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Level of Self-Care and Patient Care Against COVID-19 Among Emergency Medical Services Personnel; a Cross-sectional Study

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Abstract: **Introduction:** Provision of pre-hospital care by emergency medical services (EMS) requires paying attention to self-care and patient care against possible infections. The present study was conducted with the aim of determining the level of self-care and patient care against COVID-19. **Methods:** The present correlational, descriptive, analytical study was carried out on 301 EMS personnel in Iran. Data were collected using a demographic information form and questionnaires made by the researcher on the level of self-care and patient care against COVID-19. **Results:** The results showed that more than half of the participants (55%) were aged 27 to 34 years. The majority of the participants had an experience of participating in self-care (88.7%) and patient care (83.7%) training courses against COVID-19. The overall score of self-care was 55.96 ± 6.97 out of 72 and that of patient care was 26.86± 3.39 out of 32, both of which revealed a favorable level. However, in some questions, the mean score was lower than the optimal level. The lowest mean score among items related to self-care against COVID-19 was allocated to wearing protective clothing (1.77±1.19). Among items related to patient care against COVID-19, the lowest mean score was related to training the patient about hand hygine after touching contaminated equipment (2.83±1.08 out of 4). There was a positive (r=0.491) and significant correlation between self-care and patient care against COVID-19 (p=0.001) based on our findings. **Conclusion:** Although the general level of self-care and patient care against COVID-19 was favorable, due to the undesired level of some domains, it seems necessary to implement corrective planning through periodical training and monitoring the performance of the personnel.

Keywords: COVID-19; Emergency Medical Services; Infection control; Patient care; Self care

1. Introduction

The outbreak of Coronavirus Disease 2019 (COVID-19) caused an excessive increase in the workload of different groups of healthcare providers. One of these groups was emergency medical services (EMS) personnel. EMS personnel are one of the primary healthcare groups that have direct contact with all groups of patients. Therefore, they are classified as frontline healthcare workers (1, 2). In Iran, people who need immediate medical care call "115". Based on the condition of the patients, they are either treated at the scene or transferred to medical centers (3).

One of the important things in providing care to patients in each of the treatment groups is observing safe-care, which includes maintaining the health of personnel and preventing harm to the patient due to non-compliance with scientific and standard protocols. Since COVID-19 disease is highly contagious and has a notable incubation period and there is the possibility of the absence of evident symptoms in some patients, the possibility of transmission of this disease is high (4). Adherence to infection control and protecting patients receiving services from EMS for medical reasons other than COVID-19 is important and can be considered as part of pro-

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viding safe care to the patients (5). In addition to the general conditions mentioned, EMS personnel are faced with various patients and numerous missions, emergency conditions, and limited time and equipment. Therefore, the possibility of being infected with this virus is high among EMS personnel. In addition to the contamination of personnel, if infection control standards are not followed, the risk of infecting non-COVID-19 patients who need to receive medical services from EMS personnel is high. In addition, the closed and limited space of the ambulance cabin and sharing medical equipment among patients are other predisposing factors, and failure to pay attention to infection control standards in this field also increases the risk of cross-infection between staff and patients (6).

Bledsoe et al., (2014) in America, showed that compliance with infection control standards among EMS personnel was lower than the optimal level (7). In Iran, Mohammad Khani et al., (2017) showed that the majority of EMS personnel did not have good knowledge and performance regarding compliance with infection control standards (8). However, it has been found that compliance with standard precautions has a significant effect on reducing cross-infection between personnel and patients (9).

The present study was conducted with the aim of determining the status of self-care and patient care for preventing the spread of COVID-19 from the perspective of EMS personnel.

