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Using the Electronic Educational Package of the Stress Management Program for the Mental Health and Job Performance of Intensive Care Unit Nurses in the Face of Patients with COVID-19

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Abstract

Background: *Due to nurses' special job position, they are faced with a variety of illnesses and accidents in intensive care COVID-19 wards, which puts them in front of so many stresses that can cause anxiety and endanger their mental health. The study aimed to investigate the influence of the web-based stress management program on mental health and job performance of ICU nurses in the face of patients with COVID-19.*

Methods: *This study was a Quasi-experimental one, with pre-test, and post-test plan without control group using the General Health Questionnaire (GHQ-28) and the ACHIVE Job Performance Questionnaire. The stress management program was prepared as a multimedia product, the program consisted of eight parts and the duration of each part was ten minutes. The significant level was set at 0.05.*

Results: *Nurses' job performance improved significantly after two weeks from the distribution of the web-based package to the participants and e-mail following the package use and completion of the tasks also 95.6% of nurses had symptoms of anxiety and depression, which became 58.8% after the intervention.*

Conclusions: *The web-based stress management program is useful for improving nurses' mental health and job performance during and after the pandemic.*

Keywords: Stress management, Job performance, Intensive care unit, Nurses, COVID-19.

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Introduction

Nurses are the key members of health care providers who, with their scientific and practical ability, play an important role in various levels of prevention, care, and treatment[1]. They have a special role in the confrontation of the challenges facing the health system, including a variety of emerging epidemics and diseases[2]. And a significant portion of the quality of health services is related to the quality of nurse care[3].

The quality of performance of the health care team depends on several factors, which, if not considered, in addition to physical and psychological damage to members of the health care team, will lead to poor quality care and injury to patients[4]. Due to their special job position, ICU nurses are faced with a variety of illnesses and accidents, which puts them in front of so many stresses that can cause anxiety and endanger their mental health[5].

The mental health of ICU nurses has a direct effect on job quality and productivity and nurses' health is threatened by exposure to various physical, physical, psychological, and social stressors and they experience high job stress[6]. Shift work, workload, conflict with colleagues, frequent contact with patients and death, lack of support resources, and time to take care of the mental and emotional problems of patients are the most important nursing stressors[7].

High mental health and job motivation in nurses are important factors that can improve the quality of services provided to patients[8]. Studies show that poor mental health in nurses is associated with serious impairments in job performance and is associated with drug errors, lack of patient safety, and dissatisfaction[9,10].

Long-term stress tolerance in nurses has undesirable consequences such as impaired physical and psychological health[11], decreased job satisfaction[12], increased job burnout[13], and decreased efficiency and care quality and mental health, the proper nurses' job performance is one of the most important factors that influence health care services[14].

Improving the quality of nurses' job performance is an important factor that accelerates the process of treatment and recovery of patients[15] and poor nurse's performance causes errors in the patient's treatment process, increasing patients' hospitalization time and increasing costs[16]. Several factors can affect nurses' job performance, including stress, anxiety, burnout, gender, role conflict, income, and conditions.

Currently, the COVID-19 pandemic has affected more than 327 million people worldwide, and despite all the efforts of the World Health Organization to control the disease, the outbreak has led to great worldwide stress, especially among health staff and nurses[18]. According to studies, the staff of the health care system when caring for patients with COVID-19 experience

some mental health problems: severe anxiety 5.9%, depression 25% and insomnia 34.3%[19].

Nurses involved in the long-term care of patients with COVID-19 are at risk of infection as one of the occupational hazards. In addition, they face other problems including long working hours, fatigue, being away from family, and being worried about themselves or their family getting COVID-19, which can have adverse effects on nurses' mental health and thus the quality of their job performance[20].

In previous studies, several interventions have been used to improve the mental health and occupational performance of nurses such as stress management group therapy[21], and stress management training[22]. Implementing effective interventions to improve the general and mental health of nurses during the outbreak of COVID-19 is a necessity[23] and stress management is one of the most practical measures to improve people's mental health, while being cost-effective, it has a high-performance capability in various situations[22].

Therefore, this study aimed to investigate the influence of the web-based stress management program on mental health and job performance of ICU nurses in the face of patients with COVID-19.

Materials and Methods

This quasi-experimental study was done using pre-test and post-test plan without control group from January 2021 to March 2021 in Shahroud Imam Hossein Hospital with the aim of determining the effectiveness of stress management program on improving mental health and job performance of ICU nurses in dealing with patients with COVID-19.

