MERIT RESEARCH JOURNALS
www.meritresearchjournals.org

Merit Research Journal of Medicine and Medical Sciences (ISSN: 2354-323X) Vol. 11(5) pp. 119-129, May, 2023
Available online http://www.meritresearchjournals.org/mms/index.htm

DOI: 10.5281/zenodo.7974775

Original Research Article

Acceptance of Mandatory Influenza Vaccination among Saudi Primary Care Physicians

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Abstract

Acceptance of mandatory influenza vaccination requires an understanding of knowledge, and attitudes (KA). This study explored the KA and other co-variables influencing the acceptance of mandatory influenza vaccination among Saudi physicians working in primary care. A Cross-sectional study among Saudi physicians working at Wazarat primary health care center in Riyadh was conducted from Nov 2022 through Jan 2023. A convenience sample of 162 physicians was recruited and surveyed using a validated questionnaire. A total of 138 responded and completed the study. Univariate and multivariate analyses using SPSS version 22 were performed to assess associations between sociodemographic factors, KA, and acceptance of mandatory influenza vaccination. The response rate was 85%. While the age of 92% of the participants was < 36 years, 73.2% were males, and 34.1% were smokers. Only 67.4% of the participants accepted mandatory vaccination. Youngers, females, singles, postgraduates, and staff with no chronic disease had higher odds to accept the mandatory flu vaccine. On univariate analysis, physicians with better knowledge and good attitudes were more likely to accept the mandatory flu vaccination. On multivariate analysis, physicians with higher knowledge and attitude scores were more likely to accept the mandatory vaccination (adjusted odds ratio (aOR): 1.17; (95%CI 1.05, 1.31)). Acceptance of mandatory vaccination was negatively correlated with a declination of flu vaccination (*r*=-0.237, *P*=0.005) and positively with actual vaccination (*r*= 0.203, *P*=0.017). High levels ofgood attitudes towards and knowledge of influenza vaccination were associated with a high level of acceptance of mandatory flu vaccination. This study paves the way for more targeted initiatives including risk communication approaches to be implemented to improve acceptance of mandatory influenza vaccination rates.

Keywords: Acceptance, Influenza, Mandatory, Physician, Vaccination

INTRODUCTION

Influenza is a disease that not only impacts health, but also has social, and economic impacts (Rabensteiner et al., 2018). Annual flu epidemic affects between 5% to 15% of the world's population and causes up to 5 million serious cases and 250,000 to 500,000 deaths (Hulo et al., 2017). Healthcare Personnel (HCP) are an important group of professionals who may be exposed to biological risks at work as they come into contact with infected patients and contaminated objects (La Torre et al., 2017). So, information, training, and prevention are very important in this field (La Torre et al., 2017). Luckily, there are effective and safe vaccine to protect against flu

infection, and its use is based on evidence-based recommendations (Pearson et al., ND; Zeitouni et al., 2015). The influenza vaccine reduces both morbidity and mortality (Pless et al., 2017). Accepting and receiving the flu shots, compliance with the annual shot, and improving the uptakeare hard (Vaux et al., 2011).

The Center for Disease Control and Prevention (CDC)-Advisory Committee on Immunization Practices (ACIP) and the CDC-Healthcare Infection Control Practices Advisory Committee (HICPAC) in the USA advocate immunization of all at-risk HCP against influenza (Vaux et al., 2011). Despite that the overall coverage rate among HCP in the USA in season 2008-09 hardly reached 53% (Advisory Committee on Immunization Practices, Centers for Disease Control and Prevention, 2011). Therefore, the Infectious Diseases Society of America (IDSA) advocates mandatory influenza vaccination of all HCP (Infectious Diseases Society of America (IDSA), ND). The IDSA believes that mandatory vaccination is the most effective strategy to stop spreading influenza. The IDSA advocates a policy requiring influenza vaccination, besides continuing education about the disease and the vaccine. Furthermore, the IDSA believes that any refusal or hesitancy when the vaccine is made available and without medical reasons should be met with actions needed to protect the patients (Infectious Diseases Society of America (IDSA), ND).

In 2014, experts from 29 European countries revealed that only 5.5% of vaccination were mandatory (Galanakis et al., 2014). However, none of the 29 countries adopted a policy that made vaccination against influenza mandatory (Galanakis et al., 2014). InItaly, recommending the influenza vaccine and mandating the HB, varicella, and MMR vaccines were reflected in low influenza vaccine uptake, high HB vaccine uptake, and high immunity against MMR and varicella among HCP (Prato et al., 2010). Moreover, while most HCP were willing to accept mandatory HB vaccination, few accepted mandating flu vaccine (La Torre et al., 2017; Maltezou et al., 2011). Furthermore, despite being named by 89% of the HCP as one of the recommended vaccines in Italy, the influenza vaccine was less acceptable than the MMR and varicella, which were named as recommended vaccines by less than 50% (Riccò et al., 2017).

