Original Research

An Evaluation of a Web-Based Crisis Management Training Program for Nurse Managers: The Case of the COVID-19 Crisis

Handan Alan PhD, RN[1] [ORCID], Arzu Kader Harmanci Seren PhD, RN[2],

Feride Eskin Bacaksiz PhD, RN[3], Serkan Güngör MS[1], Osman Bilgin MS[1] and

Ülkü Baykal PhD, RN[4]

[1]Department of Nursing Administration, Florence Nightingale Faculty of Nursing, Istanbul University-Cerrahpaşa, Istanbul, Türkiye; [2]Department of Nursing, Faculty of Health Sciences, Fenerbahce University, Istanbul, Türkiye; [3]Department of Nursing Administration, Hamidiye Faculty of Nursing, University of Health Sciences, Istanbul, Türkiye and [4]Arel University, Istanbul, Türkiye

Abstract

Objective: The effective management of nursing services, the main power in patients' care and treatment in the front line of the fight against the COVID-19 pandemic, and nurse managers' effective leadership behaviors in the fight against the pandemic have been important key factors. It is thus critical to support nurse managers, strengthen them through training, and increase their competency so that they can successfully manage crises, disasters, or pandemics. This study aims to assess the effect of a web-based training program on the knowledge levels of nurse managers who worked during the COVID-19 pandemic.
Methods: This is a randomized controlled experimental study. The study population consisted of the members of the Nurse Managers Association. The intervention group had 30 participants, and the control group had 31 participants in the final.
Results: There was no statistically significant difference between the intervention and control groups' mean number of correct pre-test responses ($P = 0.843$). However, the intervention group's mean number of correct post-test responses was statistically significantly higher than the control group's after the web-based training program ($P < 0.001$).
Conclusions: Web-based training programs can effectively increase nurse managers' knowledge levels. Therefore, web-based training programs should be developed in ordinary times for the management of crisis situations.

Introduction

Extraordinary situations can deeply affect social life at the local, regional, national, and even global levels. The novel coronavirus (COVID-19) has resulted in an extraordinary situation that has affected social life at the global level in the aspects of the economy, social life, and politics, besides health. It is 1 of the modern world's biggest and longest crises.[1]

The field that has been affected most by COVID-19 is health services. During the pandemic, many problems that require specific management techniques for extraordinary situations such as insufficient manpower and personal protective equipment, orientation for new employees, and transferring employees, as well as increased workloads and fair distribution of resources, concern about getting infected/ infecting relatives and friends, ensuring patient and employee safety, and maintaining active communication.[2-4] It is considered that training will help the nurse managers' role in crisis management to ensure that care is safe, effective, patient focused, and high quality/ evidence based.[2]

Background

A crisis is an unexpected, significant, disruptive,[5] and harmful or threatening event for organizations and their stakeholders.[6] It is also a time of confusion, uncertainty, and suffering. The crisis has no policy manual. This descriptor fit the present COVID-19 crisis: the manuals must be written as managers work through uncharted territory. Effective COVID crisis leadership requires nurse managers to quickly adapt and modify behavior and procedure at lightning speed.

Effective crisis management must include strategic, operational, research, and educational, as well as training components.[7] Given the dearth of knowledge of COVID-specific crisis management, it is deemed crucial to support nurse managers in eliminating their need for training in the conditions of a pandemic, which they have never encountered before. Providing training while nurse managers are working on the frontline may help them to overcome the new problems.[8-11]

This is because crises are characterized by confusion, uncertainty, stress, and 'each crisis situation is unique and will require a flexible approach.'[12]

Only the individuals who successfully complete qualified training programs can address complicated situations quickly and calmly, and make professional decisions, even under intense pressure.[13]

It is important to support nurses and nurse managers, and strengthen them through training during extraordinary situations. Although dissemination of required information may be more important than the ordinary times to overcome the problems relevant with the crisis in hospital settings or affected fields, it is not possible to train manager nurses via classical in-person education methods during the crises.[14,15] Thus, innovative methods are required.[16] To pass the barriers caused by the crisis, it is expected that web-based training programs in which nurse managers participate, national and international examples are shared, experiences are discussed, and standard solutions are determined, may be helpful.[2,14,15]

Souza-Junior *et al.* evaluated 187 publications published in English, Portuguese, and Spanish.[17] They concluded that technology-based learning programs consisting of web-based synchronous, or asynchrony training programs disseminated during the 2000s were used in the training of nurses, education of nursing students/ peers, and management of care.[2,15] Thus, researchers endorsed web-based learning program as a viable platform to disseminate information and support a standardized approach to professional development of manager nurses working in a complex and dynamic healthcare settings during the pandemic. This study evaluated the efficiency of the web-based education program which was developed based on the qualitative interviews with the nurse managers.