2. Methods

2.1. Study design and settings

The present correlational, descriptive, analytical study was carried out on emergency medical services (EMS) personnel in Kurdistan University of Medical Sciences Iran, from January to March 2022. Data was collected using a demographic information form and questionnaires made by the researcher on the level of self-care and patient care against COVID-19. The present article was part of a master's thesis approved by the School of Nursing and Midwifery and Research and Technology Deputy of Kurdistan University of Medical Sciences (Ethics code: IR.MUK.REC.1400.239). The patients were informed about the study objectives, informed consent was obtained from all the patients, and the patients were assured about the confidentiality of information they provided.

2.2. Participants

The study population included EMS personnel working in urban and interurban medical emergency departments in emergency medical services (EMS) affiliated to Kurdistan University of Medical Sciences, Iran. A total of 301 participants were included in the study. The inclusion criteria included willingness to participate in the study and the experience of providing care during COVID-19 pandemic in medi-

cal emergencies. The exclusion criterion was not completing the questionnaires.

2.3. Data gathering

Data collection was done by means of a demographic information form and a two-part researcher-made questionnaire on the level of compliance with self-care standards against COVID-19 (section 1) and the level of compliance with patient care standards against COVID-19 (section 2).

Section 1 included 18 questions. The questions were scored using a five-point Likert scale ranging from 0 (never) to 4 (always). The total score was from 0 to 72. The results were reported as the mean score of each question (a score of 3 and above indicated a favorable level) and the total score of the questionnaire (a score of 50 and above indicated a favorable situation).

The second section on the level of compliance with patient care standards against COVID-19 included 8 questions. The questions were scored using a five-point Likert scale ranging from 0 (never) to 4 (always). The range of scores was from 0 to 32. The results were reported as the mean score of each question (a score of 3 and above indicated a favorable situation) and the total score of the questionnaire (a score of 22 and above indicated a favorable situation).

To perform psychometric evaluation of the questionnaires made by the researcher, the validity of each section was first tested using qualitative method (content validity and face validity) and experts' opinions. Qualitative evaluation of each section was carried out by another 10 new experts. The CVI (content validity index) was 0.85 and CVR (content validity ratio) was 0.81, indicating acceptable content validity. In addition, face validity was measured using a qualitative method, through receiving feedback from 30 EMS personnel on the comprehensibility and clarity of the questions. Cronbach's alpha coefficient was used to measure the reliability of sections. Cronbach's alpha coefficient was 0.79, confirming the reliability of the sections. The participants were informed about the objectives of the study, and informed consent was obtained from each participant. The questionnaires were completed by the participants through self-report technique.

2.4. Statistical analysis

For the descriptive analysis of the data, frequency distribution (frequency and percentage), central tendency, and dispersion index (mean and standard deviation) were used. To do inferential analysis of data, Kolmogorov-Smirnov test was used to examine if data were normally distributed, and Pearson's correlation coefficient was used to check the possible relationship between mean scores. SPSS (version 26) was used for statistical analysis of data. A significance level of 0.05 was considered in all analyses.

Table 1: Baseline characteristics of the participants (N=301)

Variables	Number (%)
Age (year)	
≤26	68 (22.6)
34 – 27	166 (55.1)
≥35	67 (22.3)
Clinical work experience (year)	
≤5	144 (47.8)
15 – 6	136 (45.2)
≥16	21 (7)
Education level	
Associate Degree	138 (45.8)
Bachelor's degree	156 (51.8)
Master's degree	7 (2.3)
Participation in infection control courses	
Yes	197 (65.4)
No	104 (34.6)
Getting COVID-19	
Never	90 (29.9)
Once	146 (48.5)
More than once	65 (21.6)
Receiving COVID-19 vaccine	
No	10 (3.3)
One dose	11 (3.7)
Two doses	168 (55.8)
Three doses	112 (37.2)
Receiving training related to self-care against COVID-19	
Yes	267 (88.7)
No	34 (11.3)
Receiving training related to patient care against COVID-19	
Yes	252 (83.7)
No	49 (16.3)

3. Results

3.1. Baseline characteristics of participants

According to the findings, all the participants were male. 55.1% of the participants were in the 27 to 34 years age group. Most of the participants had work experience less than 5 years. More than half of the participants had a bachelor's degree (51.8%). About 96% of the participants had received COVID-19 vaccine. The majority of the participants had a history of participating in infection control courses (65.4%) and received training on self-care (88.7%) and patient care (83.7%) against COVID-19 (Table 1).

