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COVID-19 vaccination intention among healthcare workers in Vietnam

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ABSTRACT

Objective: To assess the acceptance of coronavirus disease (COVID-19) vaccine among healthcare workers at two general hospitals in Vietnam when it is available.

Methods: A cross-sectional study was conducted using a convenience sampling from January to February 2021 among 410 healthcare workers at two general hospitals in Vietnam *via* a self-administered questionnaire. A multivariable regression analysis was performed to determine predictors of vaccine acceptance including the demographic factors, COVID-19 knowledge, and vaccine beliefs based on the domains of Health Belief Model.

Results: Among 410 healthcare workers, 76.10% showed vaccination willingness. Predictors of acceptance were determined that the group reporting as “vaccine acceptance” was more likely to be positive towards the perceived susceptibility and severity of COVID-19 (*OR* 2.45; 95% *CI* 1.48-4.06, *P*<0.05), perceived benefits of vaccination, and cues to action (*OR* 4.36; 95% *CI* 2.35-8.09, and *OR* 5.49; 95% *CI* 2.84-10.61, respectively, all *P*<0.001), but less likely to have the perceived barriers to vaccination (*OR* 0.19; 95% *CI* 0.09-0.38; *P*<0.001) compared with the no acceptance group. Besides, people who had a good knowledge regarding the severity of illness were 3.37 times more likely to have identified as vaccine acceptance (*OR* 3.37; 95% *CI* 1.04-10.86, *P*<0.05). The demographic factors were also associated with willingness to receive the vaccine, with participants who were staff and received COVID-19 information from relatives were less likely to accept the vaccine over those who were doctors and not receiving information from relatives (*OR* 0.36; 95% *CI* 0.13-0.96, and *OR* 0.37; 95% *CI* 0.17-0.78, respectively, all *P*<0.05).

Conclusions: A rate of willingness to get vaccinated against COVID-19 was relatively high with discrepancies between occupation, receiving information from relatives, knowledge toward the severity of illness, and the elements of Health Belief Model. The findings will provide information for the management authorities to develop relevant interventions to promote COVID-19 vaccination uptake.

KEYWORDS: Acceptance; COVID-19; Healthcare workers; Intention; SARS-CoV-2; Vaccination

1. Introduction

Since its emergence, the ongoing coronavirus disease 2019 (COVID-19) pandemic has threatened all the aspects of life, globally. As of March 19, 2021, the virus was identified in 223 regions of the world with over 120 million confirmed cases, of which over 2.6 million deaths have been reported[1]. Until now, Vietnam has been ranked amongst one of the most successful countries in managing COVID-19 with 2 572 confirmed cases and 35 deaths since the beginning of the outbreak[2]. During this period, there were no specified treatments, so a set of strong interventions were applied, such as a lockdown, banning travel, isolation, closing schools and workplaces, limiting the size of gatherings, plus, the release of guidelines included intensive public health measures such as wearing of masks, washing hands regularly, cleaning surfaces and social distancing policies[3]. On the other hand, COVID-19 has devastated the healthcare facilities even in some well-resourced nations, and healthcare workers are at high risk of infection because they constantly expose to patients with SARS-CoV-2. It is estimated that at least 20% of healthcare providers have been diagnosed with the virus, so protecting them from infection plays an important role, not only for themselves but also the preservation of healthcare