Similarly, the strict and enforced recommendation of HB vaccine for HCP in Croatia since 2002 led to a coverage rate of 98% (Wicker and Maltezou, 2014). On the other hand, while coverage of more than 80% with the flu vaccine is needed to produce a protective immunity, flu vaccination coverage in Croatia hardly reached 36% despite earlier recommendation (Wicker and Maltezou, 2014). However, some countries that implemented mandatory influenza vaccination for HCP achieved coverage of 95% (Wicker and Maltezou, 2014). In Greece, in 2011, most HCP agreed to mandatory vaccination, especially physicians, although varied greatly by disease. In 2009, in France, the national survey revealed a vaccination uptake among HCP for mandatory vaccines like HB of >90% (Guthmann et al., 2009). On the other hand, coverages for non-mandatory vaccines like influenza were <30% (Guthmann et al., 2009).

Innovative strategies may not achieve the desired success, and mandatory vaccination should be considered (Brondi et al., 2013; Chean et al., 2014). Mandatory vaccination with declination statements improved vaccination uptake rates among HCP (Haviari et al., 2015; Maltezou and Poland, 2016; Maltezou et al., 2012). Influenza is of public health concern in Saudi Arabia and there have been so many outbreaks in recent years. The Saudi Thoracic Society (STS) and the Scientific Committee for Influenza and Pneumococcal Vaccination (SCIPV) have made it clear that HCP should get the flu vaccine every year (Zeitouni et al., 2015). Therefore, since 2017 the Saudi Ministry of Health (MOH) required all HCP to get the flu shot every year (Zeitouni et al., 2015). The 2017 Infection prevention and control guidelines from the Saudi MOH and the Advisory Committee on Immunization Practices both included mandatory influenza vaccination of all HCP. Aside from that, all HCPs can get the vaccine for free.

Several studies have found that HCP in different parts of the world, including Saudi Arabia, are hesitant, don't know enough about the flu vaccine, hold misconceptions about the flu and its vaccine, and don't accept the vaccine (Hollmeyer et al., 2009). Despite deficient knowledge about vaccination noticed among healthcare students in Athens, Greece, 96.7% preferred mandatory vaccination (Karageorgou et al., 2014). Moreover, Dutch HCP working in a nursing home who believed that they are at more risk, trust the vaccine effectiveness, and accept mandatory vaccination were more likely to vaccinate (Looijmans et al., 2009). In his recent study in Saudi Arabia, Alshammari et al., 2019, found that 67.6% of the HCP who took part in the study were vaccinated (Alshammari et al., 2014). Most HCP (84.1%) thought that the flu shot could prevent the flu. Also, about 75% thought that HCP might be more likely to get influenza than other people. Most of the respondents, (89.6%), could recognize the signs and symptoms of influenza. HCP were more likely to get the flu shot if they thought that getting vaccinated would keep them from getting the flu, if they knew that the SCIPV made a recommendation, and if they perceived that the flu shot is accessible. Fifty-eight percent of those who hesitated the vaccine were worried about the safety of vaccines. While 42.3% believed that they can get the flu from the vaccine, 50.5% held wrong ideas about the symptoms of the flu (Alshammari et al., 2014).

In 2008, United States (US), a healthcare organization mandated the influenza vaccination for its staff to improve the coverage rate, allowing for restricted exemptions only (Buchan and Kwong, 2016). At the end, 98.4% of the

staff vaccinated, 1.3% exempted, and the remaining terminated (Buchan and Kwong, 2016). On the other hand, while only 29% of those hesitated the mandatory vaccination thought that they are at higher risk, 51% of the acceptors did (Buchan and Kwong, 2016). In another experience from US, from 2005 to 2010, a medical center, required every HCP to receive the seasonal influenza vaccine (Rakita et al., 2010). Exempted HCP were required to wear a facial mask. While 97.6% of the 4,703 HCP vaccinated in 2005, the rate reached and stayed at more than 98% for the next four years (Rakita et al., 2010). On the other hand, while less than 0.7% of HCP worn a mask during the flu season, very few numbers of HCP left the work at the center (Rakita et al., 2010).

