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Original Article

Training by Multimedia Messaging Service Method, a Solution to Improve Knowledge, Attitude, and Performance of Health Workers: A Quasi-Experimental Study

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Abstract

Background: Since health workers are the leading providers of health services, increasing their knowledge and performance can play an essential role in preventing diseases, especially Coronavirus Disease 2019 (COVID-19).

Objectives: The current research was conducted to compare the effects of lecture training and Multimedia Messaging Service (MMS) training on health workers' knowledge, attitude, and performance in preventing COVID-19.

Methods: This quasi-experimental study was conducted in two groups with a pretest-posttest design. The study population included 60 health workers in Nikshahr selected by random sampling. The data collection tool was a researcher-made questionnaire, including demographic questions and items on health workers' knowledge, attitude, and performance in preventing COVID-19, completed in two training groups by lecture and MMS methods online before and after the intervention.

Results: The participants' mean score of knowledge increased significantly after training in both lecture and MMS methods ($P < 0.050$), but no significant difference was observed between the two methods ($P > 0.050$). The mean attitude score in the two groups before and after the intervention showed no significant difference ($P > 0.050$). In the performance dimension, a significant difference was observed between the two groups post-intervention, and this score significantly increased in the MMS group ($P < 0.050$).

Conclusion: Considering the effect of the MMS method on health workers' knowledge and performance, this method can be considered a suitable solution to meet the growing demand for training.

Keywords: Health Education; Knowledge; Attitude; Performance; Coronavirus Disease 2019

Background

In December 2019, a new type of coronavirus (Coronavirus Disease 2019, COVID-19) was detected in Wuhan, China, which quickly spread all over the world so that the World Health Organization (WHO) declared this disease a pandemic in March 2020 (1). COVID-19 has spread to almost all countries, affecting all nations, infecting millions of people, and killing hundreds of thousands of people. This disease has disrupted the world economy and challenged countries from a political-social perspective (2). Therefore, to control this disease, it is essential to prevent contracting it and eliminate the cycle of disease transmission in society. Due to the respiratory transmission of COVID-19 and the persistence of this virus in the environment, the way people behave in society plays a vital role in its transmission process (3). Individuals need to be taught healthy behaviors to recognize healthy ways of life, act according to them, maintain and improve health, and avoid contracting diseases (4).

The learning process is critical for promoting and developing society (5). Health education programs aim to provide information, influence attitudes and beliefs, improve decision-making skills, and empower individuals to change themselves and their society (6). Providing training in various health fields is one of the

crucial duties of health workers. Therefore, the awareness of health workers as the first individuals responsible for providing healthcare services can influence society's health.

It is essential to measure health workers' information and attitude continuously and, if necessary, organize training and retraining workshops to increase their awareness and attitude (7). At present, training is mostly face-to-face. Besides advantages, it has disadvantages, including time and place restrictions for both trainers and trainees. Electronic learning (e-learning) is a new training method (8). E-learning can cover many individuals simultaneously so they can continuously receive their required information remotely without spending much time and money and leaving the house to participate in visits or face-to-face sessions (9). This advanced technology is an essential part of care training in developed countries. With the recent advances in information and communication technology, new platforms of e-learning have emerged, including Multimedia Messaging Service (MMS)-based training in virtual space, providing the possibility of sending various audio and video messages and even short educational videos at any time; hence, less cost and time are required than face-to-face training (10).

Norouzi et al. compared the effect of training by lecture and multimedia methods on emergency ward nurses' knowledge, attitude, and performance regarding applying a communication model in nursing registration and reporting in selected military hospitals in Tehran. They showed that both methods affected the nurses' knowledge, attitude, and performance; however, the multimedia method was more effective (11). Aligholipour et al.'s study investigated the effects of face-to-face and MMS training on glycosylated hemoglobin and fasting blood sugar of diabetic patients on insulin treatment in Tabriz. The results showed that MMS-based training in the Telegram environment improved self-care and reduced the average glycosylated hemoglobin in patients with diabetes compared to face-to-face training (10). In a descriptive-analytical study conducted to compare the knowledge and attitude of 93 virtual education students and 130 non-virtual education students about e-learning in Guilan, Pakseresht et al. concluded that the knowledge of the virtual group was higher. However, no difference was observed between the attitudes of the two groups (12). Kardan Barzoki et al. investigated the effects of lecture and MMS training on the knowledge, attitude, and performance of nurses working in heart wards regarding caring for patients with temporary pacemakers on 52 nurses working in Shahid Rajaee cardiovascular center in Tehran. The results indicated no difference in the effects of the two lecture and MMS training methods on knowledge, attitude, and performance regarding caring for patients with a temporary pacemaker, meaning that MMS training could be as effective as the lecture method (13). Holanda and Pinheiro's study compared undergraduate nursing students' learning using educational hypermedia and the traditional lecture approach on sexually transmitted diseases and showed no significant difference in learning performance between the groups (14).