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resources[4]. Previously, influenza vaccination has been recognized as the most efficient method of preventing outbreaks and reducing morbidity and mortality, especially for healthcare workers[5]. No doubt, the introduction of a safe and effective vaccination is just one of the required urgent responses needed during this pandemic, which is suggested to mitigate the possibility of infection and control the pandemic. As of 18 February 2021, WHO listed at least seven different vaccines that have been dispensed in a number of countries and healthcare workers (HCWs) are nominated as the highest priority for vaccination. Also, more than 200 additional vaccines are currently under development, of which more than 60 are currently in clinical trials[6]. In Vietnam, the government has ordered about 5 million doses of the vaccine available through the COVID-19 Vaccines Global Access Program as well as other commercial sources. Besides, the production of vaccines made in Vietnam is progressing and is currently in phase III trials, which is intended to vaccinate the entire population. The vaccination campaigns are expected to begin in the first quarter of 2021 with the highest-risk groups, including healthcare practitioners, being offered the first vaccinations[7]. As a result, achieving high vaccination coverage of healthcare workers early not only ensures an adequate workforce to treat infected patients, but also allows medical authorities to share their positive vaccination experiences with patients and their family members, so as to encourage vaccine uptake to achieve herd immunity to the COVID-19, which is estimated to be 67.0%[8]. Nevertheless, some concerns are presented about the newness and safety of the vaccine, as well as[9] vaccine hesitancy, are likely to impair the effectiveness of the roll-out of the COVID-19 vaccine programs[10]. The findings of some studies that assessed the acceptance of vaccines amongst HCWs showed that the proportion differed from areas where the prevalence was 73.9% in the European population but only 40% and 27.7% in Hong Kong and Congo, respectively[9,11,12]. Besides, some elements including the costs and attitude of a vaccine as well as misinformation or misperceptions that may influence the intention[13]. The Health Belief Model is a useful framework to predict intention and beliefs regarding previous immunization[14,15]. The model assesses four aspects including perceived susceptibility and severity, perceived benefits, perceived barriers, and cues to action. Therefore, it is crucial to further investigate the willingness to be vaccinated and to understand beliefs towards the COVID-19 vaccine among healthcare workers to devise some strategies in order to have a positive and seamless vaccination role out plan for COVID-19.

2. Subjects and methods

2.1. Participants and survey design

A cross-sectional study was conducted by using a convenience sampling from January to February 2021 among 410 HCWs at two general hospitals in Vietnam, where they did not directly care for patients with COVID-19. Data was collected *via* a self-administered

questionnaire which addressed: (1) demographical characteristics, (2) knowledge about COVID-19, (3) 12-item beliefs towards vaccination developed based on the Health Belief Model, and (4) intent to get a vaccine against COVID-19 when it's available.

2.2. Measures

Nine items for assessing COVID-19 knowledge were introduced in our prior research with Cronbach's alpha of 0.60 in the current sample[16]. Response options ranged from 0 (no correct answer) to 1 (correct answer) for each. The total knowledge score was calculated by the sum of 9 items. Beliefs towards vaccination were assessed by using the 12-item scale based on four subscales of Health Belief Model based on previous study[17] including the perceived susceptibility and severity of COVID-19 illness (4 items), perceived benefits (3 items) and barriers (3 items) of vaccination, and cues to action (2 items) to which the internal consistency of the questionnaire in the current study was good (Cronbach's alpha of 0.77). Responses were evaluated on a five-point Likert scale ranged from 1 "strongly disagree" to 5 "strongly agree". Acceptance of the COVID-19 vaccination was measured using one item each ("do you think you will get a COVID-19 vaccination when it's available"). Response option ranged from 0 (no agree) to 1 (agree).

2.3. Statistical analysis

All data was calculated using STATA version 14.0 software. The descriptive analysis reported the frequencies (percentages) and mean scores (standard deviation). The *chi*-square test and *t*-test were used to analyze the relationship between the dependent (intent to get a COVID-19 vaccine), and independent variables (demographic characteristics of the participants, COVID-19 knowledge, beliefs towards vaccination) in the univariate analysis, all variables that were significant at $P < 0.05$ were then considered in a multivariable regression model. Odds ratios (*OR*) with corresponding 95% confidence intervals (*CI*) were reported for each independent variable. $P < 0.05$ was defined as a statistically significant difference.

2.4. Ethics approval

All participants agreed and signed the consent form before taking part in the survey. Ethical approval for the study was obtained from the University of Medicine and Pharmacy at Ho Chi Minh City review board with the number 27/UMP- BOARD.

3. Results

3.1. Demographic characteristics of participants

Demographic characteristics of participants were presented in Table 1. Four-hundred and ten HCWs (410/854; 48.0%) participated in the survey and returned the questionnaire with a mean age of

Table 1. Demographics and COVID-19 vaccine acceptance.

Variables	Overall [n (%)]	Acceptance to get COVID-19 vaccination [n (%)]		Chi-square or t-value	P-value
		Yes [312 (76.10)]	No [98 (23.90)]		
Age (mean±SD)	39.33±9.31	39.20±9.50	39.73±8.69	0.49	0.622
Gender					
Male	128 (31.22)	94 (73.44)	34 (26.56)	0.72	0.395
Female	282 (68.78)	218 (77.30)	64 (22.70)		
Occupation					
Doctor	70 (17.07)	48 (68.57)	22 (31.43)		
Nurse	146 (35.61)	122 (83.56)	24 (16.44)		
Technical	48 (11.71)	42 (87.50)	6 (12.50)	28.17	<0.001
Paramedic	68 (16.59)	56 (82.35)	12 (17.65)		
Staff	78 (19.02)	44 (56.41)	34 (43.59)		
Source of COVID-19 information					
Television	324 (79.02)	260 (80.25)	64 (19.75)	14.62	<0.001
Social media	348 (84.88)	258 (74.14)	90 (25.86)	4.86	0.028
Website of hospital/Ministry of Health	308 (75.12)	242 (78.57)	66 (21.43)	4.17	0.041
Relatives	202 (49.27)	144 (71.29)	58 (28.71)	5.07	0.024