Methods

Aim and type of the study

This randomized controlled experimental study aimed to evaluate the effect of a web-based training program on the knowledge levels of nurse managers who worked at the front-line during the disaster and crisis, called COVID-19 pandemic. It could reach large masses regardless of time and place, and the content on the platform provides both rapid training to new users and reviewing existing users whenever they wish. This study is registered with Clinical Trials (clinicaltrials.gov ID: NCT04778995)

Preparation of the website

Consistent with recommendations found in literature, to meet the nurse managers' knowledge needs regarding effective crisis management in nursing services, our first step in building our training program was to create learning objectives. This training program was designed to address these learning objectives to know the: (1) nurse manpower planning methods that will provide healthy working environment conditions, (2) methods to follow the changes in patient care, (3) basic principles of personal protective equipment supply and distribution, (4) stress management methods, (5) training methods for employees, (6) interpersonal communication techniques, and (7) methods to increase the motivation of the employees. Based on the literature,[2,3,14,18] and the themes generated in qualitative interviews with the nurse managers, the training program included these 9 categories: (1) Management of Crises and Extraordinary Situations, (2) Leadership in Crisis, (3) Planning and Managing Nurse Manpower in Crises, (4) Supervising and Managing Patient Care, (5) Logistics and Support Services, (6) Communication in Extraordinary Situations, (7) Motivating the Nursing Personnel in Extraordinary Situations, (8) Stress Management During Crises, and (9) Employee Adaptation and Training.

Once we decided that our education would be web-delivered, a web page called the 'Nurse Manager Training Program' was prepared with the support of a computer engineer. The participants had to use their usernames and passwords each time they logged on to the system. The home page includes brief information and a video that explains the program's aims. The training content prepared in sections was provided using a link called 'Download Training Documents.'

The expert trainers were consensually selected by the researchers to make presentations for these categories. Determined people were contacted for training, after obtaining consent and video shoots were made by the researchers, paying attention to the social distance rules in a dedicated classroom by appointment at mutually suitable times. The training videos show 35 - 40 minutes.

Study population and sample

The study population consisted of the members of the Nurse Managers Association who replied to the announcement on the association's social media site and email group. The study sample included nurse managers who met these inclusion criteria: (1) being a member of the Nurse Managers Association, (2) being a nurse manager, (3) having worked as a manager for at least 2 years, (4) having at least a bachelor's degree, (5) having worked during the pandemic and, (6) voluntary participation. The nurse managers who did not meet these criteria were excluded from the study.

Determination of the intervention and control groups: randomization

A link to the online introductory information form was sent via email to the nurse managers who indicated that they wanted to participate in the study via email (n = 189). The completed information forms were reviewed and those who did not meet the inclusion criteria (those who were staff nurses, postgraduate students, and academicians; n = 109) were excluded. The remaining 80 nurse managers were assigned numbers in the order that they completed the form and randomization was made afterwards.

Randomization was made to ensure that the groups were similar in terms of all factors other than the website efficiency of which was analyzed in this study. Simple randomization (www.randomizer.org) was used to assign equal numbers of participants to the intervention (n = 40) and control (n = 40) groups. In the intervention group, 38 participants began the training and 30 of them finished it, while in the control group, 37 participants completed the pre-test and 31 participants completed the post-test. In the intervention group, those who did not complete the training (n = 8), and in the control group, those who did not complete the post-test (n = 6) were excluded. A flowchart was prepared using the CONSORT scheme (Figure 1).

