Family Medicine and Primary Care: Open Access
Alrashdi M, et al. J Family Med Prim Care Open Acc 6: 187.
www.doi.org/10.29011/2688-7460.100087
www.gavinpublishers.com
Review Article

Acceptance of Seasonal Influenza Vaccination by Healthcare Workers in Primary Health Care Workers Centers- Riyadh, Saudi Arabia

Muharib Alrashdi*, Abuobieda Abdalrouf, Mostafa Kofi

Family and Community Medicine Department, Prince Sultan Military Medical City, Riyadh, Saudi Arabia

***Corresponding author:** Muharib Alrashdi, Family and Community Medicine Department, Prince Sultan Military Medical City, Riyadh, Saudi Arabia

Citation: Alrashdi M, Abdalrouf A, Kofi M (2022) Acceptance of Seasonal Influenza Vaccination by Healthcare Workers in Primary Health Care Centers Riyadh, Saudi Arabia. J Family Med Prim Care Open Acc 6: 187. DOI: 10.29011/2688-7460.100087

Received Date: 14 May, 2022; **Accepted Date:** 10 June, 2022; **Published Date:** 16 June, 2022

Abstract

Background: Seasonal influenza disturbs work fluency and jeopardizes patients' safety. Influenza vaccination uptake among Healthcare Workers (HCWs) is suboptimal all over the globe. This study aimed to study the influenza vaccination acceptance and uptake among HCWs in Wazarat Health Care Center (WHC) at Prince Sultan Military Medical City (PSMMC), Riyadh, Saudi Arabia. **Method:** Two hundred out of randomly selected 240 HCWs working at WHC-PSMMC, Riyadh, Saudi Arabia were surveyed between May and June 2017. A validated 25-items self-administered questionnaire was used to collect the data. The collected data included sociodemographic, work and health related data, and beliefs towards influenza and its vaccine. Scoring system was used for transformed categorical data. The mean scores, median and Interquartile (IQR) were estimated and compared. Univariate and multivariate analysis were used to study the associations of the influenza vaccine uptake with those covariates. IBM® SPSS®16 Statistics software was used for data analysis. Ethical aspects including confidentiality, informed consent, and approval were carefully considered. **Results:** With a response rate of 83% to the survey, only 41% of the participants found have received the 2016 influenza vaccine. On univariate analysis gender, nationality, occupation, level of education, work nature, work experience, past infection, and previous vaccination were associated with vaccination uptake. The vaccinated HCWs were more likely to perceive themself susceptible to influenza and its complications and to perceive the influenza vaccine as safe and effective compared to unvaccinated HCWs. On Multivariate analysis, HCWs perceived influenza vaccine as beneficial, HCWs doing clinical works and non-Saudi HCWs were (Odd Ratio (OR):1.25 (95% Confidence Interval (CI); 1.10, 1.42) *P*=0.001), (OR: 2.83 (95% CI; 1.10, 7.28) *P*=0.03), and (OR: 3.81(95% CI; 1.24, 11.67) *P*=0.03) times more likely to vaccinate against influenza, respectively. **Conclusion:** Despite rigorous recommendation influenza vaccination uptake was suboptimal. Mandatory influenza vaccination policy may need to be adopted to achieve a vaccination coverage above 80% as recommended by the world health organization (WHO). This could be combined with interventions that address the associated factors to guarantee the maintenance of the desirable acceptance level and minimize the declination rate.

Keywords: Seasonal influenza; Influenza vaccine; Vaccination uptake; Healthcare workers

Introduction

Influenza is a common respiratory illness caused by influenza virus types A, B or C [1]. Influenza type A is considered the most severe type of influenza and the subtype H1N1 virus was responsible for the recent influenza pandemic [2]. Type B causes a less severe illness and is more frequent in children and Type C causes a flu-like disease and usually has an uncomplicated course [2]. It is estimated that about 9% of the world's population is affected by influenza annually accounting to nearly one billion infections and three to five million severe cases, and deaths annually [3]. In United States (US), nearly 20% of the population is affected annually with around 225,000 hospitalizations every year [4].

Saudi Arabia deserves greater attention as it serves as an abode for major pilgrimage center with an annual turnover of millions of pilgrims from around the globe. There is a high risk for transmission of infection posing major threat to the health

of airport personnel, healthcare staff, security personnel and civilians. Moreover, the most effective way to prevent infection with the influenza virus and its potentially severe complications is immunization. Hence, Saudi Thoracic Society recommends adoption of strict vaccination strategies [5].