The research community was nurses in the ICU wards of the hospital who have been in charge of care for patients having COVID-19. The sampling method in this study was census so that all nurses working in intensive care units who were responsible for caring for patients with COVID-19 were included in the study if they wished and had the necessary conditions. After the invitation message was sent to ICU nurses and also informed them about such a training course by attending the care wards of patients with coronavirus and

finally 68 out of 75 nurses were enrolled based on inclusion criteria. The inclusion criteria were all nurses caring for patients with COVID-19 from the time of admission, and all nurses present in the specific care units of patients with coronavirus who have been exposed to the virus through direct patient care since the official announcement of the start of the pandemic. The exclusion criterion was participating in any supportive psychological intervention.

Data collection tools included the General Health Questionnaire (GHQ-28) and the ACHIVE Job Performance Questionnaire.

The GHQ-28 questionnaire was designed by Goldberg and Hillier in 1979[24] and consists of 28 questions in the form of 4 subscales, each of which contains 7 questions. The subscales include physical symptoms, anxiety, social dysfunction, and depression. The items for each question are 4-point Likert and have scores of 0, 1, 2, and 3, respectively. Finally, based on the cut-off point of 23, a score of 23 or more indicates a mental health disorder and a lower score indicates mental health. Williams' meta-analysis of 43 studies that used the questionnaire found 84% sensitivity and 82% specificity for the questionnaire[25].

The Achieve Job Performance Questionnaire was designed by Hersey & Goldsmith in 1980[26]. It has 42 questions in seven subscales: ability (4 questions), clarity (7 questions), help (5 questions), incentive (6 questions), evaluation (9 questions), validity (6 questions) and environment (5 questions). This questionnaire has 42 questions in the five-point Likert range, with scores of 1 to 5, respectively, and a higher score indicates better job performance.

The training package was prepared as a multimedia product, the program consisted of eight parts and the duration of each part was ten minutes. At the end of each section, homework was considered, as well as assignments that were expected to be completed after two weeks. Each episode was made into a video clip that displayed the content of sessions with related images. The table shows the content of each session (Table 1).

Table 1. Content of the program

Session	Content
1	Organizational matters and program overview, stress, triggers and stress type and adverse effects of stress
2	Coping strategies and body techniques and related exercise
3	Cognitive and body techniques, mindfulness-based exercises
4	Cognitive techniques
5	Emotion and emotion regulation
6	Emotion regulation
7	Social skills and assertiveness
8	Social skills and assertiveness, evaluation of the program and personal goals

The general objective of this package (based on Hofmann et al study (2010) was to teach easy and quick techniques to better tolerate the current stressful pandemic situations. The first part was psycho-educational, which was about the concept of stress, its scientific definition, symptoms, and adverse

effects. Sections 2-4 included physical and cognitive strategies (breathing exercises, cognitive planning, and reconstruction) as well as brief mindful-based exercises such as (meditation training, mental relaxation, finding meaning for life and living in the moment). In Sections 5 and 6, emotion-based methods

such as daily reflective diary and emotion control were discussed. Lessons 7 and 8 taught methods of self-expression and social skills (effective communication; resolving interpersonal conflicts)[27].

The entire content of the package was provided to learners in the form of 8 separate files. Attempts were made to make the package as practical as possible by emphasizing doing exercises at the end of each session and reminding participants about the homework and exercises of the previous sessions at the beginning of the next session. After giving the post-test, the psychotherapist who provided a supportive package was available for support if needed during the treatment by telephone, WhatsApp, and e-mail messaging system.

Follow-up was done by e-mail. Initially, an acknowledgement message was sent to the participants, and then every three days a reminder message was sent to them for two weeks to perform the requested exercises. Nurses could also ask questions at any time by e-mail. Two weeks after the intervention, the questionnaires were re-completed and analysed, and then the effectiveness of the stress management program on mental health and job performance was examined.

To observe ethical considerations, after explaining the study objectives and method to nurses, written informed consent was obtained from them. It should be noted that the principles of the Helsinki Declaration, including the right to enter the research freely, no harm or loss to participants, maintaining the right to withdraw from the study, and confidentiality of information, were observed in this study. The present study with the code of ethics IR.SHMU.REC.1398.175 has been registered in the Ethics Council in Biomedical Research of Shahroud University of Medical Sciences. The necessary permission was obtained from the research department and the Research Ethics Council of Shahroud University of Medical Sciences, as well as the management of the Hospital and entering the study environment.

