

## ⇒ Research Article



# Evaluation of the Knowledge and Performance of Nurses in Dealing with COVID-19 Disease: A Cross-sectional Study in Southern Iran

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## Abstract

**Background:** The prevalence of coronavirus disease 2019 (COVID-19) is on the rise worldwide. Since nurses are in close contact with infected people, they are a component of the infection transmission chain. Therefore, their knowledge and performance regarding COVID-19 prevention and protection methods can help break the transmission chain. This study aimed to evaluate the self-care level of nurses in charge of caring for patients with COVID-19.

**Methods:** The study population in this descriptive-analytical and cross-sectional study included all nursing staff working in the hospitals affiliated with the Hormozgan University of Medical Sciences. A sample size of 110 nurses was determined adopting the convenience sampling. Data were collected using demographic information as well as questionnaires developed by the researchers to measure the knowledge and performance of the nurses responsible for dealing with COVID-19 patients.

**Results:** A total of 158 nurses with a mean age of  $33.77 \pm 6.92$  years participated in the present study, 85.4% of who were female. Half of the participants (51.3%) showed generally good and excellent levels of self-care. Average scores of the knowledge and performance of nurses increased significantly with an increase in age and work experience ( $P < 0.05$ ). Moreover, the knowledge scores of nurses working in internal wards and intensive care unit (ICU) as well as the performance scores of nurses working in internal wards were lower than those of nurses working in COVID-19 wards.

**Conclusion:** It was found that nurses had relatively good knowledge and performance in dealing with COVID-19 patients. However, various factors such as work experience, age, place of work, etc. may have affected the knowledge and performance of nurses. Therefore, it was recommended that the training of medical staff should be organized so that the efforts to control the epidemic were not negatively affected by unintentional errors but were positively directed towards controlling the disease.

**Keywords:** Coronavirus, COVID-19, Self-care, Nurses, Awareness, Performance

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## Background

Respiratory infections, resulting in serious complications and widespread mortality, are major causes of pandemics which, in turn, pose major challenges to the healthcare systems. For this reason, the infections have attracted a worldwide research attention recently (1). The coronavirus family includes a group of large, single, RNA viruses that have long been identified as the causes of diseases in humans, such as colds and diarrhea. Over the past years, new strains of the virus caused SARS and MERS diseases, and with the outbreak of a severe respiratory infection of an unknown cause in Wuhan, China, this species became prevalent and was termed as

a new coronavirus 2019 (COVID-19) since December 2019 (2).

The global prevalence of this disease is on the rise and it is challenging to control this situation. Although diseases from the coronavirus family, such as severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS), were widespread around the world in the past, the high prevalence of the new variant (i.e., COVID-19) has directed an extra attention to this disease (3) and created a serious health problem (4). In June 2020, the World Health Organization (WHO) declared the outbreak of the virus a serious and urgent threat to public health (5). Up to October 26, 2020, more than 43 345 944

cases of COVID-19 were reported worldwide, with more than 1 159 093 deaths and 31 904 891 recovered cases on a global scale (6). In Iran, the prevalence of COVID-19 was officially confirmed on February 19, 2020. Up to October 26, 2020, 568 896 cases of COVID-19 were reported in Iran, with 32 616 and 455 054 improved and dead cases, respectively (7).

The primary target of coronavirus infection is the mucosal cells of the respiratory and gastrointestinal tracts. Due to said characteristics, the virus also spreads through these systems (8), mainly by direct transmission and respiratory droplets. However, excretion from the body and transmission of contamination to surfaces can contaminate the hands and mucosal surfaces, which is one of the main transmission routes of these viruses (9).

Hospital transmission are one of the most common routes of the coronavirus spread, and health care staff directly involved in fighting against the virus are at a higher risk. Since February 11, 2019, 1716 confirmed cases of COVID-19 with at least six deaths have been reported among employees of the hospitals in Shanghai, China (10). At present, there is no valid treatment for COVID-19 and the main treatment strategies are symptomatic and supportive; hence, developing preventive strategies to halt further spread of the infection assumes critical importance (11).

Protection of hospital staff is an important priority (10). Due to the limited knowledge concerning the type of spread and prevalence of COVID-19, health workers should take all precautions to protect themselves from infections and maintain their health (9). Nurses are at higher risk of infection due to their close contact with infected patients and, therefore, play a decisive role in controlling the infection (12, 13). Wearing protective clothing and N95 masks as well as having eye protection are major and vital components when being in direct contact with suspected patients (9).