Healthcare Workers (HCWs) are often in contact with patients, so they are considered a potential source of transmission [6]. Hence, the World Health Organization (WHO) recommends influenza vaccination for HCWs [7]. The influenza vaccine is safe and well tolerated and can prevent up to 70%-90% of influenza cases in healthy adults [8,9]. Immunization of HCWs has been associated with improvements in patient safety and decreased morbidity and severe mortality in hospitals and other healthcare facilities [10-16]. Moreover, vaccination of HCWs reduces workplace absences, delivers economic benefits for healthcare systems, and provides cost savings for healthcare organizations [10,17,18]. Despite studies showing that vaccination is effective among medical personnel and reduces influenza transmission and mortality among hospitalized patients, the uptake is still suboptimal [19]. The WHO and the Center of Diseases Control and prevention-US (CDC) have endorsed the promotion of the flu vaccine [10,20]. The WHO has aggressively campaigned for the importance of the flu vaccine program both nationally and internationally. The WHO and the CDC declared that the seasonal flu vaccine is safe, and the most effective in the protection against the flu and avoidance of severe complications and hospitalization [21,22].

In a study conducted in US, 2005-06, 59% of the registered nurses found have received the influenza vaccine [23]. The most common reason for being vaccinated was protecting oneself from illness (95%), whereas the most common reason for not being vaccinated was concern about adverse reactions (39%) [23]. However, another study carried out also in US in the same year estimated the influenza vaccine uptake as 38% among HCWs [24]. In Singapore in season 2004-05 influenza vaccination rates among HCWs were found to be more than 50%, 65% and 70% among doctors, nurses and, ancillary staff respectively [25]. In a study conducted in US, 2010, 75.2% of the respondents reported agreeing with the new mandatory policy. Most respondents (72%) believed that the policy is coercive, but more than 90% agreed that the policy is important for protecting patients and staff and considered it as part of professional ethical responsibility [26].

During 2007-08, the Emergency Service (EMS) staff in North Carolina believed that influenza vaccine is ineffective [27]. Similarly, in 2008, in Greece, nurses who hesitated influenza vaccination found to hold low perceived susceptibility and vaccine effectiveness [28]. Such HCWs thought that, not making it mandatory support their perception [27,28]. Furthermore, in 2009, HCWs from a teaching hospital in France hesitated vaccination doubted increased susceptibility and vaccine safety [29]. Hence, only 22% of sampled HCWs from that Hospital received the seasonal influenza vaccine. However, the rate was significantly higher among physicians, as 45% of them have received the vaccine. The main reasons given for accepting of the seasonal were "protection of the patient" and "self-protection" [29]. In his study in 2009, in Hong Kong public hospitals, Chor et al. assessed the willingness of HCWs to receive the influenza vaccine [30]. Positive factors associated with HCWs' willingness to vaccinate included prior vaccination and their perceived risk for acquiring influenza. Barriers to willingness to vaccinate included fear of the vaccine's adverse effects and uncertainties about efficacy [30].

Regionally, in 2010, the influenza vaccination rates among HCWs in United Arab Emirates, Kuwait and Oman were 24.7%, 67.2%, and 46.4% respectively [31]. About 59% of the vaccinated HCWs were motivated by self-protection [31]. On the other hand, 31.8%, 29.4%, 17.3%, 24.9%, 20.1% of unvaccinated HCWs claimed lack of time, unawareness of vaccine availability, unawareness of vaccine importance, and doubted vaccine effectiveness and safety [31]. Furthermore, 25.4% claimed missing vaccination due to actual unavailability of the vaccine [31]. In Saudi Arabia, the influenza vaccination rate among HCWs in season 2008-09 was 41% [32]. The total coverage rate for the period between 2003 and 2008 was 69%. Half of the vaccinated HCWs received one to three out of the five shots [32]. While 63.9% thought that the influenza vaccine is important, 35% believed that they are not at risk of influenza [32]. Moreover, 66.8% perceived influenza vaccine as unsafe and 62.3% perceived influenza as non-serious disease [32]. In contrast to those high rates, only 5.9% of HCWs who covered medical works during 2007 Hajj season had received the influenza vaccine [33].

