Health Beliefs and Compliance of Standard Precautions of COVID-19 among Employed Nurses

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ABSTRACT

Aims The adherence to standard precautions guidelines as the main strategy for preventing healthcare-associated infections such as COVID-19. This study aimed to specify a health belief model to predict the standard precautions of employed nurses.

Instruments & Methods This descriptive cross-sectional was conducted in Qom, Iran, from March to May 2020. One hundred and ninety-five randomly sampled registered nurses from two hospitals completed self-reported compliance with standard precautions of COVID-19 and health belief model scale. Data analysis was performed using partial least squares path modeling.

Findings Less than one-tenth (7%) of participants reported compliance with all standard precautions items. There was a significant relationship between health motivation and standard precautions (β=0.515, t=13.650). Cues to action (β=0.356, t=4.512) were identified as the strongest predictor of health motivation and, perceived threat (β=0.143, t=2.144) was the weakest predictor. The model explained approximately 20% of the variance in compliance with standard precautions of COVID-19.

Conclusions Regarding the various factors associated with the violence perpetrated by pregnant women against their husbands, it is important to consider the appropriate psychological and educational interventions in prenatal care services to reduce the severity and frequency of violence by pregnant women against men, after providing solutions to involve men to identifying the effective factors.

Keywords Standard Precautions; Compliance; Health Belief Model; COVID-19; Nurses

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Introduction

Nowadays, the spread of infectious diseases is known to be a global concern for the health of life. To witness an example, Coronavirus disease 2019 (COVID-19) has become pandemic [1]. Iran is one of the countries with the highest incidence [2]. According to the World Health Organization (WHO), In Iran (the Islamic Republic of), from January 3, 2020, to March 21, 2021, there have been 1,793,805 confirmed cases of COVID-19 with 61,724 deaths [3].

The widespread and rapid transmission of the disease has led the WHO to declare an "international public health emergency" State. The virus is transmitted through direct contact with the infected person's respiratory droplets (through coughing and sneezing) and contact with infected surfaces and can survive for hours on the surface [4, 5].

Although there is a possibility of occupational accidents in all health care provision environments, the hospital is the main and most hazardous to the health care worker in terms of occupational diseases in health systems [6, 7]. Also, the close and continuous exposure of health care workers, including nurses, to patients and infected levels increases the risk of disease and mortality [8, 9]. Therefore, programs to control and prevent infection are essential for the health of nurses and prevent the spread of pathogens and diseases that can be transmitted to them [10, 11]. To this end, the WHO and the Centers for Disease Control and Prevention have introduced regulations as standard precautions (SPs) [12, 13]. SPs include hand and respiratory hygiene measures, use of personal protective equipment, control and prevention of infections, timely and appropriate treatment, and minimization of complications [14-16]. As a fundamental part of nurses' performance, paying attention to these principles and measures will protect their health in any situation, especially when caring for patients.

Seen in several studies is the status of SPs among health care workers and nurses having been reported to be poor [9, 13, 16]. Also, the effect of factors such as perceived barriers, knowledge of SPs, health beliefs on the standard of care of health care workers, including nurses, has been emphasized [9, 12, 17]. Tsai *et al.* reported that knowledge of COVID-19 and the health belief model (HBM) constructs improved behavioral intention to prevent the spread of COVID-19 among nursing students [18]. Wong *et al.* reported that the level of adherence of the SPs was positively associated with the satisfaction on infection control and prevention policy among healthcare workers [19]. The health belief model helps to understand preventive behaviors and can be used in occupational diseases training programs [9, 20]. According to this model, people react appropriately to health messages and disease prevention when exposed to a real risk (perceived sensitivity), which is very serious for them (perceived severity). Behavior change has many benefits for them (perceived benefits), and they

can remove existing barriers to perform health behaviors (perceived barriers). Of other constructs of this model, self-efficacy also means judging one's abilities to perform practice and a guide to practice which are considered to be accelerating forces that cause a person to need to perform practice and are, in fact, stimuli that affect the person from the inside and lead them to perform health behavior [21].

Given that no research has been done on nurses' beliefs and health care standards of COVID-19 in nurses, the study results can be effective in developing appropriate educational interventions to increase nurses' compliance. The purpose of the study was to determine the factors affecting SPs of COVID-19 in nurses of Qom educational hospitals based on the HBM.