However, evidence has suggested that hospital staff were not prepared for this sudden outbreak and did not have enough information and knowledge about protective equipment as well as using personal protective equipment (10). Reports show that one of affected health workers became infected with symptoms of unilateral conjunctivitis and then fever despite the use of protective clothing and the N95 mask, and other cases of deceased health care workers may be indicative of this issue (9). Since nurses are in close contact with infected people, they are a component of the infection transmission chain; therefore, their knowledge about effective methods for providing prevention of and protection against COVID-19 can help break the transmission chain (12). Late January, the WHO and the Centers for Disease Control and Prevention (CDC) released recommendations for health care workers regarding the prevention and control of COVID-19, and held several online training sessions in different languages

to update prevention strategies, including training and raising awareness of these workers (13).

The occurrence of COVID-19 epidemic in Iran as well as the severity of pathogenicity and transmission of the virus have repeatedly highlighted the importance of self-care among nurses working in medical centers.

### Objective

This study aimed to evaluate the self-care level of the nurses caring for COVID-19 patients in the southern part of Iran, Hormozgan province, Bandar Abbas.

### Materials and Methods

This study was a descriptive-analytical, cross-sectional study which is regarded as an applied research. The study population included all nursing staff ( $n = 900$ ) working in hospitals affiliated with Hormozgan University of Medical Sciences. A sample size of 110 nurses was determined through a convenience sampling method. To evaluate the validity of the questionnaire, 10 faculty members of the Department of Nursing and Midwifery were requested to review and approve the formal validity, relative content validity coefficient (CVR), and the content validity index (CVI) of the questionnaire. The CVI was calculated by aggregating the scores for each item that scored “fully relevant” and “relevant but in need of review” divided by the total number of professionals, and to determine the CVR, experts were asked to rate each item by range, check the three sections “necessary”, “useful not necessary” and “required then the answers were placed in the CVR formula and its value was calculated. Taking into account the methods in previous studies, the scale CVI (S-CVI) was regarded equal to 0.92 in this study, and the validity of the content of the scale was confirmed due to the fact that its value was higher than 0.79. Furthermore, the value of CVR was equal to 0.95, indicating that the content validity of this questionnaire as well as its reliability were confirmed (Cronbach's  $\alpha = 0.76$ ) based on the responses of 30 nurses working in hospitals affiliated with Hormozgan University of Medical Sciences. Data were collected using two demographic information and researcher-made questionnaires (self-care of the nurses caring for COVID-19 patients) with 44 questions. Out of the said 44 questions, 31 ones were relating to nurses' information about self-care, and 13 ones were concerning to self-care behaviors of the nurses caring for of COVID-19 patients. The answers were based on the Likert scale, where 4, 3, 2, and 1 are assigned to *strongly agree*, *agree*, *disagree*, and *strongly disagree*, respectively. A higher score of the subjects in the self-care questionnaire was regarded as their higher knowledge about self-care and more self-care behaviors. Satisfaction and employment in one of the wards of hospitals affiliated to the University of Medical Sciences were considered as inclusion criteria, and unwillingness to participate in

the study was regarded as the only exclusion criterion. Sampling was performed after obtaining the approval for the project from ethics committee (ID: IR.HUMS.REC.1399.021) and the letter of introduction from the Deputy of Research for the Deputy of Treatment. Due to the prevalence of COVID-19 and the absence of researchers in the clinic to complete the questionnaire, data were collected using the Internet Base approach. An electronic questionnaire was first prepared and then, utilizing WhatsApp messenger, the nurses working in the studied hospitals were requested to cooperate and participate in the study. Sampling started on June 1 for 15 days, after which the data were analyzed by SPSS software (version 20) adopting descriptive and analytical statistics. Continuous categorical variables were reported as mean (standard deviation, SD) and number (percent), respectively. The normality of the dependent variables (awareness, performance and self-care) was rejected by Kolmogorov–Smirnov test ( $P < 0.001$ ). Therefore, median regression was used to assess the relationships between dependent and independent variables by R Package. Regarding the low frequency in one of the categories of education degree, this variable was not entered in the median regression model. Finally, 6 variables including age, work experience, gender, marital status, workplace, and hospital ward were used in median regression. A  $P < 0.05$  was considered as statistically significant. To compute the awareness score, scores of 31 items related to awareness were summed, and then the total score was divided by 31 (total items). As for the performance score, moreover, scores of 13 items related to performance were summed, and then the total score was divided by 13 (total items). The awareness levels of the nurses were measured by calculating the quartiles of awareness score and categorized as weak (if participants scored less than the first quartile), medium (if participants scored between the first and second quartiles), good (if participants scored between the second and third quartiles), and excellent (if participants scored more than the third quartile). The performance and self-care scores were grouped in the same way.

