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Research Article

DETERMINING THE PREDICTIVE RELATIONSHIP BETWEEN FEAR OF CORONAVIRUS AND COMPLIANCE WITH ISOLATION PRECAUTIONS IN NURSES

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Abstract: *Nurses, who spend a long time with the patient to meet their care needs and have the most contact with them, are one of the riskiest occupational groups in terms of COVID-19. This study was planned to determine the predictive relationships between fear of coronavirus and compliance with isolation precautions in nurses. An online survey was conducted with 243 nurses in July 2020. The data of the study were collected by using an Information Form and the Compliance with Isolation Precautions Scale and the Fear of COVID-19 Scale. Our study result showed that the compliance of the nurses with isolation precautions was on a good level and coronavirus fears of the nurses were moderate. The fear of coronavirus variable significantly affected compliance with isolation precautions. Nurses, who spend more time with patients by staying in the frontlines of the COVID-19 pandemic, are at great risk in terms of transmission of infection. This is why isolation precautions and discussing and improving the factors that affect isolation precautions are vitally important for nurses.*

Keywords*: Coronavirus; COVID-19; Fear of coronavirus; Isolation precautions*

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1. Introduction

The COVID-19 virus was seen for the first time in China in December 2019 and has led to a pandemic by spreading to the entire world in a few months. This virus is a coronavirus that leads to severe acute respiratory failure [1-3]. COVID-19 is mainly transmitted through droplets. Droplets that are spread onto r surfaces by infected individuals by respiration infect people. In the study which determined viruses in infected individuals' nasal and throat smears, droplets, and aerosols that they spread by Leung et al. [4], the RNA virus was identified in the aerosols spread by some patients although they were not coughing. The study reveals the probability of viruses being transmitted by aerosols and the importance of using facemasks. Standard droplet and contact isolation measures need to be taken in all cases suspected for COVID-19. Additionally, in contact with a confirmed/potential COVID-19 case from a distance shorter than one meter, gloves, non-sterile gowns, surgical masks, face shields, and goggles need to be used. It was reported that 2055 healthcare workers were infected in China from the beginning of the pandemic to 24 February 2020 [5]. Especially nurses, who spend a long time with the patient to meet their care needs and have the most contact with them, are one of the riskiest occupational groups in terms of COVID-19. It is highly important for nurses to take isolation measures to protect themselves against infectious agents and also prevent other patients from getting affected [6]. Nurses have a key role in the prevention of transmission from patient to patient and from patient to healthcare personnel. For them to be able to realize these roles, the psychological and mental health of nurses is

highly important [7,8]. The fact that COVID-19 is a very new infection, it has several unknowns, and it has turned into a pandemic in a short time has led to a worldwide fear. Many studies reported significant relationships between the COVID-19 pandemic and situations such as depression, anxiety, and fear, as well as psychological and mental health [8,9,10]. For this reason, the effects of fear of COVID-19 on nurses' work life, especially their isolation measures, are very important. This study was planned to determine the predictive relationships between fear of coronavirus and compliance with isolation precautions in nurses' instructions.

2. Materials and Methods

The study was planned as a relational screening type.

2.1. Study Universe and Group

The population of the study consisted of all nurses working at public hospitals in the province of Konya in Turkey. Participation in the study was voluntarily, no sample was selected, and the study was completed with 243 nurses who filled out the questionnaire form completely.

2.2. Data Collection

Questionnaire forms of the data were collected online on the web, using Google Forms. The data were collected between 19 and 30 July. An online questionnaire link was shared through social media tools (such as WhatsApp, Facebook), information was provided about the research, and nurses were invited to fill in the questionnaire. The data of the research were collected based on self-report. Incompletely filled-out questionnaires were not included in the study.

2.3. Data Collection Tool

The data of the study were collected by using an Information Form developed by the researchers in line with the literature [1,9,11,12,13], the Compliance with Isolation Precautions Scale, and the Fear of COVID-19 Scale. The Information Form consisted of 23 questions on the sociodemographic characteristics and COVID-19 related qualities among the nurses. Compliance with Isolation Precautions Scale was developed in 2011 by Tayran and Ulupınar, and its cronbach's alpha value was determined as 0.85. It is a 5-point likert-type scale consisting of 18 items. The minimum and maximum scores on the scale are respectively 18 and 90. A high score indicates high compliance with isolation precautions [14]. In this study, cronbach's alpha value of the scale was found as 0.94.