Descriptive statistics were used to describe quantitative demographic variables. To compare the mean scores of mental health and job performance, the paired-t test was used. Also to evaluate the correlation between quantitative demographic variables and mental health and job performance of the Pearson correlation coefficient was used.

All demographic variables were entered in the regression model and then using backward regression, the variables of age, level of education, marital status, and shift work were excluded from the model and finally, variables of gender and work experience have been reported. Regression was also used to control type one error.

Results

Table 2 shows the demographic variables of the study. Most participants are female (79.9%) and most are married (63.2%). Other demographic factors are shown in Table 2.

Table 3 shows general health and job performance scores before and after intervention. Before the intervention, 95.6% of nurses had a score above 23 on the GHQ-28 test, meaning that the majority of nursing staff had mental health problems and symptoms of anxiety and depression. After the intervention and the availability of the web-based packages, the average number of nurses with obvious mental health problems decreased to 58.8%. The chi-square test showed a significant difference was observed before and after the intervention between mental health disorders in nurses (P-value<0.001).

The results of the paired-t test showed that the use of e-packages significantly increased the mean score of nurses' general and mental health after intervention in the subscales of physical symptoms, anxiety and insomnia, social dysfunction, depression, and the overall score (P-value<0.001). Also, the average score of nurses' job performance in general and in the areas of help, validity, incentive, clarity, evaluation, and ability (P-value<0.001) had a significant increase compared to before the intervention. However, in the environment subscale, there was no significant statistical difference compared to pre-intervention (Table 3).

Table 4 shows the role of age and gender on job function in backward regression mode. The backward regression model considering the initial value of job performance scores showed that this increase in scores is due to intervention and this difference is significant. Also, 17% of the variance of the job performance score before the intervention is explained by the variables within the model, so women have a mean average of 14.9 points less than men (Table 4).

Table 5 shows the role of gender and work experience on general health in backward regression mode. The backward regression model considering the initial scores of general health showed that the increase in scores is due to the intervention and this difference is significant. Also, 23% of the variance of the general health questionnaire score after the intervention is explained by the variables within the model (Table 5). The regression model showed that women scored 8.59 points lower in general health than men and also that the general health score increased by 0.971 points per year of increase in work experience.

Table 2. Demographic variables

Demographic variables		N (%)
Gender	Female	53(77.9%)
	Male	15(22.1%)
Marital status	Single	25(36.8%)
	Married	43(63.2%)
Educational level	Bachelor	60(88.2%)
	Master	8(11.8%)
Shift work	Fixed	2(2.9%)

	Rotation	66(97.1%)
		Mean (SD)
Age		32.13 (5.97)
Work experience		5.87 (4.25)
Days of contact with the patient		37.36 (5.06)

N: Frequency; SD: Standard Deviation

Table 3. General health and job performance score before and after intervention

GHQ Scores	Before intervention	After intervention	Effect size	t	P-value
GHQ Domain	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**		
Somatic symptoms	10.98 (4.23)	7.20(3.95)	3.77(5.36)	5.80	<0.001
Anxiety and insomnia	11.69 (3.75)	7.08 (4.11)	4.60 (4.74)	8.0	<0.001
Social dysfunction	12.85 (3.57)	8.98 (4.13)	3.86 (5.49)	5.80	<0.001
Severe Depression	6.26 (3.82)	3.04 (2.91)	3.22 (3.57)	7.43	<0.001
Total scores	**41.79 (12.55)**	**26.32 (12.08)**	**15.47 (15.24)**	**8.36**	**<0.001**
Staff performance scores	**Before intervention**	**After intervention**	**Effect size**	t	P-value
Staff performance domain	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**		
Components of ability	13.33 (4.44)	15.45 (3.38)	2.11 (3.81)	4.57	<0.001
Clarity	19.60 (5.44)	23.92 (5.11)	4.32 (6.45)	5.52	<0.001
Help	12.72 (3.80)	15.63 (3.82)	2.91 (4.95)	4.84	<0.001
Incentive	15.33 (4.55)	18.94 (4.45)	3.60 (5.79)	5.12	<0.001
Evaluation	22.08 (6.29)	27.38 (7.06)	5.29 (8.37)	5.21	<0.001
Validity	14.17 (4.52)	18.11 (4.22)	3.94 (5.98)	5.42	<0.001
Environment	12.27 (4.23)	12.95 (3.40)	0.67 (5.47)	1.01	0.312
Total scores	**109.54 (25.34)**	**132.41 (24.56)**	**22.86 (31.02)**	**6.07**	**<0.001**