Since health workers are the leading service providers in the country's healthcare system, increasing their awareness, attitude, and performance can play an essential role in educating healthy individuals., it is expected that health workers expand their knowledge, apply new things in their skills, and are aware of new changes in health issues. Since the needs of society are constantly changing and COVID-19 is becoming a health crisis in the world, human resource training is of particular importance. Also, the significance of people's health adds to it. On the other hand, the resources available in the health and treatment sector are limited, especially concerning the training, prevention, and treatment of COVID-19. Therefore, it is essential for officials, managers, and healthcare professionals to implement training courses and evaluate their effect.

Objectives

The current research was conducted to compare the effects of lecture training and Multimedia Messaging Service (MMS) training on health workers' knowledge, attitude, and performance in preventing COVID-19.

Methods

This quasi-experimental study was conducted in two groups with a pretest-posttest design in 2020-2021 on health workers of health centers in the city of Nikshahr. Health workers working in health centers participated in the present study if they wished to participate and had a smartphone. It was decided that if more than 10% of the questions in the questionnaire remained unanswered, that questionnaire should be removed, and no item was observed in this regard. The sample size was 30 people in each group, with a confidence level of 95%, an accuracy of 0.5%, and a test power of 80%. First, according to the list of city health workers, 60 were selected by simple random sampling and divided into two control and intervention groups based on random allocation and registration number in the list (odd numbers: lecture group and even numbers: MMS group).

The tool used in the study was a researcher-made questionnaire consisting of four parts. The first part contained nine questions related to the health workers' specifications (age, gender, work experience, marital status, education level, household income, place of residence, history of COVID-19 infection in the individual or family, and history of participation in similar training courses). The other three parts contained questions related to health workers' knowledge (30 questions), attitude (25 questions), and performance (20 questions) regarding the prevention of respiratory infections caused by COVID-19, which were prepared according to the research objective and review of the latest sources and related articles. The validity of the questionnaire was confirmed by 10 professors of medical education, health, and nursing departments of Kerman and Iranshahr Universities of Medical Sciences. The tool's reliability was also obtained as 0.73 by internal consistency.

Data collection in the present study was performed in two stages before and immediately after the intervention for the lecture and MMS groups simultaneously. After the approval of the university research council and the ethics committee (IR.KMU.REC.1399.622), the intervention content was sent to the participants through MMS for three weeks on the WhatsApp platform. In this method, during the day, we presented at least four short educational messages as texts, images, and videos related to COVID-19, including COVID-19 definition, transmission, symptoms, and prevention. It was also performed for the lecture group during three 90-minute sessions with an interval of one week. The first session included the COVID-19 definition, the, time to see the virus

and the disease history and classification. The second session included the clinical symptoms of the disease, pathogenesis, epidemiology, transmission, and guidelines for diagnosis. The third session included the risk factors of COVID-19, the differences between COVID-19 and influenza, and COVID-19 prevention and treatment. The sessions were presented online by the researcher in the form of a lecture, and the summary of each session was provided to the participants of this group in the form of educational slides. The participants were followed up for one month after the intervention. After the end of the intervention, the questionnaires were given to the participants of both groups at the same time and were completed by them online. The lecture and MMS groups (intragroup comparison) were compared before and after the intervention in terms of knowledge, attitude, and performance using the paired t-test. The comparison of these variables between the two groups (intergroup comparison) was performed using the independent t-test. The data were analyzed in SPSS version 16 software (IBM Corporation, Armonk, NY).

Results

The personal and professional characteristics of the participants are presented in Table 1. Most participants (22%) were female in the lecture group and male (16%) in the MMS group. The mean age of health workers in the lecture and MMS groups was 33.8 ± 1.1 and 30.4 ± 1.4 years, respectively. The participants in both lecture and MMS groups were homogenous in terms of gender, marital status, education level, residence status, history of COVID-19 infection, and family monthly income.

Comparing the mean knowledge score of health workers in the two investigated groups using the independent t-test (intergroup comparison) showed no significant difference between the two groups regarding the prevention of COVID-19 respiratory infection in the pre-intervention and post-intervention stages. Also, comparing this mean score in the pre-intervention and post-intervention stages in the MMS group (intragroup comparison) using the paired t-test showed a significant difference between the two stages ($P = 0.003$) so that in the post-intervention stage, this score significantly increased by two points compared to the pre-intervention. In the lecture group (intragroup comparison), the paired t-test showed that the mean knowledge score did not change from pre-intervention to post-intervention ($P = 0.125$) (Table 2).