The Fear of COVID-19 scale was developed by Ahorsu et al [15] and its Turkish validity and reliability study was conducted by Haktanır et al [16]. The cronbach's alpha value of the scale was determined as 0.86. The single-factor scale is a 5-point likert-type scale consisting of 7 items. The minimum and maximum scores on the scale are respectively 7 and 35. Higher scores indicate higher levels of fear of COVID-19 [16]. In this study, the cronbach's alpha value of the scale was found as 0.89.

2.4. Data analysis

The analyses of the data obtained in the study were conducted using SPSS 21 statistical analysis program (Chicago, IL, USA). In data analysis, descriptive statistics of frequencies, percentages, means, and standard deviations were used. The suitability of the numerical variables with normal distribution was tested by the Kolmogorov-Smirnov test (0.004-0.000), and it was determined that they were not normally distributed. In the comparison of the mean scores in the Compliance with Isolation Precautions Scale based on the independent variables (COVID-19-related characteristics), Mann Whitney U test was

used in independent groups with variables in two groups based on the size of the sample, and the Kruskal Wallis test was used in independent groups with variables in three or more groups (Bonferroni method for post hoc analyses).

Structural Equation Modelling was used to test the model consisting of the relationships between fear of coronavirus and compliance with isolation precautions in the nurses. Structural Equation Modelling is a method that is used to establish a statistical cause-effect connection [17]. To reduce the standard errors in measurements in the scales in the model consisting of one dimension and increase reliability [18], the parceling method was used. Considering its internal consistency values, the Fear of COVID 19 Scale was divided into three parcels. The obtained model was tested by using the AMOS software. The significance level was accepted as $p<0.05$.

2.5. Ethical Considerations

Before the start of the study, permission was received from the Scientific Research Platform of the Ministry of Health of Turkey and from the Ethics Board of Necmettin Erbakan University (Number and date: 2020/2624; June 19, 2020). All subjects provided informed consent electronically before registration. The informed consent page presented two options (yes/no). Only subjects who chose yes were taken to the questionnaire page, and subjects could quit the process at any time. The questionnaire does not include questions containing the contact information or any special information of the participants.

2.6. Limitations of the study

The fact that the study was carried out with a web questionnaire constituted the main limitation of the study. This study was conducted within one province of the country; the exclusion of nurses from other provinces may affect the generalisability of the findings.

3. Results

The sociodemographic characteristics of the nurses are shown in Table 1.

Table 1. Sociodemographic characteristics of nursing

Characteristics (n= 243)	**X̄± SD**	**Min-Max**
Age	31.07±7.79	20-53
Working Years	8.82±7.68	1-32
	n	**(%)**
Gender		
Female	195	80.2
Male	48	19.8
Marital Status		
Married	135	55.6
Single	108	44.4
Educational Status		
High School	33	13.5
Two-year college	33	13.5
Four-year college	141	58.2
Postgraduate	36	14.8
Working Unit		
Surgical	60	24.7
Internal	144	59.3
Other (Management, Education, Infection, Polyclinic, Laboratory)	39	16.0

While 74.1% of the nurses had provided care for the patient with diagnosed a contagious disease before, 55.6% had provided care for the patient diagnosed with COVID-19. When the situations with difficulty while nursing care during the COVID-19 pandemic was questioned, the first places included working with personal protective equipment (41.6%), staying away from family (13.6%), and working for long hours (11.5%). 86.4% of the nurses stayed at home during the COVID- 19 pandemic, whereas 52.7% got diagnostic tested for COVID-19, and 6.4% of those who got tested turned out to be positive. When whether or not they had received any training regarding COVID-19 was questioned, while 67.1% of the nurses stated that they had received training, 52.8% said they received this training from an Infection Control Committee Nurse. Most nurses (53.5%) partially thought the pandemic could not be controlled. When they were asked about the emotions they felt during the pandemic process, the first three places included fear (32.9%), sadness (23.9%), and hopelessness (14.8%) (Table 2).

