

ORIGINAL ARTICLE

Improving Nurses' Compliance with Isolation and Standard Precautions: An Educational Intervention

Hemşirelerin İzolasyon ve Standart Önlemlere Uyumunun Artırılması: Bir Eğitim Müdahalesi

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ABSTRACT

Aim: This study aimed to investigate the impact of education on nurses' compliance with standardization and isolation precautions.

Methods: The study employs a pre-test post-test design. The study was conducted between September 2022 and September 2023 with 100 nurses in the intensive care and isolation units of a public hospital where patients with confirmed cases of SARS-CoV-2 infection were admitted. Data were collected utilising the Standard Precautions Compliance Scale and the Isolation Precautions Compliance Scale. The compliance of nurses with standard and isolation methods was examined in both time periods.

Results: The mean total score of the Compliance to Isolation Measures Scale was higher after the education (T1=55.39±7.39, T2=77.50±9.68; t=8.372, p<0.001). The mean total score of the Compliance to Standard Precautions Scale was higher after the education (T1=10.38±2.46, T2=14.43±4.29; t=6.298, p<0.001).

Conclusion: Education on the importance of using personal protective equipment, isolation, and compliance with standard precautions led to an increase in the variety and usage rates of nurses' protective equipment.

Keywords: Nurses, infection prevention, education, COVID-19

ÖZ

Amaç: Bu çalışmada hemşirelerin standardizasyon ve izolasyon önlemlerine uyumu üzerine eğitimin etkisinin araştırılması amaçlandı.

Yöntem: Çalışma ön test son test tasarımı bir çalışmadır. Çalışma bir devlet hastanesinin COVID-19 hastalarının kabul edildiği yoğun bakım ve izolasyon ünitelerinde 100 hemşire ile Eylül 2022 ve Eylül 2023 tarihleri arasında gerçekleştirildi. Veriler Standart Önlemlere Uyum Ölçeği (SPCS) ve İzolasyon Önlemlerine Uyum Ölçeği (IPCS) kullanılarak toplandı. Hemşirelerin standart ve izolasyon yöntemlerine uyumu her iki zaman diliminde de incelendi.

Bulgular: İzolasyon Önlemlerine Uyum Ölçeği toplam puan ortalaması eğitim sonrasında daha yüksekti (T1=55.39±7.39, T2=77.50±9.68; t=8.372, p<0.001). Standart Önlemlere Uyum Ölçeği toplam puan ortalaması eğitim sonrasında daha yüksekti (T1=10.38±2.46, T2=14.43±4.29; t=6.298, p<0.001).

Sonuç: Kişisel koruyucu ekipman kullanımının önemi, izolasyon ve standart önlemlere uyum konularında verilen eğitim, hemşirelerin koruyucu ekipman çeşitliliğinde ve kullanım oranlarında artışa neden oldu.

Anahtar Kelimeler: Ektopik gebelik, Heterotropik gebelik, Laparoskopi, Transvajinal ultrasonografi

Introduction

Personal protective equipment (PPE) is crucial in protecting against highly transmissible infections such as COVID-19 (1). Nurses face challenging working conditions, including isolation, working in high-risk areas, and contact with infected individuals (2). The COVID-19 pandemic has made it difficult for employees to work without interruption, as they are unable to eat, drink, or use the restroom while on the job in order to avoid infection. This can lead to disruptions in the use of protective equipment (3). Additionally, nurses with increased workloads during this time may be less likely to comply with isolation and standard measures (3).

In addition to a special issue on the 2019 novel

coronavirus (2019-nCoV), the Turkish Nurses Association (THD) periodically reports the results of surveys investigating the challenges faced by nurses in providing care to patients infected with the virus. The results of the fifth survey, conducted on April 27, 2020, indicated that 24% of nurses encountered difficulty in accessing gloves, 39.3% medical masks, 79.7% N95 masks, 43.9% visors or goggles, and 60.9% disposable coveralls. It was reported that only 26% of the nurses participating in the survey indicated that their institutions had no shortage of PPE. Additionally, it was reported that in some institutions, when PPE is delivered or when a coronavirus disease 2019 (COVID-19) test is requested, a form requiring the signature of the recipient is provided,

which states, "I declare that I accept the liabilities that may arise from the inappropriate use of personal protective equipment." (4).