Instrument and Methods

This descriptive cross-sectional study was carried out on all nurses at the different wards of the two Qom University Hospitals that were the care center of the COVID-19 patients during the period from March to May 2020. There are twenty-eight wards that ten wards were chosen randomly. Participants (n=610) were selected based on the following inclusion criteria: over one year of working experience in a hospital department and be willing to cooperate in the study. Sample size estimation using the sample size formula was 269 base on z: 95% = 1.96; P=0.5 and d= 0.03.

A questionnaire was used in multi sections as follows:
1. Socio-demographic variables include age, sex, educational status, job title, years of experience, history of infection with COVID-19, type of warts, and standard precaution training.
2. Compliance with SPs practices was determined using questions related to Practices of health care workers on SPs. The questionnaire was developed based on the Centers for Disease Control and Prevention guideline on infection control. It includes nine items related to SPs of COVID-19, including hand hygiene, using personal protective equipment, airborne, droplet, and contact precautions. Participants were asked to indicate how much each item they do in caring for their patient. Rating questioners were included from 1 (never) to 4 (always). An average of all item scores was computed after the completion of the questionnaire. The Content validity of the questionnaires was confirmed using the viewpoints of five health education experts. The internal consistency coefficient was 0.91, indicating a good range of reliability.
3. A health belief questionnaire used to assess health beliefs and perceptions about SPs of COVID-19. It was compiled of 26 items and seven subscales as follows: susceptibility with three items (e.g., I am at risk for COVID-19), perceived Seriousness with three items (e.g., COVID-19 can cause death), perceived benefits with two items (e.g., I help my family's health by adherence to SPs of COVID-19), perceived barriers

with four items (e.g., adherence to SPs of COVID-19 is difficult), perceived self-efficacy with three items (e.g., I can consider SPs of COVID-19 correctly despite the limitation), cues to action with four items (e.g., My colleagues encourage me adherence to SPs of COVID-19), and health motivation (intention) with seven items (e.g., I plan to attend training courses to learn more about SPs of COVID-19). These items were measured using a 5-point Likert scale (1 strongly disagree and five strongly agree). The scores of each subscale were obtained by the average computed as the sum of items of it. The Content validity of the questionnaires was confirmed using the viewpoints of five health education experts. The reliability of the scale was assessed by calculating internal consistency. The Cronbach's alpha ranged from 0.71 for perceived health motivation to 0.90 for perceived self-efficacy, indicating a good range of reliability.

This research was confirmed by the ethics committee of Qom University of Medical Sciences. Ethical considerations were considered in the study. The study's objectives were explained to the participants, and they were assured that all the personal information would be confidential. Informed consent was obtained from the participating nurses.

Statistical analyses were completed using the Partial Least Square (PLS) software version 3. Structural modeling was applied to analyze the model's predictive relevancy and the relationships between the SPs and HBM constructs. The key standards for evaluating the structural model are the R square, Path coefficient (β) and T-statistic value, and goodness of fit (GoF) index. R square corresponds to the degree of explained variance of dependent variables while β values the strength of an effect from the dependent construct variables. The greater the significant Path coefficient, the more the substantial effect on the dependent variables [22]. The GoF index was calculated to display the model fit to the data. The GoF values lie between 0 and 1, where values of 0.10 (small), 0.25 (medium), and 0.36 (large) indicate the quality of the PLS path model [23]. Regarding the study's theoretical framework, HBM constructs, as independent variable adherence to SPs as a dependent variable were included in the model.

Findings

In total, 195 questionnaires were completed. The mean age of the nurses was 33.6±6.6 years (range, 22-51 years). The mean experience year of the participants as an employee nurse was 9.2±6.2 years (range, 1-28 years). Demographic variables were showed in Table 1.

In this study, 48.8% of responders had SPs behaviors less than average. 7% of nurses reported that they were "always compliant" with all SPs behaviors, 69.6% reported always wearing gloves, and 38.4% reported always cleaning shared patient care equipment before use.

The perception barriers (44.2%) and health motivation (78.8%, n=153) had the lowest and highest percentage of the mean from the maximum obtainable score among model structures, respectively. There was a significant correlation between SPs and some constructs of HBM model, including a perceived barrier, cues to action, self-efficacy, and health motivation (Table 2).