Furthermore, in 2009, in US,70% of the staff in a children's hospital accepted mandatory influenza (Douville et al., 2010). While 94% of those accepted mandatory vaccination found vaccinated, only 55.6% of those refused it found vaccinated (Douville et al., 2010). Although both groups perceived influenza as a serious disease, HCP who accepted mandatory vaccination were more likely to perceive the vaccine as safe (Douville et al., 2010). In the year 2010, only 57.4% of studied HCP in USbelieved that HCP should be vaccinated against seasonal flu (McKee, Bohannon, 2016). Vaccination acceptance was higher among HCP whose employers required them to get a flu shot, who perceived flu as a serious disease, and who perceived the flu shot as safe and effective (McKee, Bohannon, 2016).

A cross-sectional study in US targeted the flu seasons from 2008/2009 to 2013/2014 revealed a vaccination rate of 26.4% during the 2013-2014 season (Reiter et al., 2009). While 12.5% of the HCP vaccinated all through the six seasons, 48.4% never vaccinated during the six seasons. Reasons behind vaccine hesitancy included vaccination declination, doubting vaccine protective effectiveness and safety, and fearing side effects. Although 79.3% of the participants believed that influenza transmission occurs in healthcare facilities, 64.4% of them refuse the idea of mandating the vaccine (Reiter et al., 2009). In 2017, a qualitative study carried out in Switzerland revealed that HCP, especially the nurses, were not happy with mandating the flu vaccine despite working with vulnerable patients. They accepted flexible mandatory vaccination as when signing a declination form was an option (Gualano et al., 2021).

A high rate of immune HCP would protect people who cannot be vaccinated or will not benefit from it, and would also maintain work fluency. Therefore, mandatory vaccination policy could be easily advocated among HCP with positive attitudes. However, optimizing HCP vaccination is not easy; for instance, mandatory vaccination policies are ethically controversial (Galanakis et al., 2013). Mandatory vaccination of HCP imposes a debate about the limit of the boundaries of governments or institutions to force HCP to vaccinate to protect the patients (Stewart, 2015). Moreover, HCP think that mandatory vaccination breaches their rights and might go further and sue the institution (Stewart, 2015). Like in the case of other important actions which is needed to protect the public but contradict private rights, administrative powers could be activated. Mandatory school vaccination was far effective in improving vaccination coverage. Private rights to hesitate vaccination should always be measured against the whole community protection (Stewart, 2015).

METHODS

A cross-sectional study was conducted with convenience sampling using a validated questionnaire-based online survey from Nov 2022 to Jan 2023. The purpose of this research was to investigate the knowledge, attitudes, and acceptance of mandatory influenza vaccination among Saudi primary care physicians. The eligibility criteria included primary care Saudi physicians working at Wazarat Health Center (WHC). The study population was those physicians who worked in the WHC during the duration of this study.WHC is the largest primary healthcare center under Family and Community Medicine (FCM) in Prince Sultan Military Medical City (PSMMC), Riyadh, Saudi Arabia. The sample size was estimated using a 95% confidence interval and a 5% margin of error. Using a rate of 50% for the acceptance of mandatory flu vaccination, the estimated sample size was 162 physicians. The questionnaire was developed in English and a shareable link was disseminated to physicians who worked in the WHC. The questionnaire was divided into four main parts: basic sociodemographic, knowledge, attitudes, and acceptance of mandatory influenza vaccination.

Basic sociodemographic data collected were age, sex, marital status, the highest level of education, chronic diseases, and smoking. Participants were also asked whether they accept the mandatory influenza vaccine and whether they have taken the flu vaccine of the last season. To assess the knowledge, and attitudes (KA) of the respondents towards mandatory vaccination, 14 items were included in the questionnaire. The knowledge part comprised 7 items with two options each (“yes,” and “no or not sure”). These items were chosen to evaluate participants’ understanding of the mandatory vaccination in Saudi Arabia for HCP and exemptions, the utility and benefit of mandating a vaccine, the type and strains of the virus of the vaccine, and the seasonality of vaccination. The attitude part consisted of 7 items with two response options each (“yes,” and “no or not sure”). These items included participants’ thoughts on influenza vaccine effectiveness and safety, influenza infection seriousness, the ethical duty of vaccinating and the right to decline vaccination, adverse reactions versus benefits, and the risk of influenza for HCP versus the general

population.