SD: Standard Deviation; GHQ: General Health Quality

Table 4. The role of age and gender on job function in backward regression mode

Parameter	B	Std. Error	t	P-value	95% Confidence Interval	
					Lower bound	Upper bound
Width of origin	156.454	20.283	7.714	0.000	115.934	196.974
The ratio of Women to men	-14.964	6.790	-2.204	0.031	-28.529	-1.399
Age	-1.218	0.477	-2.553	0.013	-2.171	-0.265
Pre-intervention Job function scores	0.244	0.111	2.210	0.031	0.023	0.465

Table 5. The role of gender and work experience on general health in backward regression mode

Parameter	B	Std. Error	t	P-value	95% Confidence Interval	
					Lower bound	Upper bound
Intercept	13.285	3.577	3.714	0.000	6.141	20.428
The ratio of women to men	8.595	3.199	2.687	0.009	2.204	14.986
Work experience	0.971	0.320	3.040	0.003	0.333	1.610
Pre-intervention general health scores	0.167	0.107	1.559	0.124	-0.047	0.381

Discussion

The results of this study show that the web-based package is useful for improving the mental health of nurses both during and after the pandemic and it is necessary to support such measures. Other studies have shown the positive effects of digital packages on improving the mental health of health workers in the face of job stress[28,29]. Using interventions that also include cognitive strategies such as problem-solving methods, modifying thinking patterns, caring skills, and improving interpersonal performance as well as behavioural techniques such as relaxation training, deep breathing, and aerobic exercise. In addition, ones that benefit from emotion-driven approaches, such as recording memories, are more useful than interventions that use only cognitive methods to control stress[30].

The prevalence of symptoms of depression and anxiety in nurses in this study was 95.6%. A meta-analysis of 12 articles shows that the rate of depression in all healthcare workers is 22.3%. Of course, the fact that studies have been done during the peak of the disease or its reduction is also effective in the occurrence of this difference, because this study took place at the peak of the disease[31].

In this study, as in some other studies, both in the general community and in members of health care teams, it has been shown that women are more vulnerable to stress and depression[32,33]. In studies conducted during the pandemic period in the world, the same gender difference is indicated[34,35]. Of course, the fact that women in general have a higher level of depression is much more challenging today and meta-analysis studies have shown that these differences are largely due to

gender heterogeneity in countries, and this requires further study[36].

According to the results of the present study, following the use of the package, in addition to the improved mental health of nurses, their job performance also improved significantly. This effectiveness can be due to the direct relationship between performance and job satisfaction[37]. Many studies have shown that factors related to mental health such as self-esteem, negative emotions, and stress tolerance levels are directly related to job satisfaction and performance[38,39]. In this study, a significant relationship was found between age and the effectiveness of psychotherapeutic interventions. This can be due to more flexibility of young people, more time to use the package and do their homework, or more free time because most of them are single[40].

Such a significant relationship between gender and the effectiveness of the intervention is also observed. Some other studies also point out that cognitive and behavioural interventions in women are more effective[41,42]. But two points need to be considered; first, these studies were not in times of crisis like the pandemic, and secondly, this difference can be justified by the quarantine conditions of the employees in the pandemic conditions. In this study, most of the nurses were female, married, and had children, so certainly being away from their children and not being with their families put more pressure on them than men, making them unable to use the web-based package.

Almost all nurses in this study reported high levels of anxiety and depression symptoms. Nurses' professional performance significantly improved after using the content in the package and their general health level also improved. Stress management helps promote stress management skills and improve psychological health and job performance in nurses, especially during the early COVID-19 pandemic. These stress management web-based package interventions may be easier to incorporate for nurses than previously validated longer interventions and may therefore be offered to a broader population.

One of the limitations of this plan was the unavailability of the control group because the study was conducted at the peak of the disease and all nurses working in the city were exposed to the virus. Thus it was impossible to prevent information leakage due to quarantine conditions. One of the strengths of this study is that the intervention was performed when nurses were not receiving any mental health services despite being placed in a pandemic peak. Results show that even though this package was collected in a very short time, it had a great impact on the mental health of nurses, and therefore we recommend this package to all ICU nurses. Although the package is designed for Iranian nurses, most of the issues covered in this package have an international audience. As a result, the current package can be expanded with a little revision and because studies related to Coronavirus are constantly being conducted in many countries, the present package can be tested even in international studies and its data can be used.

Ethical Considerations

This study was approved by the ethics committee of Shahroud University of Medical Sciences (ethics code: IR.SHMU.REC.1398.175).

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