Data collection tools

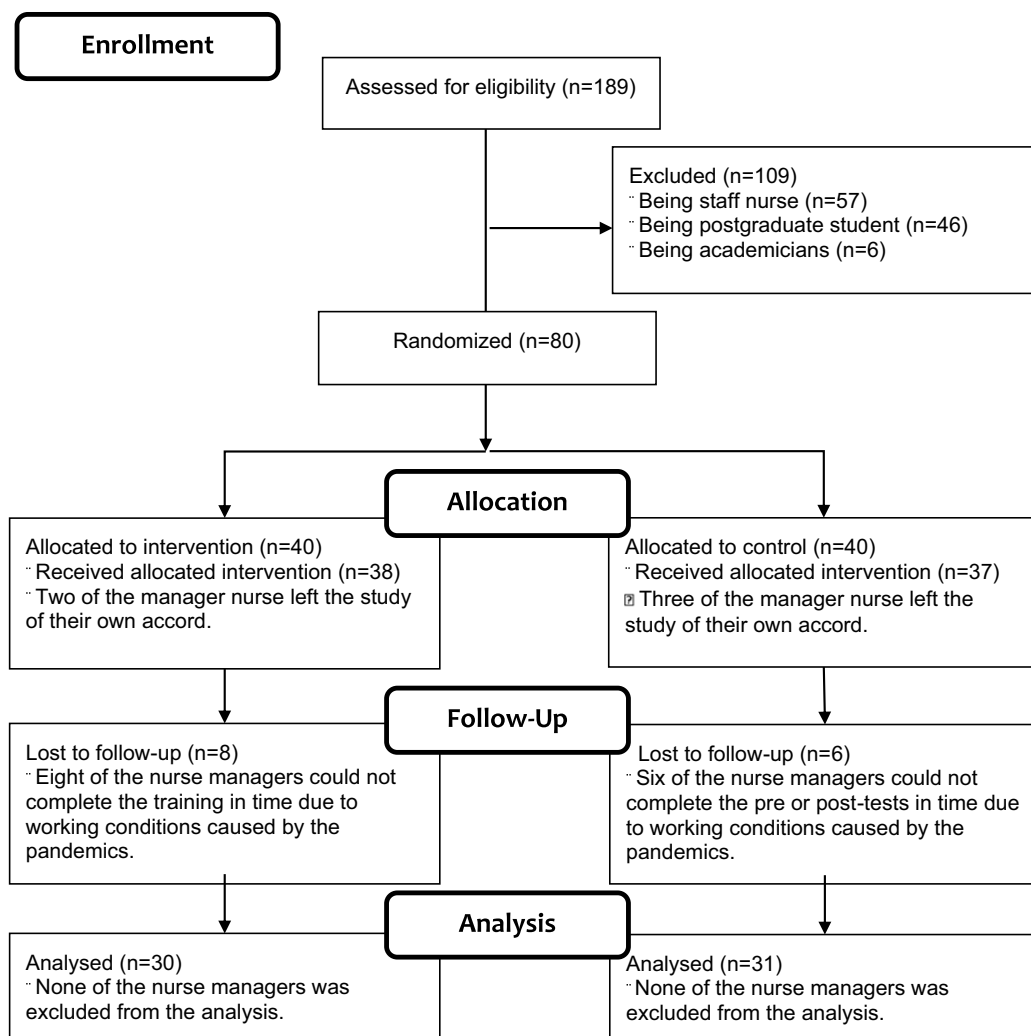The data were collected using a participant information form, the pre-test and the post-test form.

Figure 1. CONSORT flow diagram.

Participant information form

This form was prepared by the researchers and includes questions on the participants' personal and professional characteristics. Personal characteristics section included 6 questions: name, email address, gender, and age, as well as marital status and education level. Professional characteristics section included 5 questions: employed institution, hospital type (whether it is a pandemic hospital), management position, and professional experience/ management experience.

Pre-test and post-test forms

Expert trainers who worked in this training program prepared 2 or 3 questions about the topics they would teach. The questions and responses were sent to 10 experts working in the field of education to be assessed for validity. The statements were finalized considering their recommendations. Each multiple-choice question has 5 response options. The participants should give the correct answer after reading the question. The participants' responses to the pre-test and post-test were coded, and the items' Kuder-Richardson reliability values ranged from 0.642 to 0.695.