During the COVID-19 pandemic, nurses are playing a vital role in the frontline of the fight against the virus. Several international organizations and countries have published reports outlining measures to safeguard the health and safety of nurses, including the use of personal protective equipment. The World Health Organization (WHO), and the European Centre for Disease Prevention and Control (ECDC) are organizations that provide recommendations on this matter. In Turkey, the Turkish Ministry of Health published measures titled 'Infection Control Measures in Healthcare Institutions' in response to the pandemic (4). It is hypothesized that infection rates will decline as nurses demonstrate heightened compliance with the aforementioned control measures. Compliance can be increased through the implementation of training programs. For this reason, the objective of this study was to determine the impact of education on nurses' adherence to standard and isolation measures outlined in the 'Infection Control Measures in Healthcare Institutions' published by the Ministry of Health of the Republic of Turkey, given the increasing workload of nurses in COVID-19 units.

1) Is there a difference in the mean score of the nurses' Compliance with Isolation Precautions Scale after and before the training program prepared for the implementation of isolation and standard precautions?

2) Is there a difference in the mean score of the Compliance to Standard Precautions Scale of nurses after and before the training program prepared for the implementation of isolation and standard precautions?

Methods

Design and Participants

The study was conducted in accordance with a one-group pre-post test quasi-experimental design (5). The study was conducted in a public hospital located in the Western Black Sea Region of Turkey. The hospital where the study was conducted employs a total of 115 nurses, all of whom are stationed in the units where patients with confirmed cases of coronavirus are admitted. The objective was to reach the entire population, which was achieved by avoiding sample selection. A total of 100 nurses who met the eligibility

criteria were included in the study to participate in the research. The response rate was 86.9% (100/115) (5). The following criteria were established for participation in the study: (1) employment as a nurse in the units where patients with confirmed cases of coronavirus disease 2019 (Covid-19) were admitted in the hospital where the study was conducted; (2) willingness to participate in the study; and (3) completion of all follow-up and training activities. Those who were excluded from participation in the study for failing to complete the training modules included those who dropped out of the study.

Data Collection Tools

Identifying Information Form, Standard Precautions Compliance Scale (SPCS), and the Isolation Precautions Compliance Scale (IPCS) were data collection tools.

Identifying Information Form: The form encompasses inquiries pertaining to the demographic characteristics of nurses, including age, gender, and educational background. Additionally, it solicits information regarding the nurses' experiences with and knowledge about the novel Coronavirus Disease 2019 (COVID-19), as well as their familiarity with standard and training-related isolation measures and the utilization of protective equipment.

Compliance with Isolation Measures Scale: The Scale of Compliance with Isolation Precautions was developed by Tayran and Ulupinar (6) in Turkish for the purpose of evaluating compliance with isolation precautions among a sample of 430 nurses and physicians. The scale comprises 18 items. An exploratory factor analysis revealed that the scale is composed of four sub-dimensions. The aforementioned factors are as follows: transmission route, employee-patient safety, environmental control, hand hygiene, and glove use. The factor analysis of the scale yielded a variance explanation of 50.50%. Items 8, 12, 13, 14, and 17 collectively constitute the "transmission route" sub-dimension, while items 18, 24, 32, 33, 34, and 35 comprise the "employee and patient safety" sub-dimension. Items 1, 26, 27, and 29 collectively represent the "environmental control" sub-dimension, and items 20, 21, and 22 constitute the "hand hygiene and glove use" sub-dimension. The scale items are evaluated using a 5-point Likert-type rating scale. The scale items were scored based on self-report using a 5-point Likert-type scale, with the following ratings: The scale employs a 5-point Likert-type rating system, with the following options: 1 = Strongly disagree, 2 = Disagree, 3

= No opinion, 4 = Agree, 5 = Strongly agree. Items 5, 7, 12, and 17 on the scale comprise negative statements and are reverse scored. The lowest possible score on the scale is 18, while the highest is 90. A high score is indicative of a positive adaptation to the isolation conditions. In terms of scale reliability, the Cronbach alpha reliability coefficient for the 18 items included in the total scale is 0.85. The internal consistency reliability coefficients for the scale's sub-dimensions are as follows: "transmission route" (0.80), "employee patient safety" (0.72), "environmental control" (0.61), and "hand hygiene glove use" (0.52) (6).

Compliance with Standard Precautions Scale: The Compliance with Standard Precautions Scale is a scale that aims to reveal the compliance of healthcare workers with standard protective measures, which are evaluated within the scope of measures to be taken for infection control. In other words, it is a measurement tool in which healthcare workers make self-assessments to determine whether they exhibit protective and safe behaviors in infection control and prevention. The Turkish validity and reliability study of the scale was conducted by Samur et al. in 2020. The one-dimensional and four-point Likert scale is graded as "1=never", "2=rarely", "3=sometimes", "4=always". In the evaluation of the scale, the "always" response to the positively rated items (items 1, 3, 5, 7, 8, 9, 10, 11, 12, 13, 14, 16, 17, 18, 19 and 20) is coded with "1 point" and the other responses are coded with "0 points". The "never" response to the negatively rated items in the scale (items 2, 4, 6 and 15) is coded as "1 point" and the other responses are coded as "0 points". The total score that can be obtained from the scale varies between "0 - 20". As the score obtained from the scale increases, it is interpreted that compliance with standard measures increases (7).