Table 1. Personal and professional characteristics of the studied units in the lecture and multimedia messaging service groups

Variable	Training Group		P
	Lecture N(%)	Multimedia Messaging Service N(%)	
Gender			0.055
Female	22 (73.3)	14 (46.7)	
Male	8 (26.7)	16 (53.3)	
Marital Status			0.353
Single	3 (10.0)	6 (20.0)	
Married	27 (90.0)	24 (80.0)	
Education level			0.017
Secondary school	1 (3.3)	3 (10.0)	
Diploma	26 (86.7)	11 (36.7)	
Associate'	1 (3.3)	13 (43.3)	
Bachelor'	2 (6.7)	3 (6.7)	
Place of residence			0.063
City	6 (20.0)	9 (30.0)	
Village	24 (80.0)	21 (70.0)	
History of COVID-19 infection			> 0.999
Yes	2 (6.7)	2 (6.7)	
No	28 (93.3)	28 (93.3)	
Household monthly income (Toman)			0.215
2-3 million	2 (6.7)	3 (10.0)	
3-4 million	5 (16.7)	4 (13.3)	
4-5 million	16 (53.3)	6 (20.0)	
5 million or higher	7 (23.3)	17 (56.7)	

Table 2. Comparison of the mean knowledge score before and after the intervention in two lecture and multimedia messaging service groups

Stage	Group					Independent T-Test Results	
	Lecture		Multimedia messaging service		Total		
	Mean (SD)	Frequency	Mean (SD)	Frequency	Mean (SD)	Frequency	
Pre-intervention	25.6 (3.8)	30	25.8 (2.8)	30	25.7 (3.3)	60	df = 57, P = 0.804, t = 0.249
Post-intervention	27.5 (3.2)	30	29.6 (3.9)	30	28.6 (9.4)	60	df = 58, P = 0.409, t = 0.832
Paired t-test results	df = 28, p = 0.125, t = 1.580		df = 29, p = 0.003, t = 3.300				

df: Degree of freedom; SD: Standard deviation

Comparing the mean attitude score of health workers in the two investigated groups (intergroup comparison) using the independent t-test showed no significant difference between the two groups in terms of the attitude toward the prevention of COVID-19 in the pre-intervention and post-intervention stages (P > 0.050). Also, based on the paired t-test, no significant difference between the two stages was observed in the MMS group (P = 0.898). There was no significant difference in the lecture group (P = 0.160) (Table 3).

The independent t-test showed no significant difference between the two groups in terms of performance in the pre-intervention phase (P = 0.141); however, this score in the post-intervention phase was significantly higher in the MMS group than in the lecture group (P = 0.035). In the lecture group (intragroup comparison), no significant difference was observed between the two stages in terms of performance score, but in the MMS group, this score increased significantly in the post-intervention stage compared to the pre-intervention stage (P = 0.016) (Table 4).

Table 3. Comparison of the mean attitude score before and after the intervention in two lecture and multimedia message service groups

Stage	Group						Independent T-Test	
	Lecture		Multimedia messaging service		Total			
	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N		
Pre-intervention	99.6 (14.7)	30	100.2 (10.9)	30	99.9 (12.9)	60	df = 58, P = 0.866, t = 0.169	
Post-intervention	103.8 (10.5)	30	104.3 (15.1)	30	104.1 (12.9)	60	df = 58, P = 0.0898, t = 0.129	
Paired t-test results	df = 29, p = 0.160, t = 1.441		df = 29, p = 0.206, t = -1.295					

df: Degree of freedom; SD: Standard Deviation

Table 4. Comparison of the mean performance score before and after the intervention in the two lecture and multimedia message service groups

Stage	Group						Independent T-Test Results
	Lecture		Multimedia messaging service		Total		
	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	
Pre-intervention	63.0 (8.3)	30	63.9 (7.0)	30	99.9 (12.9)	60	df = 58, P = 0.141, t = 1.492
Post-intervention	64.4 ± 5.9	30	67.7 (5.8)	30	104.1 (12.9)	60	df = 58, P = 0.035, t = -2.113
Paired t-test results	df = 29, p = 0.091, t = 3.085		df = 29, p = 0.016, t = -2.571				

df: Degree of freedom; SD: Standard Deviation

Discussion

The present study indicated the effect of the training methods on improving the health workers' knowledge and performance in the two lecture and MMS groups, but the MMS method was more effective than the lecture method in improving the health workers' performance. Comparing the mean knowledge score in the pre-intervention and post-intervention phases in the MMS group (intergroup comparison) showed a significant difference between the two methods (P = 0.003). After the intervention, no significant difference was observed between the lecture and MMS groups (P = 0.898).

