	93.4	37	6.6	19.49	0.81
Pain management	497	89.1	61	10.9	501	89.8	57	10.2	45.10	0.39
Regular blood pressure check	477	85.5	81	14.5	497	89.1	61	10.9	30.53	0.04
Keeping track of the fluid intake and output	417	74.8	141	25.2	469	84.1	89	15.9	47.66	0.00
Monitoring and management of laboratory findings	475	85.1	83	14.9	481	86.2	77	13.8	64.42	0.41
Evaluation of constipation status	401	71.9	157	28.1	419	75.1	139	24.9	84.23	0.00

†Percentage of rows is taken out of total n; ‡ : Chi-square test was applied; *: Fisher exact test was applied and percentages were taken over "n".

DISCUSSION

The majority of the nurses (75.8%) who participated in the study stated that they did not use scales to evaluate the sedation level of the patients. In their study (2020), Rashidi et al. concluded that the use of the Richmond Agitation and Sedation Scale (RASS) in patients followed in the intensive care unit can be very effective in optimizing the use of sedatives (Rashidi et al., 2020). It is very important to institutionally support the use of reliable and valid measurement tools (such as RASS) in order to support nurses in determining the sedation level of patients and managing the process effectively in intensive care units.

It is important that intensive care nurses are professionals who are experts in their field, follow up-to-date information and constantly renew themselves, as this will affect patient outcomes. The majority of the nurses participating in the study (71.0%) stated that nurses have roles and responsibilities in sedation management. Davidson et al. (2015); emphasized that nurses are effective in many roles related to intensive care (Davidson et al., 2015). Varndell et al., (2015) stated that nurses take important responsibilities in the management of sedation for critically ill patients, including patient evaluation and titration of sedation to the determined target level in collaboration with the physician (Varndell et al., 2015). Intensive care nurses should be able to take a role in appropriate clinical decision-making by

identifying practices that can help the patient achieve physical and mental well-being and provide comfort in the provision of individualized quality care in critical patient care.

Due to the complex and critical health conditions of intensive care patients, sudden changes and uncertainties, sedation management requires clinical evaluation and decision-making based on precise nursing decisions. (Ramoo et al., 2016). However, some situations may prevent nurses from taking responsibility in sedation management. It has been determined that the nurses participating in the study stated that the workload is high, the anxiety of making erroneous assessments and the lack of knowledge as situations that prevent them from taking responsibility in sedation management. Similarly, in the study of Ramoo et al. (2016), it was determined that nurses perceived excessive workload, anxiety of misinterpretation, and lack of knowledge as obstacles for sedation assessment and management. (Ramoo et al., 2016). In this sense, it is important to plan and implement in-service educations in order to reduce the number of patients and workload per nurse institutionally, and to increase and update their knowledge on sedation management.

Sedation is a part of the treatment of intubated patients in intensive care units and is a method that is frequently used to reduce pain and agitation, to prevent/reduce patient behaviors that may adversely affect the continuation of treatment, and to ensure patient comfort (Zhang et al., 2017; Luz et al. 2022). In the study, it was determined that after the web-based education, the nurses' correct response rates to the statements increased, which can be listed as the ones about sedation and its purpose of use, evaluation of the sedation level, the advantages or disadvantages of the sedation strategies applied in the intensive care units, the effects of sedative drugs and the situations that increase the need for sedation in the patients, and the sedation management.

Agitation is considered a serious problem in intensive care units (Burk et al., 2014). As the diagnosis of agitation is delayed, the initiation of treatment is delayed as well, and this may cause an increase in morbidity and mortality (Almeida et al., 2016). Agitation risk factors should be identified and treated with the admission of patients to the intensive care unit (Barr et al., 2013). It is possible for intensive care nurses to reduce the agitation of patients and improve patient outcomes by using appropriate non-pharmacological practices along with the medical treatment of the patient (Zhao et al., 2020). In our study, it was determined that after the web-based education, the rate of nurses applying the approaches to support orientation, which is one of the nursing practices to prevent agitation and reduce the need for sedation, increased, but there was a decrease in the nursing practice for repeating orientation information frequently in confused patients. In the study of Silva et al. (2011), it was determined that nurses' practices of speaking slowly and clearly with patients and allowing sufficient time for answers were quite inadequate (Silva et al., 2011). Although the nurses were aware of the importance of communication in effective patient care in intensive care, they stated that they communicated less with unconscious patients due to time constraints in the intensive care environment. (Yoo et al., 2020). In the study, in accordance with the literature, it was determined that nurses' practices that ensure the orientation of patients to people, places and times, and nursing behaviors aimed at frequent repetition of orientation information in patients with confusion are insufficient. It is thought that this situation may be due to less communication between nurses and intubated patients and their task-oriented working approach.