3.2. Level of self-care

The total score of self-care against COVID-19 was favorable (55.96±6.97out of 72). the results showed that 11 out of 18 items revealed a good condition (score greater than 3). The most favorable score was related to wearing a mask (3.95 ± 0.3 out of 4). Seven items had a score lower than the desired level (less than 3). The lowest scores were allocated to wearing

protective clothing (1.77±1.19 out of 4) and using face shield (1.86±1.35 out of 4) (Table 2).

3.3. Level of patient care

The results indicated that the level of patient care against COVID-19 was favorable (26.86±3.39 out of 32). Out of 8 items, 7 had a favorable condition (score greater than 3), and the highest scores were related to the use of masks by personnel (3.69±0.62 out of 4) and use of nasal cannulas and face masks for the patients (3.68 ± 0.62 out of 4). According to Table 3, the only unfavorable score was related to patient training about performing hand hygiene after touching contaminated equipment (2.83±1.08 out of 4).

The results of the Pearson correlation test showed a positive and significant correlation between the level of compliance with self-care standard and the level of compliance with patient care standard against COVID-19 (r = 0.491, P = 0.001).

4. Discussion

The findings of present study showed that, general level of self-care and patient care against COVID-9 was favorable, but level of some domains of self-care and patient care against COVID-19, such as using protective clothing and face shields as measures related to self-care and training patients about hand hygine as measures related to patient care did were not at a good level.

A significant number of the participants of the present study had an experience of participating in the infection control courses (65.4%). This statistic was higher than that revealed by Wang et al., (2020) in China reporting 48% (11), Martin et al., (2020) in Latin America reporting 49% (12), and Olsson et al., in Sweden reporting 38% (13). The reason for this difference, in addition to the professional motives of people to increase their awareness in the field of infection control, can be the influential impact of participating in in-service courses and provision of relevant documentation in the annual evaluation and promotion of EMS personnel in Iran.

The current study showed that 70% of the personnel were infected with COVID-19 at least once, which was a high number.

Although no accurate reports on the rate of infection among EMS personnel in other countries were found, it was significantly higher in our study compared to the infection rate of other groups of healthcare workers (HCWs). For instance, it was 19% in Ethiopia, 20% in Italy and in the United States, and 15% in Spain according to a study done by Atnafie et al (14). Given the acceptable overall score of self-care against COVID-19, the reasons justifying the higher prevalence of infection compared to other health treatment groups can be emergency working conditions and time limit to fully protect oneself before close contact with patients. Due to the time

Table 2: The level of self-care against COVID-19

Item	Mean	SD
1. Do you wear protective clothing that is resistant to the penetration of secretions when caring for a patient suspected of COVID-19?	1.77	1.19
2. Do you use gloves when caring for a patient suspected of COVID-19?	3.74	0.65
3. Do you use a face shield when caring for a suspected patient?	1.86	1.35
4. Do you use a mask when caring for a suspected patient?	3.95	0.30
5. Do you examine the patient for signs of fever, cough, and shortness of breath to prevent possible transmission of COVID-19?	3.74	0.61
6. Do you touch your face during the mission?	2.58	1.37
7. Do you adhere to hand hygiene after the mission?	3.82	0.59
8. Do you avoid unnecessary contact with patients?	3.61	0.62
9. On missions, if you wear protective clothing, do you take off your personal protective clothing before getting back to the ambulance and start transferring the patient?	2.38	1.43
10. On missions, do you take off your gloves before starting to drive the ambulance and transport the patient?	3.11	1.14
11. Do you let the patient's companions to get into the ambulance cabin?	2.70	1.13
12. Do you turn on the patient's cabin ventilation fan during patient transfer?	3.23	0.95
13. Do you leave the rear doors of the ambulance open after completing the mission?	2.86	1.17
14. Do you put clothes and personal protective equipment in an infected trash can after completing the mission?	3.64	0.73
15. Do you care about the patient's companion wearing a mask?	3.58	0.73
16. Before going on a mission, are you informed if the patient is suspected to have COVID-19 infection or about the possible risk of transferring the patient by the dispatch control center?	2.76	0.96
17. Do you give a bag to a patient who has nausea and vomiting to prevent infection?	3.59	0.67
18. Do you minimize airway interventions that may cause coughing (e.g. suctioning)?	3.03	1.02
Total	55.96	6.97