Table 2. Nurses qualities related to COVID-19

Qualities (n: 243)	**n**	**(%)**
Previously provide care for patients with a contagious disease		
Yes	180	74.1
No	63	25.9
Status of having provided care for patients diagnosed with COVID-19		
Yes	135	55.6
No	108	44.4
When the situations with difficulty while nursing care during the COVID-19 pandemic		
Working with personal protective equipment	112	46.1
Staying away from family	33	13.6
Working for long hours	28	11.5
Isolation precautions	22	9.1
Cleaning of personal items such as stethoscope and phone	17	7.0
Evaporation of protective glasses	15	6.2
All	16	6.6
Place of residence during the pandemic process		
Stayed at home	210	86.4
Locations provided by the institution (hospital student dormitories, guest houses)	13	5.3
Other places (hotels, friends)	20	8.2
Diagnostic test for COVID-19		
Yes	128	52.7
No	115	47.3
COVID-19 diagnostic test result (n=128)		
Positive	7	6.4
Negative	121	94.6
Status of having received training on COVID-19		
Yes	163	67.1
No	80	32.9
Source of training on COVID-19 (n=161)		
Infection Control Committee Nurse	85	52.8
Infection Control Committee Doctor	29	18.0
Education Nurse	47	29.2

Table 2. Nurses qualities related to COVID-19 (Continued)

Qualities (n: 243)	n	(%)
Status of thinking that the COVID-19 pandemic cannot be controlled		
I thought so	71	29.2
I partially thought so	130	53.5
I did not think so	42	17.3
Emotions felt during the pandemic process		
Fear	80	32.9
Sadness	58	23.9
Hopelessness	36	14.8
Worry	31	12.8
Anger	18	7.4
Other (I felt it all from time to time, boredom, hope)	20	8.2

The mean total Compliance with Isolation Precautions Scale score of the nurses was 74.91±15.12, and our research result showed that the compliance of the nurses with isolation precautions was on a good level. While their mean total Fear of COVID-19 Scale score was 17.20±5.91, our research result showed that the coronavirus fears of the nurses were on a moderate level.

The effects of fear of coronavirus on compliance with isolation precautions were tested by structural equation modeling. Every path shown in the model was found statistically significant. The fit indices of the obtained model showed a good fit. These fit indices were found as χ^2/df =2.01, RMSEA= 0.06, AGFI=0.92, IFI =0.93, CFI=0.93 and GFI =0.97 (Figure 1). It was understood that, in general, the model had a desirable level of fit values [17,19,20,21]. The single-factor model that was tested is shown in Figure 1. All paths shown in the model were significant at the level of 0.001. These values showed that the established structural model was within acceptable ranges. The standardized beta, standard error, and significance values of the model are shown in Figure 1.

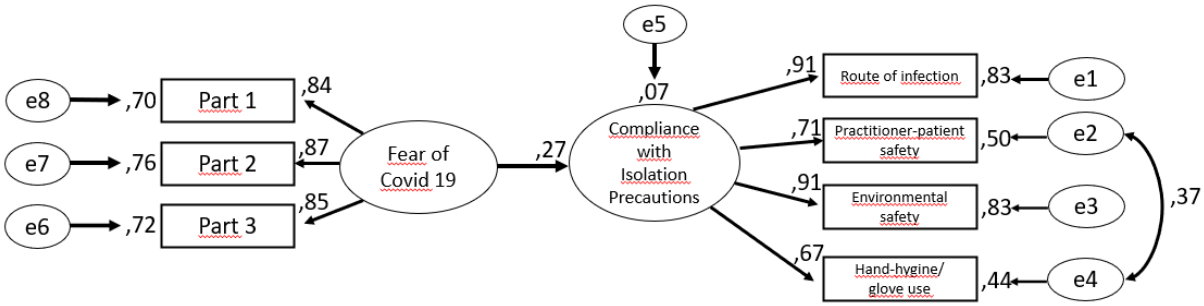

Figure 1. Path Analysis of the Structural Equation Model Between Fear of COVID-19 and Compliance with Isolation Precautions

According to these findings that were obtained, the fear of coronavirus variable significantly affected compliance with isolation precautions. The correlation coefficient regarding this factor was found as β=0.27. Positive effects were found in all paths of the model (Table 3).

Table 3. Predictive Relationship Model for Predictive Relationships Between Fear of Coronavirus and Compliance with Isolation Precautions Score

Predictor Variable	The Dependent Variable	Standardized β	Standard Error	Critical Value
Fear of COVID-19 Scale Score	Compliance with Isolation Precautions Scale Score	0.27	0.17	2.70**

****p* <0.01**

As per Table 4 there were statistically significant differences in the mean Compliance with Isolation Precautions Scale scores based on the nurses' status of having received training on COVID-19, the status of having provided care for patients diagnosed with COVID-19, place of residence during the pandemic process, and status of thinking that the COVID-19 pandemic cannot be controlled ($p<0.05$). No significant difference was found in the mean Compliance with Isolation Precautions Scale scores based on the emotions felt by the nurses during the pandemic process ($p>0.05$).