Data analysis was carried out using Statistical Package for the Social Sciences version 22 (IBM-SPSS 22). The data analysis design focused on the differences between acceptors of mandatory influenza vaccination and hesitators regarding the studied sociodemographic, knowledge, and attitudes items. Furthermore, the analysis also considered the correlations between accepting the mandatory vaccination and intention to vaccinate if not mandatory, declination of vaccination, and actual vaccination. Univariate analysis of the relationships was performed between participants' knowledge and attitudes, and acceptance of mandatory influenza vaccination. Chi-square and Fisher's exact tests were used as all variables were categorical ones. A P value < 0.05 was considered statistically significant. Factors with significant statistical and potential biological differences were then identified and used in the multivariable analysis as potential confounders. Multivariable analysis was performed using a multivariable logistic model to quantify the relationship between participants' sociodemographic, knowledge, and attitude. Adjusted odds ratio (aOR) was derived to assess independent association with acceptance of the mandatory flu vaccine.

Knowledge-attitude (KA) score was developed and used in the multivariate analysis. The KA score was the aggregate score of knowledge score and attitude score. For the knowledge score, while each correct answer (have the knowledge about) was given a score of two, each incorrect (lacking the knowledge about) was given a score of one. Accordingly, the maximum score was 14 and the minimum score was seven. For the attitude score, while disagreeing with a negative attitude towards vaccination was given a score of two, not disagreeing was given a score of one. Accordingly, the maximum score for attitude was 14 and the minimum score was seven. Participants with higher KA were more knowledgeable about mandatory vaccination and also holding vaccination promoting attitudes.

Ethics approval was granted by the IRB 1596. Informed consent was sought from respondents before participation in the study. Confidentiality of data was assured as participants were informed that their responses would remain anonymous, and no personal identifiers would be included.

RESULTS

A total of 138 out of 162 physicians responded to the survey. The majority of the participants were less than 36 years old. Similarly, most of the respondents were males. Moreover, while 46.7% of physicians were married, 53.6% were single. Likewise, while 54.3% of the participants achieved postgraduate degrees, 45.7% of them have not yet. Health-wise, only 8.7% of the respondent have a chronic disease and 34.1% were a smoker. (Table 1)

Youngers (<=35 years), females, singles, postgraduates, and staff with no chronic disease had higher odds to accept the mandatory flu vaccine compared to their counterparts. However, no significant relationship existed between any of the basic characteristics and acceptance of the mandatory influenza vaccine.

Knowledge-wise, although 82.6% of the studied HCP acknowledged that mandatory vaccination reduces the transmission of infection, only 40.6% accepted that mandatory vaccination increases the uptake. Furthermore, 44.9% of the participants were not aware that vaccination against influenza is mandatory for HCP in Saudi Arabia. In addition, while 81.9% of HCP knew that the current vaccine is not covering all the influenza virus strains, 53.6% realized that it is an inactivated vaccine. Moreover, while 91.3% of the participants recognized that the vaccine is recommended annually, 81.2% understood that some HCP could be exempted from the mandatory flu vaccination.

Physicians with better knowledge were more likely to accept the mandatory flu vaccination. This existed for all items used to measure the knowledge about mandatory influenza vaccination among the participants. However, it was only significant for certain knowledge items. Those who realized that influenza vaccination is mandatory in Saudi Arabia were 2.17 (95%CI; 1.05, 4.47) times more likely to accept mandatory vaccination compared to their counterparts. Similarly, those who agreed that mandatory vaccination reduces the chance of being infected were 3.75 (95%CI; 1.51, 9.32) times more likely to accept mandatory vaccination compared to those who disagreed. Moreover, physicians who knew that mandatory flu vaccine is taken once per year were 4.81 (95%CI; 1.37, 16.96) times more likely to accept the mandatory flu vaccination compared to those who did not know. (Table 2)

Regarding the attitude, although 58.0% of the studied HCP believed that mandatory vaccination is of their ethical duties, 75.4% thought that it is their right to refuse mandatory vaccination. Furthermore, 53.6%, 63.8%, 65.2%, 72.5%, and 75.4% did not believe that there is no need to mandate the flu vaccine because flu is not a serious disease, HCP is not at higher risk, ineffective vaccine, unsafe vaccine, and common side effects, respectively.