Education Program

The curriculum comprised lectures and activities on the appropriate behaviors required for isolation and compliance with standard precautions, as outlined by the researchers and in line with the existing literature on the subject. The curriculum was evaluated by eight experts from the fields of nursing and infection control to ensure content validity. The experts evaluated the training in terms of its design, content, and implementation using a 12-item questionnaire on a four-point Likert scale, ranging from 1 (not valid) to 4 (highly valid). A rating of 3.0 or above on each item was deemed indicative of the requisite level of legitimacy. A pilot study was conducted to ascertain

the nurses' comprehension of the training content. Four nurses underwent training in person, led by the researchers. The training process was not extended to the aforementioned nurses. The researchers concluded that the pilot study's findings warranted no further modifications to the teaching content.

Module 1: In the Personal Protective Equipment module, the rationale for utilizing the apron, mask, medical mask, filtered respirator, non-medical mask, goggles, visor, and gloves, as well as the appropriate circumstances for their deployment, were elucidated through a PowerPoint presentation. Subsequently, a practical demonstration was conducted, during which nurses were invited to apply the techniques demonstrated. The nurses' performance was observed, and their actions were either reinforced or corrected and repeated as necessary. At the conclusion of the module, the nurses were provided with a brochure on the subject matter.

Module 2: In the Social Distancing and Hand Hygiene Module, nurses were provided with a PowerPoint presentation that detailed the rationale behind social distancing, its practical applications, and the importance of hand hygiene. The presentation also outlined the circumstances under which hand washing is necessary and provided instructions on how to perform hygienic handwashing. The nurses' performance was observed, and their actions were either reinforced or corrected and repeated as necessary. At the conclusion of the module, the nurses were provided with a brochure on the subject matter.

Data Collection

The program, which consisted of two modules over two weeks, was prepared by the researchers in accordance with the literature (8). The first module was a PowerPoint presentation on the use of personal protective equipment. The second module was a PowerPoint presentation on social distancing and hand hygiene. A total of 10 experts in the field of nursing were consulted in the development of the program. After the necessary changes were made according to the opinions, a pilot study was conducted with five nurses. After receiving feedback from the nurses regarding the comprehensibility and applicability of the program, the modules were finalized.

Data were collected between September 2022 and September 2023. Nurses were contacted through unit managers at the hospital where the study was conducted. Nurses were asked to complete the data

collection tools prior to training. A two-week training program consisting of two modules was implemented to improve nurses' compliance with isolation and standard precautions. After each module, nurses were given various brochures on isolation and standard precautions and the use of personal protective equipment to increase the retention of the training. One month after the training, nurses were asked to complete the data collection tools again.

Analysis

SPSS for Windows 22.0 was used for data analysis. The distribution of the demographic data of the nurses was presented by number, percentage, mean and standard deviation. Normality of data was assessed by Kolmogorov-Smirnov. Due to the normal distribution of the data, the Student t test was used for two group comparisons.

Ethics

Ethics committee approval for the study was obtained from the ethics committee of a university (Protocol no: 2022-SBB-0208, Date: 27.05.2022 and Approval No: 9). The nurses were informed about the purpose of the study and signed the informed consent form.

Results

Of the nurses surveyed, 79.0% were female, with a mean age of 30.75±7.05 years. Additionally, 89.0% of the nurses held university degrees. Half of the nurses worked in the COVID-19 service, while 45.0% worked in the COVID-19 Intensive Care Unit.

In this study, 95% of the nurses had received education on the use of PPE and compliance with standard isolation measures. Out of the surveyed nurses, 81% had contracted COVID-19. The majority of nurses, 73%, believed that masks were the most effective form of PPE. Only 18.5% of the nurses reported experiencing difficulty breathing most frequently while wearing PPE (Table 1).

Table 1. Nurses' experiences with COVID-19 and Personal Protective Equipment use (n=100)

	n	%
Previous education on the use of Personal Protective Equipment and compliance with standard and isolation measures		
Yes	95	95.0
No	5	5.0
COVID-19 transmission		
Yes	81	81.0
No	19	19.0
Considering which PPE provides the most protection		

Mask	73	73.0
Visor	10	10.0
Apron	0	0.0
Glove	16	16.0
Glasses	0	0.0
Issues encountered when providing care with PPE		
Difficulty breathing	73	18.5
Allergy to the mask on the face	27	6.9
Sweating a lot in a gown	64	16.2
Difficulty caring for patients	41	10.4
The mask left marks on my face	56	14.2
Too much steam from the glasses	40	10.2
Gloves make hands sweat	63	16.0
Gloves cause allergies on the hands	30	7.6

PPE: Personal Protective Equipment

The mean total score of IPCS was higher after the education (T1=55.39±7.39, T2=77.50±9.68; t=8.372, p<0.001). The mean total score of SPCS was higher after the education (T1=10.38±2.46, T2=14.43±4.29; t=6.298, p<0.001) (Table 2).