The mean Compliance with Isolation Precautions Scale score of the nurses who had received training regarding COVID-19 was significantly higher than those who had not ($p<0.05$).

The mean Compliance with Isolation Precautions Scale score of the nurses who had provided care for patients diagnosed with COVID-19 was significantly higher than those who had not ($p<0.05$).

A significant difference was determined in the mean Compliance with Isolation Precaution Scale scores of the nurses based on their place of residence during the pandemic process. According to the results of the further analysis conducted to determine the groups causing the difference, the mean Compliance with Isolation Precautions Scale scores of the nurses who stayed at locations provided by the institution (hospital student dormitories, guest houses) and other places (hotels, friends) were significantly higher than those who stayed at their homes ($p<0.05$).

A significant difference was found in the mean Compliance with Isolation Precautions Scale scores based on the nurses' statuses of thinking that the COVID-19 pandemic cannot be controlled. According to the results of the further analysis conducted to determine the groups causing the difference, the mean score of the nurses who responded as "I partially thought so" was significantly higher than those who responded as "I did not think so" ($p<0.05$). There was no significant difference between other groups ($p>0.05$).

The differences in the mean Fear of COVID-19 Scale scores of the nurses were significant based on their statuses of thinking that the COVID-19 pandemic cannot be controlled and the emotions they felt in the pandemic process ($p<0.05$). There was no significant difference in terms of the other variables ($p>0.05$).

A significant difference was found in the mean Fear of COVID-19 Scale scores based on the nurses' statuses of thinking that the COVID-19 pandemic cannot be controlled. According to the results of the further analysis conducted to determine which groups caused this difference, the mean score of the nurses who responded as "I thought so" was significantly higher than those who responded otherwise. Additionally, the mean score of those who responded as "I partially thought so" was significantly higher than those who responded as "I did not think so" ($p<0.05$).

A significant difference was found in the mean Fear of COVID-19 Scale scores based on the emotions that the nurses felt during the pandemic process ($p<0.05$). According to the results of the further analysis conducted to determine the source of the difference, those who felt fear had significantly higher scores than the others ($p<0.05$).

Table 4. Comparison of Nurses' Compliance with Isolation Precautions Scale and Fear of COVID-19 scores and some COVID 19-related features (n= 243)

	Compliance with Isolation Precautions Scale score $\bar{X}$± SD		**Fear of COVID-19 scores $\bar{X}$± SD**	**Test p**
Status of having received training on COVID-19				
Yes	75.99±14.98	U=52.64* **p=0.015**	16.81±6.20	U=57.63 p=0.141
No	72.73±15.26		18.00±5.24	
Status of having provided care for patients diagnosed with COVID-19				
Yes	76.55±14.10	U=61.55 **p=0.037**	16.79±6.21	U=66.70 p=0.254
No	72.86±16.13		17.72±5.51	
Place of residence during the pandemic process				
Stayed at home	74.07±15.44	χ^2=8.725 **p=0.013**	17.740±5.87	χ^2=8.725 p=0.116
Stayed at locations provided by the institution (hospital student dormitories, guest houses)	82.07±6.02		18.00±4.54	
Other places (hotels, friends)	79.05±14.29		14.55±6.71	
Status of thinking that the COVID-19 pandemic cannot be controlled				
I thought so	75.39±14.81	χ^2=6.278 **p=0.043**	19.75±5.74	χ^2=30.590 **p=0.000**
I partially thought so	75.73±15.10		16.95±5.71	
I did not think so	71.54±15.58		13.69±4.87	
Emotions felt during the pandemic process				
Fear	73.68±17.50	χ^2=1.032** p=0.960	19.98±5.34	χ^2=36.171 **p=0.000**
Worry	76.12±14.06		17.67±5.91	
Anger	76.50±8.48		15.00±5.49	
Hopelessness	74.22±13.55		17.27±5.39	
Sadness	75.12±15.97		14.82±5.55	
Other (I felt it all from time to time, boredom, hope)	76.25±11.81		14.10±5.87	

* Mann Whitney U test, ** Kuruskal-Wallis test

4. Discussion

As in the entire world, the COVID-19 pandemic has also deeply affected Turkey. Without a doubt, the profession of nursing has been at the top of those most affected by this situation. Unknowns about

the virus and uncertainties in the times of the virus' elimination and contagiousness in patients have not only induced fear in nurses but also made their feelings of protecting themselves, their patients, and their families with isolation measures prominent. In this process, nurses have provided and are continuing to provide the necessary care for suspected or confirmed COVID-19 patients, usually under difficult conditions.