The attitudes of the participants were associated with the acceptance of the mandatory flu vaccination. Staff who believed that vaccination against influenza is of their ethical duties were 5.41 (95% OR; 2.50, 11.74) times more likely to accept the mandatory vaccination compared to those who believed the opposite. Moreover, HCP who thought that it is not their right to refuse vaccination was 4.89 (95% OR; 1.60, 14.88) times more likely to accept the mandatory vaccination compared to

Table 1. Basic characteristics of the physicians working at the primary care level (N=138)

Characteristic	Number (n)	Percentage (%)
Age in Years:		
<=35	127	(92%)
>35	11	(8%)
Gender:		
Female	37	(26.8%)
Male	101	(73.2%)
Marital Status:		
Married	64	(46.4%)
Single	74	(53.6%)
Education:		
Bachelor	63	(45.7%)
Postgraduate	75	(54.3%)
Chronic Disease:		
No	126	(91.3%)
Yes	12	(8.7%)
Smoker:		
No	91	(65.9%)
Yes	47	(34.1%)
Acceptance:		
No	45	(32.6%)
Ye***s***	93	(67.4%)

Table 2. Acceptance of mandatory influenza vaccination among the Saudi primary care physicians by their knowledge about the mandatory vaccination (N=138)

Knowledge	No (n) (%)	Yes (n) (%)	*P*-value
Influenza vaccination is mandatory in Saudi Arabia for HCP:			
No, or do not Know	26 (41.9%)	36 (58.1%)	
Yes	19 (25.0%)	57 (75.0%)	0.035
The mandatory influenza vaccine provided is a killed one:			
No, or do not Know	23 (35.9%)	41 (64.1%)	
Yes	22 (29.7%)	52 (70.3%)	0.438
Mandatory Vaccination reduces the chance of getting infected:			
No, or do not Know	14 (58.3%)	10 (41.7%)	
Yes	31 (27.2%)	83 (72.8%)	0.003
The mandatory flu vaccine is taken once per year:			
No, or do not Know	8 (66.7%)	4 (33.3%)	
Yes	37 (29.4%)	89 (70.6%)	0.019*
Mandatory vaccination increases the uptake of the flu vaccine:			
No, or do not Know	31 (37.8%)	51 (62.2%)	
Yes	14 (25.0%)	42 (75.0%)	0.115
Some HCP could be exempted from mandatory flu vaccination:			
No, or do not Know	8 (30.8%)	18 (69.2%)	
Yes	37 (33.0%)	75 (67.0%)	0.824
Mandatory influenza vaccination does not cover all the strains:			
No, or do not Know	7 (28.0%)	18 (72.0%)	
Yes	38 (33.6%)	75 (66.4%)	0.587

* Fisher exact Test

Table 3. Acceptance of mandatory influenza vaccination among the Saudi primary care physicians by their attitudes towards mandatory vaccination (N=138)

Attitudes	No (n) (%)	Yes (n) (%)	*P*-value
NOT an ethical duty of HCP:			
Agree or undecided	31 (53.4%)	27 (46.6%)	
Disagree	14 (17.5%)	66 (82.5%)	<0.001
Right to refuse the flu vaccine:	41 (39.4%)	63 60.6%)	
Agree or undecided	4 (11.8%)	30 (88.2%)	0.003*
Disagree			
Flu is NOT serious:			
Agree or undecided	31 (48.4%)	33 (51.6%)	
Disagree	14 (18.9%)	60 (81.1%)	<0.001
HCP are NOT at greater risk:			
Agree or undecided	23 (46.0%)	27 (54.0%)	
Disagree	22 (25.0%)	66 (75.0%)	0.011
The vaccine is NOT effective:			
Agree or undecided	25 (52.1%)	23 (47.9%	
Disagree	20 (22.2%)	70 (77.8%)	<0.001
The vaccine is NOT safe:			
Agree or undecided	17 (44.7%)	21 (55.3%)	
Disagree	28 (28.0%)	72 (72.0%)	0.061
The side effects dominate:			
Agree or undecided	18 (52.9%))	16 (47.1%)	
Disagree	45 (32.6%)	93 (67.4%)	0.004

* Fisher exact Test

Table 4. Independent determinants of acceptance of mandatory influenza vaccination among the Saudi primary care physicians (N=138)

Attitudes	*Coefficient*	*P*-value	Adjusted OR (95% CI)
Age>35 yrs.	0.574	0.521	1.78 (0.31, 10.26)
Male	0.391	0.379	1.48 (0.62, 3.53)
Smoker	0.088	0.838	1.09 (0.47, 2.54)
KA Score	0.159	0.006	1.17 (1.05, 1.31)
Intention to vaccinate	0.504	0.280	1.66 (0.66, 4.12)
Vaccine education	-0.352	0.390	0.70 (0.32, 1.57)

those who thought the contrary. Similarly, physicians who disagreed with mandating the flu vaccine as they are not at higher risk of influenza than the public were 2.56 (95% OR; 1.23, 5.34) times more likely to accept the mandatory vaccination compared to those who agreed.