Data collection

The nurse managers in the intervention group were told that they could access the content of the training whenever they wanted between October 15 and November 30, 2020, but not after that period. The nurse managers could access the training content by mobile phone, tablet, or computer at any place and time using any internet connection (using their usernames and passwords via the determined internet address). Completing the pre-test was the prerequisite for opening the training videos. Reminder emails were sent to the participants who did not watch the training videos for a long time. When they felt that they had learned the content of the training and wanted to end the training, they completed the training by doing the post-test. A certificate of participation was sent to them via email.

The nurse managers in the control group received no training during the study. They were explained that they were in the control group via email and asked to complete the online pre-test sent via a link between October 15 and 25, 2020. The participants who completed the pre-test were sent the link to the post-test via email between December 1, and 10, 2020. Then, the web address was made available so that the control group could also access the

Table 1. **Distribution of the intervention and control groups' sociodemographic characteristics** (n = 61)

		Intervention (n = 30)		Control (n = 31)		
		n	%	n	%	Test and significance
Gender	Female	27	90.0	29	93.5	$\chi^2 = 0.256$
	Male	3	10.0	2	6.5	$P = 0.616$
Age	≤ 39 years	14	46.7	22	71.0	$\chi^2 = 3.722$
	≥ 40 years	16	53.3	9	29.0	$P = 0.054$
	Mean (SD)	39.53 (7.33)		36.13 (5.80)		
Marital status	Married	20	66.7	22	71.0	$\chi^2 = 0.132$
	Single	10	33.3	9	29.0	$P = 0.717$
Education	Postgraduate	11	36.7	11	35.5	$\chi^2 = 0.009$
	Graduate	19	63.3	20	64.5	$P = 0.923$
Position	Clinical manager nurse	7	23.3	10	32.3	$\chi^2 = 0.604$
	Head nurse	23	76.7	21	67.7	$P = 0.437$
Hospital type	Private	6	20.0	8	25.8	$\chi^2 = 0.465$
	University	9	30.0	10	32.3	$P = 0.793$
	Public	15	50.0	13	41.9	
Pandemic hospital	Yes	27	90.0	30	96.8	$\chi^2 = 1.142$
	No	3	10.0	1	3.2	p=0.354
Professional experience	≤ 10 years	7	23.3	7	22.6	$\chi^2 = 3.615$
	11 - 20 years	8	26.7	15	48.4	$P = 0.164$
	≥ 21 years	15	50.0	9	29.0	
	Mean (SD)	18.80 (8.25)		16.00 (6.73)		
Management experience	≤ 3 years	8	26.7	13	42.0	$\chi^2 = 4.780$
	4 - 7 years	5	16.7	9	29.0	$P = 0.092$
	≥ 8 years	17	56.7	9	29.0	
	Mean (SD)	9.46 (6.63)		5.90 (5.14)		

χ^2, chi square; n:,Number; %, percentage, SD, Standard Deviation

content of the training. A certificate of participation was sent to the control group who completed the training.

Data analysis

Numbers, percentages, minimums, and maximums, as well as means and standard deviations were used to determine the distributions of the participants' personal and professional characteristics, and their pre-test and post-test responses. The sociodemographic characteristics of the intervention and control groups were compared using parametric (independent samples t- test) and non-parametric (chi-squared) tests. The paired samples t- test was used to assess the intervention and control groups' intra-group pre-test and post-test scores, and the independent samples t-test was used to compare their intergroup scores. Internal consistency of the responses to the pre-test and post-test was tested using Kuder-Richardson reliability coefficients.

Ethical consideration

Written permission was obtained from the Nurse Managers Association. The nurse managers who met the inclusion criteria were provided with verbal and written information about the study, and their written informed consent was obtained from those who agreed to participate. They were told that the data would only be used for scientific publications and that they could leave the study any time they wanted. This study was supported by a scientific and technological research council.

Results

Most of the 30 participants in the intervention group were female (90.0%), married (66.7%), and head nurses (76.7%). Most of them worked at public hospitals (50.0%) and pandemic hospitals (90.0%). Their mean age was 39.53 (SD = 7.33). Their mean professional experience was 18.80 (SD = 8.25) years, and their mean management experience was 9.46 (SD = 6.63) years (Table 1).