While 74.1% of the nurses had previously provided care for patients with a contagious disease, 55.6% had provided care for an individual diagnosed with COVID-19 (Table 2). Like in the finding of this study, a study conducted in China [9] found that 54.5% of healthcare workers (nurses or doctors) had provided care for an individual with a contagious disease, while 55.6% had provided care for an individual diagnosed with COVID-19. In another study in Turkey conducted in the same province, 29.8% of nurses had provided care for a patient diagnosed with COVID-19 [1]. This situation may be explained by that, while the number of COVID-19 diagnosed patients tended to decrease in April when the study by Erkal Aksoy and Koçak [1] was conducted, as July when our study was conducted corresponded to one month after the normalization process, the number of cases, and therefore the number of nurses providing care had increased. Additionally, at the dates when this study was conducted, the province where it was conducted was among the top five provinces with the highest numbers of cases, and the occupancy rate of hospitals was very high. The finding that most of the nurses who participated in the study had previous experience providing care for a patient with a contagious disease was an important finding regarding the care of patients diagnosed with COVID-19.

When the situations with difficulty while providing nursing care in the pandemic process were questioned, the first three places included working with personal protective equipment (41.6%), staying away from family (13.6%), and working for long hours (11.5%) (Table 2). In a case report in Turkey, an intensive care nurse stated that they had difficulty in breathing, hearing, and communicating in nursing practices such as providing care for patients and applying treatments wearing protective equipment for long times during work hours, they could not wipe their sweat when they sweated, they could not drink enough water, and they could not go to the toilet when they wanted to [22]. According to a study conducted in Singapore, de novo personal protective equipment-associated headaches developed in 81% of healthcare workers (nurse, doctor, and paramedical staff) [23]. Nurses have worked and are working selflessly by trying to cope with many situations while they have been aiming to perform nursing care during the pandemic process.

Among the nurses in this study, 52.7% were diagnostically tested for COVID-19, and 6.4% of those who got diagnostic tested turned out to be positive (Table 2). A study in China reported that 3.5% of all patients were healthcare workers [20]. As opposed to the finding of this study, a study conducted in Iran found that none of the participants were tested for COVID-19, and none were infected [7]. It was considered that the differences in the findings of the studies were caused by the fact that the number of cases was low in March when the study in Iran was carried out.

When asked about whether or not they had received any training on COVID-19, 67.1% of the nurses in this study responded as they had, while 52.8% stated that they received this training from an Infection Control Committee Nurse. In a study conducted in China, 64.63% of the sample (psychiatrists and psychiatry nurses) stated that they had completed training on COVID-19, and most (64.63%) stated the source of the training as the internet [10]. In another study in China, 97.8% of healthcare workers (nurse or doctor) stated that they had received training on COVID-19 [11]. The low rate of having received training on COVID-19 in our study in comparison to other studies suggested that considering the sources of receiving training, training might have meant in-person training for the participants. In the pandemic period, training related to COVID-19 has been mostly provided as online training or in very small groups. In this case, low rates of personal training are an expected result. About half of the nurses (53.5%) partially thought that the pandemic cannot be controlled (Table 2).

In a study conducted in China, most healthcare workers (67%) thought the pandemic would never be controlled [25]. The fact that COVID-19 is a new infection, it has several unknowns, and it has turned into a pandemic in a very short time might have led to this thought. When the emotions felt in the pandemic process by the nurses were asked, the first three places included fear (32.9%), sadness (23.9%), and hopelessness (14.8%) (Table 2). In the study by Aksoy Erkal and Koçak [1] conducted in the same province of Turkey, the participating nurses stated their most intensely felt emotions as anxiety (36.3%), uneasiness (31.3%), and fear (19.4%). When the study by Aksoy Erkal and Koçak [1] was conducted in April 2020, it had been only two months since Turkey was introduced to the infection. For this reason, COVID-19 is a highly novel infection with too many unknowns. This novelty and uncertainty may have led to feelings of anxiety, uneasiness, and fear in nurses. In July when our study was conducted, the increased number of cases with the normalization process may have led fear, sadness, and hopelessness to become prominent.