HCP who disbelieved mandating the flu vaccine as it is ineffective were 3.804 (95% OR; 1.79, 8.08) times more likely to accept the mandatory vaccination compared to those who believed in that. Furthermore, participants who disagreed with mandating the influenza vaccine as influenza is a non-serious disease were 4.03 (95% OR; 1.88, 8.62) more likely to accept the mandatory vaccination compared to those who agreed. Finally, respondents who thought that the side effects of the influenza vaccine do not out weight its benefits were 3.21 (OR 95% CI; 1.44, 7.17) times more likely to accept the mandatory vaccination compared to those who thought the contrary. (Table 3)

While only 67.4% of the participants accept the mandatory vaccination, 71% have actually received their last season flu shot. Moreover, 79% of the studied HCP intended to receive the flu shot if it is not mandatory. On the other hand, 29% of the participants have ever declined the influenza vaccine. Moreover, while 92% of the respondents could easily access the vaccine, 64% has received an education related to vaccination against influenza. Acceptance of mandatory vaccination was negatively correlated with a declination of flu vaccination to (r=-0.237, *P*=0.005) and positively with actual vaccination (r= 0.203, *P*=0.017). From the multivariable logistic regression analysis, only the knowledge-attitude score remains statistically associated with the acceptance of mandatory vaccination. The chance of accepting the mandatory flu vaccination decreased as the score decreased (aOR: 1.17; (95%CI1.05, 1.31); *P*=0.006). (Table 4)

DISCUSSION

The purpose of this research was to study the acceptance of mandatory influenza vaccination among primary care doctors in Saudi Arabia. The acceptance rate of mandatory vaccination among primary care Saudi physicians participated in this study was 67.4%. This rate was similar to rate of acceptance among HCP in United Kingdom (67%) (Gualano et al., 2021). On the other hand, while it exceeded the rate in Canada (56%), it lagged behind the rate in United States (73%) (Reiter et al., 2009; Gates et al., 2021). The researchers of this study thought that these levels of acceptance may be explained by the variation in the attitudes of the HCP towards mandatory vaccination.

Despite the associations between the basic characteristics of the participants and the acceptance of mandatory influenza vaccination in this study, none was significant. Youngs, females, singles, postgraduates, and physicians who did not have a chronic disease had higher odds of accepting the mandatory flu vaccine than their counterparts did. Males, young, and singles usually tend not to adopt healthy behaviours and are more likely to hesitate vaccination. Female are usually keener to adopt healthy lifestyle and to have better longevity. Most single staff are also young, and their memories towards VPDs are weak, and they have less responsibility in work. The postgraduate holders may be less aware of the threat of influenza and the importance of vaccination. Postgraduates are more knowledgeable.

Many studies from different countries revealed that sociodemographic characteristics like age, gender, occupation, marital status, and education level could influence vaccination uptake among HCP (Rehmani and Memon, 2010; Alsaleem, 2013; Corace et al., 2013; Guanche et al., 2016; Haridi et al., 2017). Older HCP were usually more likely to vaccinate compared to younger HCP (Rehmani and Memon, 2010; Alsaleem, 2013; Corace et al., 2013; Guanche et al., 2016; Haridi et al., 2017; Asma et al., 2016). Furthermore, married staff were more likely to vaccinate compared to unmarried ones (Corace et al., 2013). Unlike Turkey, Switzerland, Italy, Spain, and the UK, female HCP in Saudi Arabia showed more propensity to vaccinate (Rehmani and Memon, 2010; Alsaleem, 2013; Haridi et al., 2017; Barbadoro et al., 2013). Strangely, in Italy, HCP with low education levels showed a higher vaccination rate than those with high education levels (Barbadoro et al., 2013). HCP suffering from chronic illness were also keener to vaccinate than those who perceived health wellnesses (Asma et al., 2016; Shahrabani and Benzion, 2006; Hopman et al., 2011). The significant sociodemographic determinants of influenza vaccination among HCP included chronic diseases (Looijmans-Van et al., 2010).

Despite acknowledging mandatory vaccination, the knowledge of the participants of this about mandatory flu vaccination were deficient. However, physicians with better knowledge were more likely to accept the mandatory flu vaccination. This existed for all items used to measure the knowledge about mandatory influenza vaccination among the participants. Studies from different countries have also reported a lack of knowledge among HCP regarding mandatory vaccination. For example, a study conducted in Australia found that 70% of healthcare providers were unaware of the mandatory vaccination policy in their workplace (Buchan and Kwong, 2016). Another study conducted in the United States found that almost 50% of healthcare providers were not aware of their hospital's vaccine policy (Gualano et al., 2021).