## Results

Out of the 158 participants, 135 (85.4%) ones were females. Moreover, the mean age was approximately 34 years. Table 1 presents the demographic characteristics of people.

Skewness of awareness, performance, and overall self-care scores were determined based on the  $P$ -values of Kolmogorov–Smirnov test in Table 2. The median and interquartile ranges (IQR) of these variables are shown in Table 2.

Frequency and percentage of different levels of awareness, performance, and self-care were reported in Table 3.

**Table 1.** Nurses' Characteristics

Variable	No. (%)	
Age, Mean (SD)	33.77 (6.92)	
Work experience, Mean (SD)	10.01 (6.71)	
Gender	Female	135 (85.4)
	Male	23 (14.6)
Marital Status	Single	33 (20.9)
	Married	125 (79.1)
Workplace	Bandar Abbas	74 (46.8)
	Other cities	84 (53.2)
degree of education	Bachelor	149 (94.3)
	Masters	9 (5.7)
Hospital ward	COVID-19	25 (15.8)
	Internal	10 (6.3)
	Surgical	8 (5.1)
	Gynecology	12 (7.6)
	ICU	24 (15.2)
	Pediatric	25 (15.8)
Other	54 (34.2)	

ICU, intensive care unit.

**Table 2.** Median (IQR) of Awareness, Performance, and Total Self-care Score

Variable	Median (IQR)	$P$ Value (Kolmogorov–Smirnov Test)
Awareness	3.29 (0.84)	<0.001
Performance	3.46 (0.84)	<0.001
Total self-care score	3.36 (0.82)	<0.001

IQR, Interquartile range.

**Table 3.** Awareness, Performance, and Self-care Levels of Nurses

	Awareness, No. (%)	Performance, No. (%)	Total Self-care Score, No. (%)
Weak	34 (21.5)	62 (39.2)	38 (24.1)
Medium	44 (27.8)	16 (10.1)	39 (24.7)
Good	38 (24.1)	33 (20.9)	42 (26.6)
Excellent	42 (26.6)	47 (29.7)	39 (24.7)

As shown in Table 4, age, work experience, and hospital ward were found to affect the awareness and performance scores. Furthermore, age and work experience affected the overall self-care score. For every one unit increase in age, the predicted value for the median of awareness score increased by 0.06 approximately ( $P = 0.004$ ). By adjusting the effect of other variables and for each unit increase in work experience, the predicted value for the median of awareness score increased by 0.06 approximately ( $P = 0.005$ ). The medians of awareness scores for nurses working in the internal ward and ICU were 0.56 and 0.38 less than those for their counterparts working in the covid-19 ward, respectively ( $P = 0.026$ ,  $P = 0.046$ ).

For one unit of increase in age and work experience, moreover, the predicted values for the medians of performance scores approximately increased by 0.08 and 0.07, respectively. The performance score for nurses

**Table 4.** Coefficients and *P* Values in Median Regression Model

Variables	Awareness		Performance		Total Self-care Score		
	$\beta$	<i>P</i>	$\beta$	<i>P</i>	$\beta$	<i>P</i>	
Age	0.057	0.004*	0.078	0.001*	0.063	0.016*	
Work experience (y)	0.058	0.005*	0.073	0.003*	0.061	0.023*	
Gender	Female	-0.070	0.677	-0.103	0.612	-0.144	0.511
	Male			Reference			
Marital Status	Married	-0.158	0.261	-0.211	0.215	-0.197	0.283
	Single			Reference			
Workplace	Bandar Abbas	0.109	0.363	0.274	0.060	0.137	0.379
	Other cities			Reference			
Hospital Ward	Internal	-0.558	0.026*	-0.660	0.030*	-0.600	0.066
	Surgical	-0.331	0.242	-0.068	0.840	-0.338	0.358
	Gynecology	-0.417	0.077	-0.259	0.362	-0.318	0.301
	ICU	-0.382	0.046*	-0.281	0.222	-0.399	0.109
	Pediatric	-0.210	0.276	-0.297	0.203	-0.257	0.306
	Other	-0.268	0.103	0.029	0.881	-0.145	0.495
COVID-19			Reference				

ICU, intensive care unit.