Table 2. Associated factors between knowledge and acceptance COVID-19 vaccine.

Knowledge	Correct knowledge (N=410)	Acceptance to get COVID-19 vaccine [n (%)]		Chi-square or t-value	P-value
		Yes 312 (76.10)	No 98 (23.90)		
Pathogen (virus)					
Yes	400 (97.56)	304 (76.00)	96 (24.00)	0.086	1.000
Transmission route of COVID-19 (close contact with the infected person, respiratory droplets and airborne)					
Yes	262 (63.90)	192 (73.28)	70 (26.72)	3.16	0.075
Common symptoms (fever, dry cough and shortness of breath)					
Yes	346 (84.39)	270 (78.03)	76 (21.97)	4.57	0.032
The isolation period if suspected infection (14 days)					
Yes	342 (83.41)	254 (74.27)	88 (25.73)	3.79	0.052
Vaccine is available in Vietnam					
No	214 (52.20)	148 (69.19)	66 (30.84)	11.85	0.001
Specific treatment					
No	322 (78.54)	242 (75.16)	80 (24.84)	0.73	0.392
Preventive measures for COVID transmission (Wear facemask, hand washing, surfaces cleaning and keep distance to others)					
Yes	360 (87.80)	278 (77.22)	82 (22.78)	2.05	0.152
People with chronic illness and elderly are at high risk					
Yes	354 (86.34)	272 (76.84)	82 (23.16)	0.78	0.378
COVID-19 can be fatal					
Yes	386 (94.15)	300 (77.72)	86 (22.28)	9.55	0.002
Overall knowledge score (mean±SD)	7.28±1.56	7.24±1.47	7.41±1.82	0.91	0.361

(39.33±9.31) years. Two-hundred and eighty-two (282, 68.78%) of respondents were women, around one-third of them (146, 35.61%) are nurses. Most of them reported receiving COVID-19 information including social media (348, 84.88%), television (324, 79.02%), and website of hospital/ministry of health (308, 75.12%). Among the HCWs, 76.10% answered that they had the intention of being vaccinated the COVID-19 vaccine when it is available, compared with 23.90% who were unwilling. A significant difference between the groups of intention to get vaccination was found for the occupational groups and source of COVID-19 information ($P<0.05$) on the univariate analysis.

3.2. Knowledge about COVID-19

Knowledge about COVID-19 was displayed in Table 2. The majority of participants had good knowledge regarding pathogens (400, 97.56%), common symptoms including fever, dry cough and shortness of breath (346, 84.39%), the isolation period if suspected

infection (342, 83.41%), treatment (322, 78.54%), preventive measures for transmission (360, 87.80%), subjects at high risk of infection (354, 86.34%), and the severity of illness (386, 94.15%).

A slightly lower knowledge rate, (262, 63.90%), and (214, 52.20%) identified the transmission route of COVID-19 and available vaccine for all people, respectively. The total knowledge score was (7.28±1.56) (0-9). On the univariate analysis, there were significant differences between the groups of intention to get vaccination and knowledge about COVID-19 including the availability of a vaccine, and the severity of illness, with all $P<0.05$.

3.3. Beliefs and intention to get a vaccination against COVID-19

Results from the multiple regression model predicting determinants for intention to vaccinate with the COVID-19 vaccine are presented in Table 3. Significant differences were observed between the groups of willing and unwilling participants to vaccinate in all four subscales

Table 3. Multivariable logistic analysis of factors associated with acceptance COVID-19 vaccine.