In Saudi Arabia, even though the vaccine preventable diseases ranked high on the list of infectious diseases among adults, knowledge level about them and their vaccines among HCP was intermediate (Al Thaqafy, 2017). However, despite high knowledge of protective measures of COVID-19 among HCP in the Middle East, more than 60% of them hesitated the COVID-19 vaccine (Al-Qerem WA and Jarab, 2021). In addition, poor knowledge and fearing of side effects contributed to the gaps in adult vaccination in Europe (Salisbury et al., 2013). Although 96.7% of healthcare students in Athens, Greece preferred mandatory vaccination deficient knowledge about vaccination was noticed (Karageorgou et al., 2014). In Israel, nurses accepted the influenza vaccine were more likely to have higher knowledge, perceived seriousness, and perceived risk than unvaccinated ones (Shahrabani et al., 2009). Despite the low vaccination uptake level among nurses in London in 2010, nurses with higher knowledge, perceived risk, and perceived seriousness were more likely to vaccinate. Moreover, the perceived risk was significantly higher among knowledgeable nurses (Zhang et al., 2011). The knowledge-based intervention was effective in improving intention to vaccinate as shown in randomized control trial (Mehta et al., 2014).

The study results showed that, despite believing that mandatory vaccination is of their ethical duties, still some physicians thought that it is their right to refuse mandatory vaccination. Furthermore, considerable percentage of participants did not believe that there is no need to mandate the flu vaccine because flu is not a serious disease, HCP is not at higher risk, ineffective vaccine, unsafe vaccine, and common side effects, respectively. The attitudes of the participants were associated with the acceptance of the mandatory flu vaccination. Those were holding vaccination promoting attitudes were more likely to accept mandatory vaccination. These findings were consistent with the results of other studies. For example, a study conducted in the United States found that while many HCP agreed with mandatory vaccination, some felt that it violated their personal freedom (McKee, Bohannon, 2016). Another study conducted in Canada found that while 90% of HCP agreed that mandatory vaccination is important, only 66%

agreed that it should be mandatory for healthcare providers (Schumacher et al., 2021).

Unlike perceived influenza severity and perceived barrier, Perceived benefits of influenza vaccination and perceived influenza susceptibility successfully predicted the influenza vaccination status of 85-95% HCP in 10 studies (Corace et al., 2016). However, perceived seriousness, was also used successfully to predict vaccination uptake in many studies (Brewer et al., 2007). Moreover, the findings of one meta-analysis showed a strong relationship between the different pooled risk perception dimensions expressed in feelings format and vaccination (Brewer et al., 2007; Weinstein et al., 2007). On the other hand, not believing in susceptibility to influenza and mistrusting the vaccine efficacy and safety were associated with hesitating influenza vaccination among HCP (Rehmani and Memon, 2010; Alsaleem, 2013; Haridi et al., 2017).

The interest to stop transmission of influenza was the most frequent motivator of HCP to accept or vaccinate against influenza (Alsaleem, 2013; Haridi et al., 2017). However, HCP in Turkey were unaware of the risk of passing influenza to patients and most of them thought that severe and fatal influenza would only affect the immunocompromised (Hidiroglu et al., 2010). Furthermore, HCP hesitated vaccination in Turkey showed lower perceived benefits of the vaccine and perceived susceptibility, doubting its safety and protective effectiveness (Asma et al., 2016). These may have explained the lower acceptance level of flu vaccine among Turkish HCP. In 2015, while 80% of studied HCP in Italy felt unsusceptible to influenza and accordingly less than 30% vaccinated against influenza (La Torre et al., 2017). The perceived susceptibility was recognized as the primary determinant of vaccines acceptance in Italy (Riccò et al., 2017). Moreover, while most HCP were willing to accept mandatory HB vaccination, few accepted mandating flu vaccines (Riccò et al., 2017).

In season 2006-07, in Germany, having lower perceived risk, fearing adverse reactions and doubting effectiveness and safety of the flu vaccine resulted in low uptake among HCP (26.9%) (Wicker et al., 2009). On the other hand, a model of influenza vaccination among Dutch HCP showed that perceived susceptibility, seriousness, effectiveness, ethical responsibility, and easy access were associated with the increased vaccination rate (Hopman et al., 2011). Consistently, Dutch HCP working in a nursing home with higher perceived susceptibility and benefits and accepting mandatory vaccination were more likely to vaccinate (Looijmans et al., 2009).