The mean total Compliance with Isolation Precautions Scale score of the nurses was 74.91±15.12, which may be considered good. COVID-19 is a highly contagious infection. This is why compliance of nurses with isolation measures for prevention of transmission from patient to patient and patient to healthcare personnel is highly important. This is why the result of this study was pleasing. The mean total Fear of COVID-19 Scale score of the nurses was 17.20±5.91, which could be considered moderate. In similarity to the finding of this study, a study conducted in China reported that most (43.9%) medical staff (doctors and nurses) felt moderate levels of fear [25]. Indifference to the finding of this study, a study conducted in the Philippines found the mean total Fear of COVID-19 Scale score of nurses as 19.92±6.15 and interpreted it as above moderate [23]. According to another study in China, 63.2% of frontline nurses felt severe fear, and getting infected and death was determined as the source of this fear [27]. It was thought that these differences in the findings of studies may have been related to the infection spreading rate and number of cases at the times when these studies were conducted.

According to the obtained findings, fear of COVID-19 significantly affected compliance with isolation precautions. It may be stated that fear of COVID-19 had a promoting role in compliance with isolation measures. Nurses are on the frontlines in the pandemic process, and their risk of being infected is higher in comparison to other individuals. They also have a high risk of infecting the patients for whom they provide care, their families, and their social environment. Considering this aspect, fear of COVID-19 positively affects nurses in terms of isolation precautions.

The mean Compliance with Isolation Precautions Scale score of the nurses who had received training on COVID-19 was significantly higher than those who had not received training ($p<0.05$, Table 4). It may be stated that the compliance of nurses who receive information in training on the infection, especially on the contagion and ways of protection, with isolation precautions is better.

The mean Compliance with Isolation Precautions Scale score of the nurses who had provided care for patients diagnosed with COVID-19 was significantly higher than those who had not ($p<0.05$, Table 4). This result was an important finding showing that the nurses complied with isolation procedures related to COVID-19.

The mean Compliance with Isolation Precautions Scale scores of the nurses who stayed at accommodations provided by the institution and other places were significantly higher than those who stayed at their homes. All those who stayed at locations provided by the institution were healthcare personnel. This may have been related to the thoughts of the nurses to not harm their colleagues by thinking of themselves as infected and their feelings of an obligation to stay healthy in terms of providing care for patients.

The mean Compliance with Isolation Precautions Scale score of the nurses who responded as they "partially thought" that the COVID-19 pandemic cannot be controlled was significantly higher than those who responded as "I did not think so" ($p<0.05$, Table 4). It was considered that event the partial

thoughts of the nurses that the pandemic cannot be controlled increased their compliance with isolation precautions.

The mean Fear of COVID-19 Scale score of those who stated they "thought" that the COVID-19 pandemic cannot be controlled was the highest ($p<0.05$, Table 4). It was thought that the thoughts of the nurses that the pandemic cannot be controlled increased their fear.

The mean Fear of COVID-19 Scale score of those who responded as "fear" regarding their emotional status during the pandemic process was significantly higher in comparison to the other groups ($p<0.05$, Table 4). The moderate levels of the scores in the Fear of COVID-19 Scale and the finding that the most frequently felt emotion was fear were important in terms of showing the consistency of the study's data.

5. Conclusions

Consequently, this study showed a significant relationship between fear of COVID-19 and compliance with isolation precautions. As the fear of COVID-19 in the nurses increased, their compliance with isolation measures also increased. COVID-19 is a highly contagious disease. Nurses, who spend more time with patients by staying in the frontlines of the COVID-19 pandemic, are at great risk in terms of transmission of infection. This is why isolation precautions and discussing and improving the factors that affect isolation precautions are vitally important for nurses. Moreover, accurate and regular updates of information regarding COVID-19 may increase the compliance of nurses with isolation precautions by reducing unknowns about COVID-19.

The compliance to Research and Publication Ethics: This work was carried out by obeying research and ethics rules.

Ethical procedures: This work was approved by Necmettin Erbakan University Meram Medicine Faculty Research Ethics Committee. Approval number and date: 2020/2624; June 19, 2020.

Conflict of Interests: The authors declare that there is no conflict of interest.

Authors' contributions: The conception and design of the study HA %70 and AC % 30, data collection, data analysis, and interpretation HA %50 and AC % 50, drafting of the article interpretation HA %50 and AC % 50, critical revision of the article; HA %70 and AC % 30.

All authors read and approved the final manuscript.

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