Most of the 31 participants in the control group were female (93.5%), married (71.0%), and head nurses (67.7%). Most of them worked at public hospitals (41.9%), and nearly all their hospitals were pandemic hospitals (96.8%). Their mean age was 36.13 (SD = 5.80). Their mean professional experience was 16.00 (SD = 6.73) years, and their mean management experience was 5.90 (SD = 5.14) years (Table 1).

No statistically significant differences were found between the intervention and control groups' sociodemographic characteristics (*P* > 0.05, Table 1).

Table 2 shows the intervention group's mean number of correct pre-test responses was 12.17 (SD = 2.82). Their mean number of correct post-test responses was 14.37 (SD = 2.11). This increase was found to be statistically significant (*P* < 0.001). The control group's mean number of correct pre-test responses was 12.29 (SD = 1.99). Their mean number of correct post-test responses was 10.52 (SD = 2.53). Also, this decrease was also found to be statistically significant (*P* < 0.01; Table 2).

Table 3 shows that there was no statistically significant difference between the intervention and control groups' mean number

Table 2. Comparison of the intervention and control groups' correct pre-test and post-test responses

Intervention (n = 30)				Control (n = 31)			
Participant Number	Pre - test	Post - test	Difference	Participant Number	Pre - test	Post - test	Difference
1	3 [L]	13	+ 12	1	16 [H]	15 [H]	− 1
2	12	15	+ 3	2	11	11	0
3	10	13	+ 3	3	13	9	− 4
4	9	13	+ 4	4	16 [H]	11	− 5
5	12	16	+ 4	5	11	11	0
6	16	16	0	6	14	12	− 2
7	14	13	− 1	7	14	13	− 1
8	14	15	+ 1	8	13	11	− 2
9	14	11 [L]	− 3	9	14	14	0
10	10	11 [L]	+ 1	10	13	12	− 1
11	13	13	0	11	13	12	− 1
12	14	13	− 1	12	12	12	0
13	8	14	+ 6	13	12	10	− 2
14	10	12	+ 2	14	12	10	− 2
15	10	18	+ 8	15	14	7	− 7
16	11	17	+ 6	16	13	13	0
17	16	19 [H]	+ 3	17	13	10	− 3
18	12	14	+ 2	18	11	5 [L]	− 6
19	13	12	− 1	19	12	10	− 2
20	14	14	0	20	12	13	+ 1
21	13	13	0	21	14	11	− 3
22	15	15	0	22	11	13	+ 2
23	16	12	− 4	23	10	7	− 3
24	12	14	+ 2	24	14	10	− 4
25	11	14	+ 3	25	10	6	− 4
26	12	16	+ 4	26	10	5 [L]	− 5
27	12	16	+ 4	27	9	10	+ 1
28	11	15	+ 3	28	10	13	+ 3
29	11	15	+ 3	29	7 [L]	12	− 5
30	17 [H]	19 [H]	+ 2	30	14	8	− 6
				31	13	10	− 3
Correct Answers	Pre - test	Post - test		Correct Answers	Pre - test	Post - test	
L - H	3 - 17	11 - 19		*L - H*	7 - 16	5 - 15	
Mean (SD)	12.17 (2.82)	14.37 (2.11)		*Mean (SD)*	12.29 (1.99)	10.52 (2.53)	
Test and significance	**t = - 3.958 P < 0.001***			*Test and significance*	**t = 3.636 P = 0.001**		

**P < 0.01; ***P < 0.001
L: Lowest, H: Highest, SD: Standard Deviation, t: Paired samples t - test

Table 3. Comparison of the intervention and control groups' mean correct pre-test and post-test responses (n = 61)

		n	Mean (SD)	Test and significance
Pre-test	Intervention Group	30	12.17 (2.82)	t = - 0.199 P = 0.843
	Control Group	31	12.29 (1.99)	
Post-test	Intervention Group	30	14.37 (2.11)	**t = 6.449 P < 0.001***
	Control Group	31	10.52 (2.53)	

***P < 0.001
n, Number; SD, Standard Deviation; t, Independent samples t-test

of correct pre-test responses (P = 0.843). The difference between the groups' mean number of correct post-test responses was statistically significant (P < 0.001).