HCP who has ever been vaccinated against influenza were also more likely to accept the flu vaccine, but not those who suffered unpleasant experience. For instance, in Spain, while the influenza vaccination uptake among HCP was receding since season 2008-09, HCP who previously vaccinated were still more likely to vaccinate in 2012 (Castilla et al., 2013). In addition, HCP who were aware of flu vaccine recommendations and those in contact with patients were more likely to vaccinate (Loulergue et al., 2009). Survey and follow-up of Dutch HCP in 2013 revealed that HCP with higher perceived susceptibility and frequent prior flu vaccination had a higher tendency to vaccinate which predicted the actual vaccination among HCP (Lehmann et al., 2014).

Compared to HCP from Belgium and Germany, HCP from the Netherlands reported the least perceived susceptibility, perceived severity, and perceived trust in vaccine effectiveness and the least intention to vaccinate (Lehmann et al., 2015). High pandemic influenza vaccination uptake among HCP in Canada in season 2009-10 was attributed to their desire to protect contacts, high perceived effectiveness, and safety (Corace et al., 2013). Moreover, HCP with higher perceived risk and seriousness of influenza and lower perceived barriers to vaccinating were more likely to vaccinate (Corace et al., 2013). Similarly, HCP with higher perceived susceptibility, effectiveness, and ethical responsibility were more likely to vaccinate against influenza in Spain (Castilla et al., 2013). In Italy, while the perceived effectiveness of the influenza vaccine and personal responsibility were higher among vaccinated HCP, perceived costs of the vaccine were higher among unvaccinated (Scatigna et al., 2017).

In Brazil, in 2006, a discrepancy between perceived susceptibility and vaccination uptake existed (Dinelli et al., 2009). Although 93% of HCP believed in the risk of influenza, only 35.8% of HCP have completed their vaccination (Dinelli et al., 2009). Similarly, in 2012 in a medical centre in Malaysia, despite believing in the flu vaccine effectiveness, the uptakes among HCP for the last three seasons were suboptimal (Rashid et al., 2015). In a hospital in Switzerland, in 2013, the flu vaccination uptake was 16%, the acceptance of the influenza vaccine among surveyed HCP was 33% (Ryser and Heininger, 2015). About 36% of the HCP who declined the flu vaccine thought that skipping the flu vaccine was not a problem and that influenza is not a serious disease (Ryser and Heininger, 2015). In addition, the main reason behind declining was scaring adverse reactions (Ryser and Heininger, 2015).

Our findings also showed that acceptance of mandatory vaccination was higher among participants with higher perceived effectiveness of vaccination. HCP perceived the benefits of vaccination to outweigh their costs accepted mandatory vaccination. HCP who perceived that a safe and effective mean could avert the risk of health threats tend to accept that mean. However, perceiving an issue as a threat and a mean as effective is not isolated from the modifying factors, and knowledge as shown in this study. From the findings of this study, it is clear that HCP who perceived flu as a threat to their health were more likely to accept mandatory vaccination. Similarly, HCP perceived vaccines as an effective means to avert the threat of influenza safely were also more

likely to accept mandating it.

Seeking vaccination may be shaped by personal readiness concerned with attitudes, social, and contextual influences (Riddiough et al., 1981). Attitudes include perceived vulnerability and severity of VPD and perceived safety and efficacy of its vaccine (Riddiough et al., 1981).Concerns about vaccines varied contexts, which entail consideration of social, economic, and cultural aspects.

CONCLUSION

In conclusion, the findings of this research underline the significance of assessing the primary care doctors in Saudi Arabia's understanding of mandatory vaccination and their attitudes towards mandatory vaccination. It is likely that it will be feasible, to raise the general acceptability of the mandatory vaccination and limit the spread of influenza in the healthcare facilities. This highlights the importance of educating healthcare providers about the benefits of the flu vaccine and the importance of mandatory vaccination for the protection of public health. This also highlights the need for healthcare organizations to provide educational resources to their staff to improve awareness and understanding of mandatory vaccination policies. Clear immunization policies and drastic commitment from leaders in healthcare institutions and stakeholders are crucial. Issues like poor knowledge about vaccination and infectious diseases among HCP need to be addressed. The research was limited in a number of ways. It is difficult to draw comparisons between the results of this study and those of other studies and to generalize the findings since the sample size was small. We were unable to obtain data from vaccination records and depended on self-reporting, which may have provided us with low-quality objective data as self-reporting depends on the reliability of the responders. As the study was a cross-sectional survey, causality cannot explain the correlations found at this study. Typical bias risks of cross-sectional studies extended to include confounding and recall bias. Other factors which might contribute to vaccination hesitancy among HCP, need to be considered.

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