\*Significant at level 0.05

working in the internal ward was 0.66 less than that for their counterparts in the covid-19 ward ( $P=0.030$ ).

## Discussion

This study aimed to investigate the knowledge and performance of nurses about self-care to prevent the disease during the caring for patients with COVID-19. The results showed that the awareness of self-care behaviors and the display of them were the main concerns of the researcher in maintaining the safety of the subjects in the present study. It was recommended that the nurses gain the required knowledge about protecting their health and put this knowledge into actual practice in order to properly perform their care duties as well as to ensure their own safety.

According to our study results, more than half of the participants (51.3%) were in the general levels of good and excellent care. A study by Ahmed et al investigating the health care professionals during the spread of COVID-19 revealed that 96.4% of the participants were aware of the nature of the disease infection (14). Another study evaluating the level of knowledge among Iranian nurses showed that more than half (56.5%) of the nurses had good knowledge about this disease (15). In 2020, a study was carried out in northwestern part of Ethiopia to explore the nurses' knowledge and attitudes about COVID-19, and it was discovered that 84.9% of nurses possessed a good level of knowledge (12). A study conducted in southeastern Nigeria also found that the majority of health care workers (88.59%) had a good knowledge about COVID-19 and effectively implemented the preventive measures against the disease (16). On March 25, 2020, a

study on 414 Pakistani healthcare workers demonstrated that 93.2% and 88.7% of them had good knowledge and practice, respectively, towards COVID-19 (17).

The consistencies among the results from these studies may have been due to the professional training similarities among healthcare workers. The lower percentages of knowledge and performance reported in this study compared to those in other studies may have been attributed to the differences among questions included in questionnaire or to the fact that the study was conducted during a period of time when COVID-19 almost began to widely afflict this region of Iran. Contrary to our finding, the result from a study by Bhagavathula et al demonstrated that the healthcare workers had a poor knowledge about COVID-19. The inconsistency may have been attributable to the media coverage about the disease in the region, since 61% of healthcare workers participating in this study stated that they used social media as a valuable source of information (13).

The results of the present study showed that nurses' knowledge and performance scores increased significantly for each unit of increase in their ages. Moreover, nurses with more work experience had higher average scores of knowledge and practice. However, the results of the present study were not consistent with those of the study by Nemati et al who reported that the scores of knowledge about COVID-19 among Iranian nurses were not affected by their ages and education levels, and nurses with more or less work experience were not statistically and significantly different (15). In Saudi Arabia, a study examining the students of different disciplines indicated that their knowledge scores were not affected by the age



and level of education, and no significant differences were observed among students, faculty members, and non-university staff in terms of their knowledge about MERS-CoV (18). This difference may have been attributed to the difference in the average age of the subjects, as 75.3% of the participants in the study by Nemati et al aged over 40 years. Furthermore, the average age of participants in the study conducted in Saudi Arabia was 23 years, 80.6% of whom aged below 24 years; while the average age of the participants in the present study was 33.77 years.

Our results also showed that the knowledge of nurses working in the internal wards and non-COVID ICU was less than that of those in COVID ward; and the performance of nurses in internal wards was significantly lower than that of the nurses in COVID ward. According to a study on the initial prevalence of the virus in non-communicable diseases, two-thirds of the 31 infected medical staff working in general wards, 17.5% worked in the emergency ward, and 5% in the ICU. An important, underlying reason behind these observations was likely the hospitalization of patients in general wards without implementing protective measures (19).

### Conclusion

In sum, the nurses in this study demonstrated a relatively good knowledge and performance in dealing with COVID-19 patients. Various factors, such as work experience, age, place of work, and etc. may have affected the knowledge and practice of nurses. Therefore, it was recommended that training of medical staff should be organized so that the efforts to control the epidemic were not negatively affected by unintentional errors but were positively directed towards controlling the disease.

Since this study was conducted only in one province of Iran, the results may not have been generalizable to medical personnel in other provinces. Therefore, it was also suggested that further studies should be carried out on a larger scale to address the given problem.

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### Authors' Contribution

Study concept and design: HH, and RB; Acquisition of data: PY, and AP; analysis and interpretation of data: SR, and HH; drafting of the manuscript: AP, PY, and HH; critical revision of the manuscript for important intellectual content: RB, PY, and FT; statistical analysis: SR.

### Conflict of Interest Disclosures

The authors declare that they have no conflict of interests.

### Ethical Statement

This study was approved by the ethics committee of Hormozgan

University of Medical Sciences (ID: IR.HUMS.REC.1399.021).

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