Variables	Univariate analysis		Multivariable logistic regression	
	OR (95% CI)	P	OR (95% CI)	P
Occupation				
Doctor	Ref	-	Ref	-
Nurse	2.33 (1.19-4.54)	0.013	1.93 (0.77-4.92)	0.168
Technical	3.21 (1.19-8.66)	0.021	0.94 (0.28-3.17)	0.919
Paramedic	2.14 (0.96-4.77)	0.063	0.88 (0.31-2.49)	0.811
Staff	0.59 (0.30-1.16)	0.129	0.36 (0.13-0.96)	0.042
Source of COVID-19 information				
Television (yes vs. no)	2.66 (1.59-4.43)	<0.001	1.19 (0.52-2.72)	0.668
Social networks (yes vs. no)	0.42 (0.19-0.93)	0.031	0.34 (0.11-1.10)	0.072
Website of hospital/Ministry of Health (yes vs. no)	1.67 (1.02-2.76)	0.042	1.77 (0.77-4.06)	0.175
Relatives (yes vs. no)	0.59 (0.37-0.94)	0.025	0.37 (0.17-0.78)	0.009
Knowledge				
Vaccine is available in Vietnam (yes vs. no)	0.44 (0.27-0.71)	0.001	0.60 (0.32-1.14)	0.121
COVID-19 can be fatal (yes vs. no)	3.49 (1.51-8.04)	0.003	3.37 (1.04-10.86)	0.042
Beliefs towards vaccination				
Perceived susceptibility and severity	2.94 (2.05-4.23)	<0.001	2.45 (1.48-4.06)	0.001
Perceived benefits	4.29 (2.74-6.72)	<0.001	4.36 (2.35-8.09)	<0.001
Perceived barriers	0.69 (0.45-1.05)	0.083	0.19 (0.09-0.38)	<0.001
Cues to action	3.97 (2.53-6.22)	<0.001	5.49 (2.84-10.61)	<0.001

of vaccination beliefs (susceptibility and severity, benefits, barriers of vaccination, and cues to action), and knowledge regarding the severity of illness (all $P < 0.05$). The group nominating to receive the vaccine was more likely to have positively perceived susceptibility and severity of illness (OR 2.45; 95% CI 1.48-4.06, $P < 0.05$), perceived benefits of vaccination, and cues to action (OR 4.36; 95% CI 2.35-8.09, and OR 5.49; 95% CI 2.84-10.61, respectively, all $P < 0.001$). Also, people who have a good knowledge regarding the severity of illness were 3.37 times more likely to report as “vaccine acceptance” (OR 3.37; 95% CI 1.04-10.86, $P < 0.05$). Conversely, the vaccine acceptance group was less likely to have the perceived barriers to vaccination (OR 0.19; 95% CI 0.09-0.38; $P < 0.001$) compared with the unwilling group. The demographic factors were also associated with willingness to receive the COVID-19 vaccine, with participants who were staff and received COVID-19 information from relatives being less likely to accept the vaccine over those who were doctors and not receiving information from relatives (OR 0.36 95% CI 0.13-0.96, and OR 0.37; 95% CI 0.17-0.78, respectively, all $P < 0.05$).

4. Discussion

In this survey, we found that the prevalence of HCWs that intend to take up the vaccine when it is available was relatively high (76.10%) while there still be approximately one-fifth (23.90%) of the respondents showed to be vaccine-hesitant. This indicated that HCWs are probably more agreeable to getting vaccinated than other people because they are likely to be the huge affected by the health consequences of COVID-19[4]. These results corroborate the findings of Gagneux *et al.* who recorded 76.9% of the healthcare providers would accept a vaccine, however, the data differed from the study in Congo and Hong Kong ranging from 27.7% to 40%[11,18].

Moreover, the previous study showed that the acceptance vaccination proportionate against seasonal influenza and H1N1 among healthcare providers in Asia was low (37.4%) although they were at high risk of infection[19]. According to the influenza vaccination coverage rate, there was much higher coverage in Europe than in Asia and Africa, with a difference towards national vaccination policies and recommendations in most countries[20]. Several studies have shown that the willingness to receive vaccination may be different in various areas and different periods of the pandemic[21]. The other reason may be influenced by occupation and gender, being that nurses and women accounted for 35.61% and 68.78%, respectively, and found that these groups reported less acceptance to vaccination[10,22]. Furthermore, we found that the difference to accept the COVID-19 vaccination across occupations who were staff and they received COVID-19 information from relatives compared to who were doctors and not receiving information from relatives (OR 0.36 95% CI 0.13-0.96, and OR 0.37; 95% CI 0.17-0.78, respectively, all $P < 0.05$). These results are in line with those of previous studies recorded physicians were the highest intention and had a positive attitude regarding vaccine as well as who were the most important influencers of vaccine decision-making[23,24]. Some evidence suggested that correcting the misinformation from an individual comment, or on social media, may change health beliefs about vaccination[25]. Moreover, receiving information from relatives can lead to greater misconceptions about vaccines, and people may fear and doubt the vaccine efficacy. Therefore, public health campaigns should monitor and prevent the spread of fringe notions about a future COVID-19 vaccine before dangerous myths take root in the public psyche. Also, doctors will play an important role to encourage COVID-19 vaccination. Thus, strong physician recommendations can bolster public and individual support for a COVID-19 vaccine. They can share personal knowledge about