SD: standard deviation.

Table 3: The level of patient care against COVID-19

Item	Mean	SD
1. In the absence of any restrictions, do you use a facemask for the patient?	3.29	0.84
2. Do you adhere to hand hygiene before starting to care for a patient?	3.30	0.86
3. Do you use disposable care equipment if you need care equipment such as oxygen mask and nasal catheter?	3.68	0.62
4. Do you disinfect equipment between missions?	3.37	0.82
5. Do you minimize your contact with the patient to prevent possible infection?	3.39	0.69
6. Do you consider not exposing the patient to unprotected staff, patients, and companions to prevent the patient from becoming infected?	3.30	0.72
7. Do you use a facemask when providing care for the patient to prevent the transmission of possible infection to the patient?	3.69	0.62
8. Do you train the patient about hand disinfection after touching infected equipment?	2.83	1.08
Total	26.86	3.39

SD: standard deviation.

constraints and the stress of the companions while reaching the patient's bedside, one of the important measures to manage the health of personnel can be doing the preparations on the way to the mission and before coming into contact with patients.

The overall results showed the good state of self-care against COVID-19, which was in line with a study by Zhang et al., (2021) on healthcare workers in China (15). However, the aforementioned study was conducted on all healthcare workers. Comparing the results of studies done before the COVID-19 pandemic with those of current study regarding self-care against the infectious agent, it can be found that self-care was at an unfavorable level among EMS personnel before the pandemic (7, 8, 16). This difference can be caused by the feeling of less danger by the personnel in the non-epidemic situation compared to epidemic one. Nevertheless, self-care against infectious agents should be considered according to the working conditions of the personnel. It should be noted that providing medical services to infectious patients, especially those without obvious clinical symptoms, in non-epidemic conditions is possible although less likely. Therefore, considering the importance of personnel's health, reducing days away from work, and providing better quality services, it is necessary that the issue of self-care against fac-

tors that threaten the health of EMS personnel be considered by personnel and evaluated by superiors even after the normalization of the COVID-19 epidemic. In separate examination of each of the questions related to self-care against COVID-19, the results of the present study showed that the mean score of the item related to wearing protective clothing when caring for a patient suspected of COVID-19 was at an unfavorable level, which was in line with the results of a study done by Lai et al., (2020) on HCWs in China (17). However, Tabah et al., (2020) in their study on Australian HCWs showed a favorable situation in this regard (18). Lack of using protective clothing resistant to penetration of secretions can be due to the personnel's low knowledge and negative attitude about this issue, the limited access due to the high demand for the use of protective equipment during the COVID-19 pandemic, and unwillingness to use this clothing due to warm environments.

The findings of this study also indicated that the mean score of the item related to wearing a face shield when caring for a patient suspected of COVID-19 was at an unfavorable level, which was consistent with the results of studies done by Zhang et al., (2021) (15) and Lai et al. (2020) on HCWs in China (17). In contrast, Tabah et al., (2020) on Australian HCWs (18) reported a favorable condition in this regard. Considering that the main route of transmission of respiratory diseases, including COVID-19, is through the organs of the head and face (mouth, nose, and eyes) and the close contact of the personnel with the patient, the use of face shield is important to reduce the spread of infection.