Methods

This cross-sectional study was conducted in Riyadh, Saudi Arabia between 27 May and 15 June 2017. The study targeted HCWs in WHC-PSMMC however; HCWs ineligible for treatment in PSMMC and those covering peripheral clinics or on leave during data collection have been excluded. The study aimed to estimate the influenza vaccination uptake among HCWs and its relationships with socio-demographic factors, work and health-status related factors, and beliefs towards influenza infection and vaccine. A random sample of 240 HCWs stratified by their occupation to physicians, nurses, and others (pharmacists, admins, translators, X-ray technicians, health educators, social workers, and dietitians) were recruited. Data were collected using a self-administrated well-structured validated questionnaire to get the relevant data needed for the study. The questionnaire was initially prepared in English language and then translated into Arabic language and back into English following the cross cultural translation guidelines. After signing an informed consent form, each participant completed the validated questionnaire. The independent variables included socio-demographic characteristics such as age, gender, marital status, and nationality, level of education, occupation, work experience, and income. They also included work and health status related data and beliefs towards influenza vaccine and disease. The dependent variable was level of influenza vaccine acceptance.

Statistical analysis was done using SPSS 16. Results were presented as means and standard deviation, medians,

and interquartile range for quantitative data, frequencies and percent for qualitative data. Independent t-test was used to compare quantitative variables between the two vaccinated and unvaccinated HCWs. Chi-square and Fisher exact tests were used for comparing qualitative variables between the two groups. Multivariate logistic regression analysis was carried out to ascertain the association of vaccination uptake among HCWs with the proposed influencers. Scoring system was developed for transformed categorical variables like beliefs about influenza disease and vaccine and it was as follow; 1 for strongly disagree, 2 for disagree, 3 for neutral, 4 for agree and 5 for strongly agree. The maximum score was 20 for beliefs towards the infection and 30 for beliefs towards the vaccine. An ethical approval for this study was obtained from ethics review committee in PSMMC.

Results

Out of the 240 randomly selected HCWs, 200 have completed and returned the questionnaires. Almost 58% of the respondents were males. The age of most of the respondents (85%) was below 41 years. In consistent with their age range, most of the respondents (68%) found have work experience of less than 10 years. Most of the respondents were Saudi (79%), and 67.5% of the participants were married. While 84.5% of them were degree holders, only 15.5% were non degree holders. About 23% of the participants were physicians, 25% were nurses, and the remaining 52% were classified as others. Majority of participants (67.0%) were doing clinical work. The income of 53% of the participants exceeded 10,000 Saudi Riyal (SAR) (Table 1). About 40% of the respondents reported history of influenza infection. On the other hand, while 28% reported that they have never vaccinated against influenza before, 50% claimed that they have received it twice or more. Health wise, 13% of the respondents gave a history of chronic diseases. Only 41% found have received the influenza vaccine of the year 2016.

Characteristics		**n (%) (N=200)**
Gender	Male	116 (58.0)
	Female	84 (42.0)
Age (Years)	20-30	41 (51.2)
	31-40	27 (33.8)
	41-50	7 (8.8)
	>50	5 (6.2)
Nationality	Saudi	158 (79.0)
	Non-Saudi	42 (21.0)
Marital Status	Single	65 (32.5)
	Married	135 (67.5)
Highest Education Level	Secondary or less	31 (15.5)
	Graduate	105 (52.5)
	Postgraduate	64 (32.0)
Job Categories	Physician	46 (23.0)
	Nurse	50 (25.0)
	Others	104 (52.0)
Income in Saudi Riyal (SAR)	<= 10000	94 (47.0)
	>10000	106 (53.0)

Work Experience (Years)	< 5	74 (37.0)
	5-10	62 (31.0)
	>10	64 (32.0)
Vaccinated with the recent vaccine (2016)	Yes	41%
	No	59%

Table 1: Characteristics of the Participants.