Table 1) Demographic characteristics of the study sample (n=195)

Variable	Number	Percent
Age (year)		
<30	71	36.4
30-44	113	58.0
≥45	11	5.6
Gender		
Female	159	80.0
Male	39	20.0
Job title		
Nurse	170	87.2
Head nurse	9	4.6
Nursing supervisor	16	8.2
Educational background		
Associate	9	4.6
BSc	170	87.2
MSc	16	8.2
Years of experience		
<10	97	49.7
≥10	98	50.3
Type of warts		
Emergency	47	38
Intensive care	63	44
Internal	33	18
surgical	48	25
hemodialysis	27	13
Infected	18	6.4
Operating room	22	9.6
other	25	20
Standard precaution training		
Yes	151	77.4
No	44	22.6
History of infected with COVID-19		
Yes	21	14.8
No	174	89.2

Table 2) Mean, SD, percentage, range of scores of HBM constructs, and correlation coefficients with standard precautions

Constructs	Mean (SD)	rang	Percentage [a]	Pearson's correlation
Perceived susceptibility	12.18 (1.79)	3-15	76.5	0.064
Perceived severity	12.26 (2.03)	3-15	77.5	0.133
Perceived benefits	8.89 (1.13)	2-10	49.2	0.125
Perceived barriers	8.30 (2.14)	3-15	44.2	-0.267*
Perceived self-efficacy	10.18 (2.23)	3-15	59.8	0.221*
Cues to action	16.00 (2.12)	4-20	75.0	0.313*
Health motivation	8.32 (1.18)	2-10	78.8	0.441*
Standard precautions	31.01 (3.83)	9-36	81.5	-

Note. [a] percentage of the mean from the maximum obtainable score; *p<0.05

Table 3 and Figure 1 provide the results of the structural model. The model explains 20% of the variance in the adherence to SPs as the dependent variable. R square for health motivation is 0.515, that 51.5% of the variance of health motivation can be explained by other constructs.

Table 3) Path analysis of standard precautions model (n=195)

Constructs	Path confidence	t-value	p values
Motivation -> Standard precautions	0.442	6.546	0.000
Perceived threat -> susceptibility	0.806	41.062	0.000
Perceived threat -> severity	0.899	24.659	0.000
Perceived threat -> Motivation	0.143	2.144	0.033
Perceived benefits-> Motivation	0.225	3.162	0.002
Perceived barriers-> Motivation	-0.160	2.359	0.019
Perceived self-efficacy-> Motivation	0.232	3.078	0.002
Cues to action-> Motivation	0.356	4.512	0.000

Figure 1) Structural equation modeling of standard precautions

Table 3 shows the path coefficients and T-statistics values of the construct were presented. Health motivation (β=0.515, t-value=13.650) was associated with adherence to SPs. Also, significant relationships were observed between all constructs with Health motivation. The cues to action construct had the highest path coefficient of β=0.356, which showed a greater value of variance and high effect about affecting the health motivation. Whereas the

perceived threat construct factor had the least effect on health motivation with β=0.143.

Table 4 shows the GoF calculation. It was calculated that the GoF index for the study model was obtained as 0.55, which shows that the data model fit was satisfactory.

Table 4) Goodness-of-Fit index calculation

Construct	AVE [a]	R square
Perceived susceptibility	0.537	0.650
Perceived severity	0.540	0.808
Perceived benefits	0.780	-
Perceived barriers	0.480	-
Perceived self-efficacy	0.478	-
Cues to action	0.540	-
Motivation	0.761	0.515
Standard precautions	0.437	0.195
Average Values	0.569	0.542
GOF [b]=$\sqrt{(AVE \times R^2)}$	0.555	-

Note. [a] AVE: average variance extracted, [b]GOF: goodness of fit

Discussion

In the present study, the focus was on the role of HBM constructs in complying with the SPs of COVID-19 in nurses of Qom educational hospitals. In this regard, the results showed that the constructs of the HBM could act as a predictor of adherence to SPs in nurses. According to the study, health motivation was the strongest predictor of nurses' SPs. This means that the more motivated people are to follow these principles, the more likely they will follow them. In this regard, Barati *et al.* also emphasized the role of motivation as a strong predictor of protective behaviors [24, 25].