being immunized and immunizing with their family members or friends and relatives to encourage the vaccine uptake[26]. In terms of knowledge, (400, 97.56%) of the sample had good knowledge towards the pathogens, common symptoms including fever, dry cough, and shortness of breath (346, 84.39%), the isolation period if suspected of infection (342, 83.41%), treatment (322, 78.54%), preventive measures for transmission (360, 87.80%), persons at high risk of infection (354, 86.34%), and the severity of illness (386, 94.15%), with a mean score of (7.28±1.56). These results were higher compared to our previous study, which indicates that HCWs have improved their knowledge regarding the pandemic[16]. Moreover, there were significant differences between the groups of intention to get vaccination and knowledge about COVID-19 including the availability of a vaccine and the severity of illness, with all $P < 0.05$. Also, people who have a good knowledge regarding the severity of illness were 3.37 times more likely to be vaccine acceptance (OR 3.37; 95% CI 1.04-10.86, $P < 0.05$). Knowledge is one of the important factors that affects intention to receive the COVID-19 vaccination among HCWs. Therefore, HCWs should be updated with the latest information about COVID-19 through trustworthy channels of information including the website of Ministry of Health/Hospital, as well as training at workplace for all healthcare providers.

Another important finding was that significant differences were observed between the intention to get vaccinated and vaccination beliefs. The group of vaccine willingness was more likely to be positive towards the perceived susceptibility and severity of illness (OR 2.45; 95% CI 1.48-4.06, $P < 0.05$). These results are in accord with recent studies indicating that the perceived susceptibility and seriousness of vaccine-preventable diseases may contribute to a higher vaccine acceptance[27]. This may be because HCWs are involved in the treatment of patients so they consider themselves at a higher risk of infection over others not in this industry. Besides, the intention is also influenced by perceived benefits of vaccination, and cues to action (OR 4.36; 95% CI 2.35-8.09, and OR 5.49; 95% CI 2.84-10.61, respectively, all $P < 0.001$). These results are in line with Wong LP *et al's* survey, which showed that the perceived benefits of vaccination reduce the likelihood of infection (OR 2.51, 95% CI 1.19-5.26)[28]. Conversely, the vaccine acceptance group was less likely to have the perceived barriers to vaccination (OR 0.19; 95% CI 0.09-0.38; $P < 0.01$). A previous study showed that the variation of vaccine hesitancy depends on the potential vaccine characteristics and safety, and side effects of a vaccine were also essential factors towards being vaccinated, which accounted for 44.6% to 57.1%, respectively in Chen *et al's* study[10,29]. A previous survey also found that the side effects and safety of the influenza vaccination was the most common reasons for vaccine hesitancy[30]. Therefore, the provision of characteristics of COVID-19 vaccines (efficacy and risk of severe side-effects), as well as vaccination strategies (herd immunity target and place of vaccine administration) should be

released to the public to increase the acceptance rate.

The limitation of our study was the timing of the investigation at the beginning of the production of the vaccine in Vietnam, therefore HCWs' vaccination intentions maybe change over time with the new information. Nevertheless, the results presented in the survey can contribute to the start of a mass vaccination strategy as it draws nearer.

A rate of willingness to get vaccinated against COVID-19 was relatively high with discrepancies between occupation, receiving information from relatives, knowledge toward the severity of illness and the elements of Health Belief Model. The findings will provide information for the management authorities to develop relevant interventions to promote COVID-19 vaccination uptake.

Conflict of interest statement

The authors declare that there is no conflict of interest.

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Authors' contributions

All authors substantially contributed to drafting and revising the article, as well as the final approval of the version to be submitted. HG, PLA, and NTNH contributed to the conception and design of the study and acquisition of the data. HG and NTNH conducted the data analysis and HG, TTT, and PLA were the contributors to the interpretation of the data.

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