On univariate analysis gender, nationality, occupation, level of education, work nature, work experience, history of influenza infection, and previous influenza vaccination were associated with the recent vaccination. Females were 2.5 times more likely to vaccinate with the flu vaccine than male. The non-Saudi HCWs were 6.9 times keener to vaccinate compared to the Saudi ones. Physicians and nurses were 5.9 and 2.6 times more likely to receive the influenza vaccine than other HCWs, respectively. The higher was the level of education, the more was the odd of vaccinating against influenza. Unexpectedly, no association existed between having a chronic diseases and flu vaccination uptake. Unfortunately, about 50% of respondents with chronic diseases have not received the influenza vaccine. Moreover, only 54% of those have bronchial asthma and 50% of the diabetics have vaccinated. The more experienced the staff, the higher was the odd to vaccinate compared to less-experienced. HCWs who reported past influenza infection and those who received the flu vaccine more than once in their lifetime tended to accept the vaccine more with an (Odd Ratios) ORs of 2.1 and 9.5 respectively. Moreover, HCWs who were doing clinical works were more wildlings to receive the vaccine (Table 2).

Variable		**Vaccinated n = 82**	**Unvaccinated n = 118**	**OR**	**95.0% C.I. for OR**	***P*-value**
Gender	Female	45 (53.6)	39 (45.4)	2.5	(1.4, 4.4)	0.002
	Male	37 (31.9)	79 (68.1)			
Age (years)	20 - 30	32 (40.0)	48 (60.0)	0. 8	(0.2, 2.5)	0.654
	31 - 40	28 (37.3)	47 (62.7)	0.7	(0.2, 2.3)	
	41 - 50	16 (50.0)	16 (50.0)	1.2	(0.3, 4.2)	
	> 50	6 (46.2)	7 (53.8)			
Nationality	Non-Saudi	32 (76.2)	10 (23.8)	6.9	(3.1, 15.2)	<0.001
	Saudi	50 (31.6)	108 (68.4)			
Marital Status	Single	28 (43.1)	37 (56.9)	0.9	(0.5, 1.6)	0.67
	Married	54 (40.0)	81 (60.0)			
Job Categories	Physician	31 (67.4)	15 (32.6)	5.9	(2.8, 12.6)	<0.001
	Nurse	24 (48.0)	26 (52.0)	2.6	(1.3, 5.3)	
	Others	27 (26.0)	77 (74.0)			

Education	Graduate Secondary Postgraduate	36 (56.2) 42 (40.0) 4 (12.9)	28 (43.8) 63 (60.0) 27 (87.1)	4.5 8.7	(1. 5, 13.7) (2.7, 27.7)	<0.001
Income (SAR)	<=10,000 >10,000	37 (39.4) 45 (42.5)	57 (60.6) 61 (57.5)	1.1	(0.7, 2.0)	0.657
Nature of Work	Non clinical Clinical	11 (16.7) 71 (53.0)	55 (83.3) 63 (76.0)	0.2	(0.1, 0.4)	<0.001
Experience	<5 years 5-10 years >10 years	38 (51.4) 16 (25.8) 28 (43.8)	36 (48.6) 46 (74.2) 36 (56.2)	1.4 0.4	(0.7, 2.7) (0.2, 1.0)	0.009
Past Infection	Yes No or not sure	57 (46.7) 65 (53.3)	23 (29.5) 55 (70.5)	2.1	(1.2, 3.8)	0.015
Time Vaccinated	=>twice =<Once	65 (65.7%) 17 (16.8%)	34 (34.3%) 84 (83.2%)	9.5	(4.9, 18.4)	<0.001

Table 2: The Vaccination against Influenza by Characteristics of the Participants.

Although 69.5% of the respondents believed that influenza can lead to complications and 80% thought that HCWs are at greater risk, only 50% thought of it as a serious disease and 87.5% considered it as an easily treatable disease. Furthermore, on univariate analysis vaccinated HCWs were more likely to perceive the influenza to have serious complications, the mean, median, and interquartile range of the score of perceiving the influenza as a serious infection did not differ between vaccinated and unvaccinated HCWs. Moreover, despite higher mean, median, and interquartile range of the score of perceived susceptibility to influenza among vaccinated HCWs compared to unvaccinated HCWs, the difference in the means were statistically insignificant. The influenza was perceived as more difficult to treat among the vaccinated HCWs than the unvaccinated HCWs. These findings were reflected in higher total score of negative beliefs toward influenza among vaccinated than unvaccinated, however insignificant difference.