The results on the mean score of touching the head and face revealed unfavorable level, which was in line with the results of the study done by Wang (11). Since most of the patients receiving medical services have acute conditions, one of the obstacles against complying with infection control standards is time limit. Therefore, not disinfecting or washing hands before touching the face can be associated with the risk of infection transmission, and it can be considered as one of the causes of high incidence of COVID-19 in the present study.

The mean score of the item related to taking off protective equipment after completing the mission and before getting into the ambulance showed an unfavorable condition. However, related studies emphasized the removing of used equipment after completing the mission (19-21). Not removing contaminated clothes after completing the mission, in addition to the possibility of contaminating the ambulance driver's cabin, can increase the risk of infection transmission to other personnel.

The results indicated that compliance with opening the ambulance door after completing the mission was low. However, based on the protocols for decontamination of the ambulance environment, establishing proper ventilation, and disinfecting the environment inside the rear cabin after com-

pleting the mission and before starting the next mission is necessary to reduce the risk of infection transmission to personnel or other patients (22). Considering aerosol production by patients infected with COVID-19 and given that COVID-19 virus is primarily transmitted between people through respiratory droplets, it is more important to observe this item. In the present study, the mean score related to being informed about susption to or definitive infection and the possible risks of transferring the patient by the dispatch control center was less than the optimal level. However, studies showed that for the safe transfer of patients with suspected infection, reducing the risk of disease transmission during medical rescue operations at the scene and during patient transfer, and the information collected by the emergency dispatcher is of key importance (23). Having previous information about the patient before dispatching is vital for a more successful mission for the patient and the personnel (24). On the other hand, given the spread of COVID-19 and the possibility that patients infected with this disease may ask for medical services due to other medical problems, it is necessary to obtain and pay attention to information about possible symptoms of communicable infectious diseases, such as COVID-19, to take self-protection measures more seriously.

The results indicated that the overall condition of patient care against COVID-19 was favorable. However, only the mean score of the item related to training the patient about hand hygiene after touching contaminated equipment was lower than the desired level. Hand hygiene is one of the most important aspects of controlling various infections, including COVID-19 (25). However, patients, due to different reasons such as lack of awareness about hand hygiene control, lack of information about potential contamination of ambulance equipment and environment, or emergency situation, do not pay much attention to hand hygiene during their transfer to the hospital. Therefore, lack of training and reminding patients increases the risk of getting infected. The results also indicated a positive and significant correlation between the level of self-care and patient care against COVID-19.

Hence, it can be concluded that people who follow infection control protocols play an important role in reducing the transmission of infection to themselves and the patient, subsequently reducing the spread of the disease in general. Similarly, Gulsen et al., in their study done in Turkey, showed that EMS personnel who used a protective mask for the patients were at a lower risk of getting COVID-19 (26).

5. Limitation

Considering that the samples are limited to one province, it is necessary to conduct a study in a larger research environ-

ment in order to obtain more comprehensive information. On the other hand, it is necessary to pay attention to the time of conducting the study, which was during the outbreak of COVID-19, because the infection control status may be under the influence of this epidemic situation. Further studies are needed in order to confirm these findings.

6. Conclusion

Based on the results of this study, some aspects related to self-care and patient care were not at a desirable level, although the general status of self-care and patient care against COVID-19 was favorable. Therefore, it is necessary to pay attention to reform programs such as infection control training in university studies, in-service training courses, monitoring the performance of personnel through field observations, and praising people who comply with infection control standards.

7. Declarations

7.1. Acknowledgments

7.2. Conflict of interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and publication of this article.

7.3. Fundings and supports

7.4. Authors' contribution

Study design: Salam Vatandost, Sina Valiee, and Naser Kamyari.
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Manuscript writing: Sina Valiee, Sirvan Abbasi, and Salam Vatandost.
Critical revisions for important intellectual content: Sina Valiee, Sirvan Abbasi, Naser Kamyari and Salam Vatandost.

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