The intervention group's mean for correct pre-test responses was 60.84% (SD = 30.23). It was 71.83% (SD = 29.24) on the post-test. This difference was also found to be statistically significantly high (P < 0.001; Table 4).

The control group's mean for correct pre-test responses was 61.45% (SD = 32.18). It was 57.57% (SD = 32.62) on the post-test. This decrease was not statistically significant (P > 0.05; Table 4).

Discussion

During extraordinary situations, training is extremely important for the success of each step of the process. Training programs to

Table 4. Distribution of the pre-test and post-test questions and the intervention and control groups' percentages of correct responses

	Q-N (n = 20)	Intervention (n = 30)		Control (n = 31)	
		Pre-test n (%)	Post-test n (%)	Pre-test n (%)	Post-test n (%)
Management of Crises and Extraordinary Situations	1st	7 (23.3)	13 (43.3)	3 (9.7) [L]	6 (19.4)
	2nd	19 (63.3)	24 (80.0)	28 (90.3)	28 (90.3)
	3rd	8 (26.7)	12 (40.0)	9 (29.0)	5 (16.1)
Leadership in Crisis	1st	11 (36.7)	20 (66.7)	10 (32.3)	11 (35.5)
	2nd	21 (70.0)	29 (96.7)	21 (67.7)	18 (58.1)
Planning and Managing Nurse Manpower in Crises	1st	29 (96.7) [H]	30 (100) [H]	31 (100) [H]	30 (96.8)
	2nd	10 (33.3)	13 (43.3)	10 (32.3)	9 (29.0)
Supervising and Managing Patient Care	1st	20 (66.7)	24 (80.0)	20 (64.5)	20 (64.5)
	2nd	17 (56.7)	22 (73.3)	23 (74.2)	25 (80.6)
Logistics and Support Services	1st	22 (73.3)	28 (93.3)	24 (77.4)	21 (67.7)
	2nd	28 (93.3)	30 (100) [H]	31(100) [H]	30 (96.8)
Communication in Extraordinary Situations	1st	29 (96.7) [H]	29 (96.7)	29 (93.5)	31 (100) [H]
	2nd	27 (90.0)	27 (90.0)	25 (80.6)	5 (16.1)
	3rd	3 (10.0)	1 (3.3) [L]	3 (9.7) [L]	1 (3.2) [L]
Motivating the Nursing Personnel in Extraordinary Situations	1st	27 (90.0)	30 (100) [H]	29 (93.5)	28 (90.3)
	2nd	1 (3.3) [L]	7 (23.3)	3 (9.7) [L]	5 (16.1)
Stress Management During Crises	1st	15 (50.0)	17 (56.7)	15 (48.4)	16 (51.6)
	2nd	17 (56.7)	16 (53.3)	13 (41.9)	16 (51.6)
Employee Adaptation and Training	1st	29 (96.7) [H]	30 (100) [H]	31 (100) [H]	29 (93.5)
	2nd	25 (83.3)	29 (96.7)	23 (74.2)	23 (74.2)
Correct Answers		**Pre-test**	**Post-test**	**Pre-test**	**Post-test**
	L-H	3.3-96.7	3.3-100	9.7-100	3.2-100
	Mean (SD)	60.84 (30.23)	71.83 (29.24)	61.45 (32.18)	57.57 (32.62)
Test and significance		**t = 4.982 *P* < 0.001*****		t = - 0.105 *P* = 0.283	

***P < 0.001
Q-N, Question numbers; L, Lowest; H, Highest; M, Mean; SD, Standard Deviation; t, Paired samples t-test

be prepared for such situations should differ from other training programs. While these training programs are being created, educational needs should be clearly identified, and their aims and goals should be determined.[19] This study designed and implemented an online training program based on the cause-effect approach due to pandemic conditions.