Based on the present study's findings, both lecture and MMS methods effectively increased the health workers' awareness, but this increase was two points in the lecture group and four points in the MMS group, indicating the higher effectiveness of the MMS method. According to previous studies, the most important advantages of training through MMS include no need for a trainer, ease of use, time efficiency, and cost-effectiveness (15). Wang et al.'s research showed that the MMS method could increase the participants' knowledge and awareness. This approach allows individuals to receive the required information through their mobile phones (16). Furthermore, since the messages were delivered at specific times, participants were motivated to skim and store them systematically (17, 18). Based on available studies, MMS can be very effective for educational purposes because this method is pretty flexible and resistant to power outages and forgetting (19). The findings of various studies indicate that the MMS method can be used as a complementary tool for various face-to-face training courses (13, 20-24).

Comparing the health workers' mean attitude scores showed no significant difference in the pre-intervention and post-intervention stages between the lecture and MMS groups (intragroup comparison) (P = 0.160). There was no significant difference between the two groups (P > 0.050). Regarding attitude, although this score increased by four points in both groups, these changes were insignificant. Kardan Barzoki et al. (13) and Pakseresht et al. (12) studies also showed that the effects of the lecture and MMS methods on the participants' attitudes were insignificant, which is in line with the results of the present study.

Prasetyo et al. investigated the effect of changes in educational methods during the COVID-19 pandemic and the effect of integrated e-learning on readiness for change and interest in learning among Indonesian university students. They also showed that students with e-learning had more interest and readiness to learn, and this method was more effective for them (25), which was inconsistent with the present research findings.

In Xiong et al.'s research, the attitude improved significantly in the intervention group compared to the control group (P < 0.010) (22). Lin et al.'s study showed a significant increase in the changes in attitude and motivation after training (P < 0.001). Also, MMS training changed participants' attitudes and increased their motivation (26). In Norouzi et al.'s study, the changes in the nurses' attitude scores were significantly more in the MMS training group than in the lecture group (11). The difference between the findings of the mentioned studies and the present study is probably due to the difference in the study population, the tools used, and the type of training intervention. It should be noted that the attitude score of the two groups in the present study was favorable in the pre-intervention phase; therefore, it was difficult to change; however, in the mentioned studies, the attitude score in the pre-intervention phase was unfavorable. Therefore, they mainly changed under the influence of the intervention.

The present research results showed that the performance score in the MMS group increased significantly and considerably compared to the lecture group. Given that the primary goal of health education is to change behavior or performance, this finding shows the positive effect of the MMS approach.

The results indicated that after the intervention, there was a significant difference between the lecture and MMS groups (P = 0.035) and the performance score of the MMS group was significantly higher than that of the lecture group. In the MMS group (intergroup comparison), a significant difference was also observed

between the pre-intervention and post-intervention stages (P = 0.016), so this score increased in the post-intervention phase compared to the pre-intervention phase.

In Abdel-Rasoul et al. (27), Norouzi et al. (11), Aghajani et al. (19), and Zhang et al. (28) studies, the MMS method was also more effective in improving individuals' performance than the lecture method, which is consistent with the findings of the present study. The ability to send various audio and video files or even short educational video clips at any time in MMS-based education provides visual education for individuals without the time and place restrictions and has a greater effect on individual memory (29). In Kardan Barzoki et al.'s study, the performance score was significantly increased in both methods, but no difference was observed between the two methods (13), which is contrary to the present study findings. The reason for this difference is possible because Kardan Barzoki et al.'s research was conducted on nurses, and the nurses could not correctly use the educational content of the MMS approach due to lack of time and fatigue stemming from long and rotating work shifts; hence, using training methods inside the work environment was more beneficial for them (13).

The present study had some limitations, including health workers' differences in sensitivity to the training methods, which could not be fully controlled. Also, the lack of full control of information exchange between MMS and lecture groups was another limitation of this study, so to reduce the spread of information, two groups were asked to refrain from disseminating information until the end of the research. In this way, the exchange of information was controlled as much as possible, but it may be happened partially, which was out of control. According to the research findings, suggestions are presented in two sections below.

A) Practical Suggestions: It is suggested that community health department officials in local and national comprehensive health service centers pay particular attention and planning to health workers' training in the form of retraining classes. Considering suitable interactive environments and making virtual environments attractive to motivate health workers and using frequent encouraging feedback as well as removing obstacles such as low speed and network traffic, it led health workers to train by the MMS method.

B) Suggestions for Future Studies: It is suggested that the reverse classroom method be compared with MMS among health workers for preventing COVID-19.

Conclusion

The present study showed that MMS training could significantly increase the health workers' knowledge and performance regarding COVID-19 preventive measures. Given that health workers are considered the pioneers of the health field and the first level of primary healthcare provision, and there is a possibility of the return of COVID-19 in the regions, empowering them through retraining programs can significantly help the health system to fight COVID-19 in these areas.

Supplementary Material(s): is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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