Noise caused by the treatment services provided in intensive care units and the environment is an important risk factor that creates stress and causes agitation in patients. Excessive and constant noise causes changes in the mental states of patients, insomnia, stimulation of the sympathetic nervous system, and agitation (Kröller-Schön et al., 2018; Osborne et al., 2020; Pal et al., 2022). In the study, it was determined that after the web-based education, the rate of nursing practices to reduce noise and listen to soft music in the unit increased. It is stated that irregular exposure to sound and light in the intensive care setting may disrupt the circadian rhythm and cause frequent arousal and agitation in patients (Brown et al., 2015; Bion et al., 2018). However, sleep deprivation in intensive care patients may cause increased anxiety and perceived pain levels, delirium, prolonged stay on mechanical ventilator, and low tolerance to noninvasive ventilation methods (Kamdar et al., 2013; Devlin et al., 2018). Considering the stated risk factors, the importance of non-pharmacological approaches that support sleep increases (Nilius et al., 2021). In the present study,

it was determined that the rate of nursing practices to avoid the division of sleep hours with treatment and care and to provide appropriate lighting after the education increased, but no change could be achieved regarding the use of earplugs, one of the nursing practices that support sleep. We think that there is no change in the behavior of nurses after the education, since the use of earplugs, which is emphasized to be important in providing regular sleep by protecting the patient from noise is not supported institutionally.

Pain, high fever, acute hypoxia, changes in vital signs, hypoglycemia (Barr et al., 2013) and poor oxygenation (Burk et al., 2014) are reported to be among the underlying physiological causes of agitation in adult intensive care patients. To prevent agitation, these conditions must first be identified and treated. In the study, we can say that the rate of applications to provide physiological support before and after the education is at acceptable levels.

Haemodynamic monitoring is a vital part of daily practice in intensive care. Sedation therapy applied to control psychological symptoms in intensive care patients leads to deterioration of haemodynamic and metabolic values of the patients. Among the haemodynamic parameters, it causes a general decrease in mean arterial pressure due to its effect on systemic vascular resistance and cardiac output (Akın Korhan et al., 2011). Blood pressure is an important vital sign in the evaluation of haemodynamic status. Blood pressure is measured by invasive or noninvasive methods in the clinical setting and is the responsibility of nurses. Considering the patient profile in the intensive care environment, it is very important for nurses to perform accurate and regular invasive arterial blood pressure measurement and follow-up in these units with unstable patients. Changes in blood pressure indicate the underlying cause of the patient's disease or the body's efforts to maintain homeostasis (Çevik et al., 2020). In our study, it was observed that the rate of nurses performing practices for blood pressure monitoring among the practices for monitoring the haemodynamic effects caused by sedative drugs increased after the training. However, some agents used in sedation treatment may also cause undesirable results such as nausea, vomiting, constipation, and renal failure (Guttormson vd., 2010; Akın Korhan vd., 2011). For this reason, it is important for nurses to monitor the fluid intake of the patients and regularly evaluate the constipation status. After the training, it is seen that there is an increase in the rate of nurses' physiological support practices for preventing agitation and reducing the need for sedation, monitoring the fluid intake and output, and performing important physiological support practices for the evaluation of constipation status. In fact, nurses routinely perform practices such as evaluation of haemodynamic parameters, monitoring of fluid intake and output, and evaluation of constipation status during patient care. However, we think that the increase observed in the rate of performing these practices after web-based training is the result of increasing the awareness of the effects of the practices routinely performed in patient follow-up on patient outcomes.

In intensive care units, multiple drug use, underlying comorbidities, organ dysfunctions, rapidly changing patient conditions make blood glucose control difficult in critically ill patients. Since patients followed up in intensive care are prone to glycaemic changes, frequent monitoring of blood glucose levels is very important regardless of their diabetes status (Juneja et al., 2023). In our study, it was determined that nurses increased the rate of regular blood glucose monitoring from physiological support practices to prevent agitation and reduce the need for sedation after training.

In today's world, where the knowledge of the profession increases exponentially, developing information and communication technologies and the increase in the use of personal computers provide nurses with various options and the opportunity to monitor developments (Sinclair et al., 2013). Web-based education model is one of the important options. International and national nursing professional organizations emphasize that newly developing distance education technologies are indispensable for nurses to ensure their lifelong personal and professional development and continue their education by working (Melhuish & Falloon, 2010; Sinclair et al., 2014). The current findings in our study support that the use of a web-based trai education program is important in improving nurses' knowledge about sedation assessment and management.

Limitations

The limitations of the study include the fact that the study was conducted with a single group, that it was a pretest-posttest study and that the data collection tools were used only after content validation.

CONCLUSIONS

One of the important approaches in meeting the continuing education needs of nursing professionals is web-based education. In the study in which the effect of web-based education on the knowledge and practices of sedation management of intensive care nurses was examined, it was determined that there was a significant increase in the rate of nurses answering the statements about sedation management correctly, and the rate of performing nursing practices aimed at preventing agitation and reducing the need for sedation after the web-based education. It is necessary to organise web-based in-service training programmes and institutional support of web-based learning environments in order to improve nurses' knowledge of recognising and preventing agitation and managing the agitation-sedation process in intensive care units and to raise more awareness. In addition, institutional regulations are needed to support the implementation of non-pharmacological practices to prevent agitation and reduce the need for sedation in intensive care patients.

Ethics Committe Approval

Ethics committee approval was received for this study from the Sivas Cumhuriyet University Non-Interventional Clinical Research Ethics Committee (Date: 17.01.2018, and Approval No: 2018-01/15).

Author Contributions

Idea/Concept: P.Ç., H.T.A; Design: P.Ç., H.T.A; Supervision/Consulting: H.T.A; Analysis and/or Interpretation: P.Ç., H.T.A; Literature Search: P.Ç., H.T.A; Writing the Article: P.Ç.; Critical Review: P.Ç., H.T.A.

Peer-review

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Conflict of Interest

The authors have no conflict of interest to declare.

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