On the other hand, as 49% of the HCWs agreed that flu vaccine has severe side effects or adverse reaction, 52% thought that vaccine costs outweigh its benefits. Moreover, as 62.5% and 63.5% of the respondents believed that it is safe and effective respectively, 66.6% agreed that it prevents the spread of infection to patients. Furthermore, on univariate analysis vaccinated HCWs were significantly more likely to perceive the influenza vaccine as safe, effective, and to reduce susceptibly and communicability. The means, medians, and interquartile ranges of the scores of these perceptions towards the influenza vaccine differed significantly between vaccinated and unvaccinated HCWs. Moreover, despite higher mean, median and interquartile range of the score of perceived side effects and that they outweigh the benefits of influenza among vaccinated HCWs compared to unvaccinated HCWs, the difference in the mean were statistically insignificant. These findings were reflected in significant higher total score of positive beliefs score toward influenza vaccine among vaccinated than unvaccinated (Table 3).

Beliefs		**Vaccinated n = 82**	**Unvaccinated n = 118**	**P-value**
Influenza as a Serious Disease	Mean ± SD	3.4±1.11	3.4±1.11	0.449
	Median	4	4	
	IQR	2-4	2-4	
Influenza has serious Compilations	Mean ± SD	3.98±0.99	3.55±1.1	0.003
	Median	4	4	
	IQR	4-5	3-4	
Influenza is Non-treatable	Mean ± SD	2.6±0.93	2.7±1.02	0.363
	Median	2	3	
	IQR	2-3	2-3.25	
HCWs are more Susceptible to influenza	Mean ± SD	4.15±0.9	4.06±1.04	0.804
	Median	4	4	
	IQR	4-5	4-5	
Score of Beliefs towards the disease (out of 20)	**Mean± SD**	**14.17±2.45**	**13.64±2.72**	**0.092**
Influenza vaccine has No severe side effects	Mean ± SD	3.25±1.13	3.14±0.97	0.430
	Median	3	3	
	IQR	2-4	2-4	
Its Side effects outweigh Its Benefits	Mean ± SD	3.54±1.11	3.14±0.97	0.158
	Median	3.5	3	
	IQR	3-5	2-4	
It Prevents the Spread of influenza	Mean ± SD	3.83±1.2	3.4±1.09	0.001
	Median	4	4	
	IQR	3-5	3-4	
It is an Effective Vaccine	Mean ± SD	4±0.86	3.37±0.94	<0.001
	Median	4	4	
	IQR	4-5	3-4	

It is a Safe Vaccine	Mean ± SD Median IQR	4.02±0.89 4 4-5	3.41±0.92 4 3-4	<0.001
It Reduce the Susceptibility	Mean ± SD Median IQR	3.23±1.33 3 2-4	2.7±1.06 3 2-3	0.003
Score of Beliefs towards the vaccine (out of 30)	**Mean± SD**	**21.89±4.25**	**19.36±2.5**	**<0.001**
Total Score (Out of 50)	**Mean± SD**	**36.06±5.75**	**33.01±3.89**	**<0.001**

Table 3: Influenza Vaccination Uptake among Healthcare Workers by their Beliefs towards Influenza and its Vaccine.

Binary logistic regression analysis was done to ascertain about the associations of the studied characteristics and attitudes of HCWs with the vaccination uptake among HCWs. The adopted model adjusted for the potential co-variables including the socio-demographic, work- and health- related factors. Nationality, beliefs towards vaccines, and nature of work were associated with vaccination against influenza. HCWs perceived influenza vaccine as beneficial, non-Saudi and those doing clinical work were more likely to vaccinate against influenza (Table 4).

Characteristics	***P*-value**	**OR**	**95.0% C.I. for OR**	
			Lower	**Upper**
Nationality (Non-Saudi vs Saudi)	0.019	3.805	1.241	11.672
Work Nature (Clinical Vs Non-clinical)	0.030	2.833	1.104	7.246
Score of Beliefs towards Vaccine (Pros Vs Cons)	0.001	1.250	1.099	1.422

Table 4: Association between Beliefs towards Influenza Vaccine and Vaccination Uptake among Healthcare Workers.

Discussion

It is well established fact that influenza vaccination of medical students and other healthcare staff reduces the transmission of infection [34]. Influenza is given high priority in Saudi Arabia where numerous reports of different types of influenza outbreaks have occurred in recent years [35]. A great number of the participants (59%) had not received the influenza vaccine. The study may have overestimated the vaccination uptake as participants' vaccination status was self-reported. Despite being more or less consistent with the global and regional suboptimal HCP vaccination uptake, rates seemed to be higher than previous local estimates. There were many similar studies performed, for instance, Al-Shammari reported vaccination rates as low as 38% among HCWs [36]. Furthermore, a study targeted Middle Eastern region, reported vaccination rates of 24.7%, 67.2% and 46.4% in UAE, Kuwait and Oman, respectively and concluded that the vaccination rates among the HCWs were suboptimal [31].