The present study also found that the constructs of the HBM predicted health motivation. The practice guide construct was identified as the strongest predictor of motivation to adherence to SPs of COVID-19. Assigning the highest score to the guideline structure shows that nurses seek information from internal and external guidelines to increase their motivation to adhere to SPs and maintain their health. Some studies have introduced the practice guideline as an important and effective factor in performing preventive behaviors [26].

The perceived threat had the least impact on nurses' motivation to adherence to SPs. This suggests that nurses' understanding of the risk of developing COVID-19, less than other constructs of the HBM, increases their motivation to engage in protective behavior. In contrast to the present study, Sharifirad *et al.* [27] reported fear structure among other constructs of HBM with the highest predictive power of behavior. Also, in Jiang's research, the perceived threat to SARS preventive behavior was the most important predictor of behavior [28]). Barati *et al.* also noted a significant positive correlation between motivation and perceived threat [24]. The discrepancy between the findings of these studies and the present study is likely to be related to the differences in awareness and training provided in different environmental and target groups. In addition, the
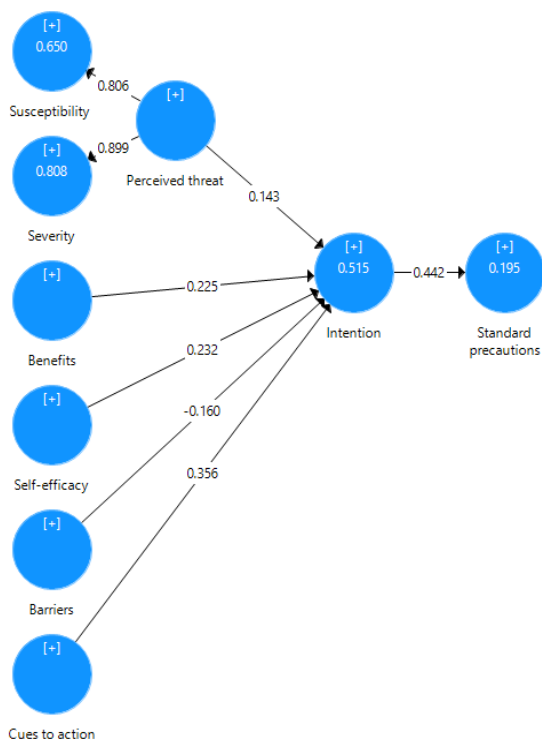
rate of perceived severity of individuals was higher than the perceived sensitivity. This confirms that the nurses in question considered the COVID- 19 disease very dangerous but found themselves less at risk. The present study results were different from those of a study by Rahmati *et al.* [29] on the subjects who had more perceived sensitivity than the perceived intensity in the study. When not taken seriously, the threat of disease reduces people's motivation to take protective measures and their superficial assessment of the effectiveness of the recommended strategies. This finding was consistent with the results of some studies [17, 26]. In the study of Tsai *et al.,* there was a significant relationship between perceived susceptibility and perceived severity with behavioral intention to prevent COVID-19 [18]. Wong *et al.* shown satisfaction with infection control and prevention policy would increase SPs adherence among the high-risk group [19].

There was seen to be a significant relationship between self-efficacy and nurses' motivation to observe SPs. That is, nurses who are perceived to follow the principles of SPs are more likely to apply the principles of protection. The findings of the present were consistent with other studies [17].

In the present study, benefits were significantly associated with health motivation. As the benefits increased, so did the incentive for nurses to compliance with SPs, in line with the results of some studies [26, 29] that identified perceived benefits as predictive of health behaviors. A significant negative association was also observed between perceived barriers and health motivation. This finding is consistent with that of Masoudi *et al.* study [17]. In another study, demographic background, knowledge of COVID-19, HBM constructs explained 58.1% of the variance in behavioral intention among nursing students [18].

There are several limitations in the present study. One of the limitations was that to evaluate the performance of nurses, a self-reported questionnaire was used, and it was not possible to observe and control the SPs objectively. Another limitation was the low response rate of the participants and the lack of cooperation in completing the questionnaire, which should be used with caution in generalizing the results to the target group.

Conclusion

The present study demonstrates that The HBM predicted changes in adherence to SPs of COVID-19 in nurses the constructs of cues to action and self-efficacy, had the greatest relationship with health motivation and adherence to SPs of COVID-19 among nurses. These results can help develop appropriate interventions to improve adherence to SPs and Infection prevention in medical staff.

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