Table 2. Differences in the mean total scores of the Compliance with Isolation Precautions Scale and Compliance with Standard Precautions Scale of nurses before and after education (n=100)

	Before the education Mean±SD	After the education Mean±SD	t	p
Compliance with Isolation Measures Scale	55.39±7.39	77.50±9.68	8.372	<0.001
Transmission route	16.48±2.90	22.36±3.08	4.529	<0.001
Environmental control	13.83±1.99	17.66±2.19	4.301	<0.001
Employee and patient safety	16.39±2.37	24.86±3.69	5.290	<0.001
Hand hygiene and glove use	9.27±1.21	12.62±1.99	4.294	<0.001
Standard Precautions Compliance Scale	10.38±2.46	14.43±4.29	6.298	<0.001

t=student t test

Discussion

This study aimed to investigate the impact of education on nurses' compliance with standardization and isolation precautions. It also aimed to identify the challenges they faced while using PPE during the pandemic and to assess compliance with standard isolation procedures. It was found that nurses' adherence to isolation and standard measures improved after education, resulting in more accurate use of personal protective equipment. The implementation of pedagogical strategies that are grounded in practical and visual activities has the potential to facilitate the positive transformation of nurses' knowledge, performance, and compliance

with standard protocols and isolation measures (9,10). Most nurses reported infrequent mask use while working. Our study aimed to increase awareness among nurses, resulting in a significant increase in mask use after the education. The education had a positive impact on mask use. Similarly, in their literature review, Sommerstein et al. (11) aimed to determine the risk of SARS-CoV-2 transmission via aerosols, provide evidence for rational mask use, and discuss additional measures for protecting healthcare workers from COVID-19. The review found that high-quality standard surgical masks are as effective as FFP2 masks in preventing droplet-associated viral infections among healthcare workers, as reported for influenza or SARS.

The study observed that nurses had a low rate of using visors, caps, and goggles. The education emphasized the importance of protective equipment, including caps, aprons, and visors, in addition to gloves and masks, to reduce the risk of transmission. After the education, usage rates increased. Ganczak and Szych (7) reported that only 5% of surgical nurses use gloves, masks, protective goggles, and gowns when in contact with potentially infective material.

The objective of educational interventions is to address the relationship between knowledge and practice. A notable correlation was identified between nurses' infection control knowledge and adherence to standard precautions (13). The findings of a web-based survey indicated a tenuous correlation between nurses' knowledge and the implementation of standard precautions (14). It is anticipated that educational interventions will enhance knowledge, which in turn will facilitate changes in practice. To effect changes in practice, educational interventions should include a behavioral component that focuses on hands-on training in the skills required for implementation, in addition to a variety of instructional settings, as implied by the findings of this small-scale study and previous ones. A single educational intervention comprising solely simulation, devoid of opportunities for feedback and retraining, proved ineffective in enhancing critical care nurses' compliance with existing hand hygiene guidelines at targeted behavior rates (15). A study conducted in Iran revealed that a health belief model (HBM)-based educational intervention was effective in enhancing nurses' knowledge, perceived threat, and perceived benefits, while reducing perceived barriers and improving control of nosocomial infections (16). The implementation of interactive training in small

groups was found to have a significant impact on nurses' compliance with hand hygiene protocols (17). It is hypothesized that the incorporation of PowerPoint presentations and practical training exercises enhanced the efficacy of the training program (18).

Limitations

It should be noted that this study is subject to several limitations. Firstly, it should be noted that this is a cross-sectional study, which precludes the possibility of making any causal claims. Secondly, behaviours associated with the Coronavirus Disease 2019 (COVID-19) are evolving rapidly. Consequently, the findings presented in this study can only reflect the final phase of the pandemic and may be less applicable with the introduction of subsequent updates.

Conclusion

As a result of this study, the importance of other protective equipment, such as visors and goggles, was emphasized in addition to masks and gloves, which were mostly used as PPE before the education. It was observed that education on the importance of using personal protective equipment, isolation, and compliance with standard precautions led to an increase in the variety and usage rates of nurses' protective equipment. This is crucial in preventing the transmission of COVID-19.

Declaration of conflicting interests

The author declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: The author is currently in the process of setting up a social enterprise which aims to provide digital solutions for managing outbreaks of communicable disease.

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