Crises also alert health services and indicate the need for effective managers, particularly in nursing services management.[3] The COVID-19 pandemic caused rapid changes and developments in health services, and consequently, a need arose for studies that require information updates and experience-sharing in caregiving and healthcare management for nurse managers. The pandemic reminded nurse managers that they should examine their crisis management knowledge and skills, formulate crisis plans, and organize nursing teams for crises. However, nurse managers must have sufficient crisis management knowledge so that they can take these steps.[14,20]

In the case of the COVID-19 pandemic and in similar cases, nurse managers play important roles in maintaining health services, preventing patients and their relatives from being negatively affected, and making managerial arrangements (personnel planning, occupational health, safety measures, teamwork, etcetera) for rapid crisis response.[20,21] It is important to prepare training programs for nurse managers in order for them to adapt to crises and manage them rationally. This study was conducted to increase the knowledge of nurse managers working in healthcare organizations to meet these needs, which are also highlighted in the literature, and to enable them to become competent at coping with crises such as pandemics and natural disasters.

The study found that the nurse managers gave more correct responses after the training program. Initially, the number of their correct responses was at a moderate level, but this number increased after the training. No statistically significant difference was found between the numbers of correct responses given by the intervention and control groups before the training program, which is important for assessing its effectiveness. The increase in the number of correct responses given by the intervention group after the training was statistically significant. The increase in the number of correct responses given by the intervention group was also statistically significantly higher than the number of correct responses given by the control group, which is also an important finding. These findings suggest that the web-based training program was effective for the nurse managers who worked during the COVID-19 pandemic.

This study found that the intervention group's rate of correct responses in the categories of crisis management, care services management, and leadership increased even more after the training program. The COVID-19 pandemic caused an unprecedented multidimensional crisis and had many negative medical, social, political, and economic, as well as cultural effects due to its origin, spread, ambiguity, and complexity.[22,23] Therefore, the increase in the rate of correct responses to the questions about crisis management should be deemed important. A study conducted in China reported that emergency strategies were developed within the

scope of crisis management, and the quality of patient care and employee safety were higher in nursing services where these strategies were implemented.[24]

The increase in the intervention group's rate of correct responses to the questions about care services management is also remarkable. Routine practices in the field are insufficient for effective care services during crises such as the pandemic, which has affected the entire world, and more unique responses are required. In this study, the fact that the training subjects supported each other may have caused the intervention group to give more correct responses to the questions about care services management after the training program.

Nursing services should be effectively managed, and nurse managers should exhibit effective leadership behaviors in the fight against the pandemic for timely, safe, need-oriented, and high-quality health care.[21] The ICN also includes nursing leadership in its priorities for the COVID-19 pandemic. Institutions need managers who can manage changing situations and develop new solutions for problems. Nurse managers play important roles in minimizing the negative effects of the pandemic, guiding nurses, and effective crisis management.[3] In this study, the intervention group's scores for the questions about leadership were higher than their pre-test scores and higher than the control group's scores. This indicates the effectiveness of the leadership content of the training program.

Limitations

The validity of the pre-test and post-test questions was based only on expert opinions, and their reliability is limited to the internal consistency analysis. While we were planning the study, pandemic conditions were getting worse. Therefore, web-based training was preferred in order to meet the training needs of executive nurses quickly and safely. Hence, the goals of the training were limited only to the cognitive knowledge/ mental skills, and planning for the affective attitude or emotions, and psychomotor/ physical skills of the manager nurses could not be made.

Conclusions

The web-based training program in this study was effective for the nurse managers. The intervention group's post-test scores were higher than their pre-test scores and higher than the control group's scores. This project can serve as a guide for providing information to nurse managers affected by the COVID-19 pandemic, the effects of which persist. This program should be offered to nurse managers working in different sectors and the managers of healthcare organizations after it is adapted, considering the geographical, political, and health-related risks across Turkey, as well as the extraordinary situations, in cooperation with the Nurse Managers Association and the Turkish Nurses Association. Programs similar to the training program in the present study should also be prepared in order to help different social segments and occupational groups that can undertake critical duties particularly during extraordinary situations in cooperation with local governments, trainers, and higher education institutions in fields and sectors other than health care and nursing. Finally, it can be suggested that training to meet the affective and psychomotor needs of nurse managers should be carried out today, where the unknowns about the pandemic are decreasing and hybrid education models can be applied.

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