Females usually tend to adopt healthy lifestyles compared to male. In addition, physicians, nurses, and postgraduates are expected to be more knowledgeable. Staff other than physicians and staff with low education level usually have low income. They are less aware of the threat of influenza and the importance of its vaccine. The education and work backgrounds can explain this association. Older staff, HCP performing clinical works, HCP with a history of influenza, and those who vaccinate many times may have been exposed to more events related to influenza, and its vaccine. Males, and young usually tend not to adopt healthy behaviours and are more likely to hesitate vaccination. Non-clinical staff may have low education level and then less knowledgeable about influenza and its vaccines, so more likely to hesitate vaccination. Therefore, staff doing non-clinical works are expected not to perceive the importance of vaccination as clinical staff. Furthermore, non-Saudi staff is expected to show more commitment towards the recommendations adopted by their employee, as they are expected to meet their job requirements. Consistent with these findings European study highlighted the role of low knowledge among its medical students and concluded that lower knowledge levels along with decreased risk perception during early years of medical graduation studies are key determinants of lower vaccination rate [37].

In this study, vaccinated and unvaccinated HCWs perceived the threat of influenza almost similarly. Inconsistent with these findings, many studies revealed and association between perceived susceptibility and seriousness with vaccination uptake behaviour. A meta-analysis of 34 studies with a total population of 15,988 showed a strong relationship between the different perceived threat and vaccination uptake [38]. On the other hand, most of the vaccinated HCWs in the current study believed that vaccine controls and prevents the spread of influenza and that it is safe and effective. A positive association existed between holding positive beliefs towards the influenza vaccine and the vaccination. Furthermore, perceiving a mean as safe and effective to avert the risk of health threats lead to accepting that mean. However, perceiving an issue as a threat and a mean as effective is not isolated from factors like sociodemographic factors.

In Italy, studies have been conducted to investigate the attitudes and knowledge of HCWs and medical students regarding seasonal or pandemic influenza, or both types of influenza vaccines [39-41]. Perceiving influenza as a serious illness with availability of an effective vaccine and understanding that one may transmit influenza were all lower in the "never vaccinated" group than in the "always vaccinated" and "sometimes vaccinated" groups. HCWs with weak knowledge about influenza may not believe they are at greater risk. Similarly, HCWs who get information about influenza vaccine from the media may not believe in vaccines' effectiveness and safety. For that reason, it is important to increase the level of knowledge regarding the risk of acquiring and transmitting influenza in the workplace and to encourage adoption of preventive measures. For the "always vaccinated" and "sometimes vaccinated" groups, the purpose of public health interventions could be to maintain and support their level of influenza awareness and knowledge through informational campaigns in workplaces [42].

In Italy, while the perceived effectiveness of the influenza vaccine was higher among vaccinated HCWs, perceived costs of the vaccine were higher among unvaccinated [43]. HCWs from four European countries hesitated vaccination were worried about the side effects of the vaccines; however, concerns about vaccines were not limited to effectiveness and safety [44]. Concerns about vaccines varied by regions and contexts, which entail consideration of social, economic, and cultural aspects [44]. In a systematic review of 37 studies about H1N1 vaccine uptake in 2009, both perceived threat and benefits were good predictors of both intention and actual uptake [45]. Similarly, older people, males, ethnic minorities, and physicians were good predictors of both intentions to vaccinate and actual uptake. People who vaccinated previously and those who received cues from their society or trusted sources were more likely to vaccinate [45]. The independent predictors of influenza vaccine uptake in Turkey included the place of work, exposure to cues, having a chronic condition, and perceived vaccine effectiveness [46]. Another study in Turkey showed that a physician, uptake of the last flu vaccine, perceived safety of the H1N1 vaccine, and agreeing to ethical responsibility were independently associated with vaccine uptake [47]. On the other hand, not trusting the effectiveness of the H1N1 vaccine and scaring its adverse reactions were independently associated with hesitating vaccination [47]. The influenza vaccine uptake among ever-vaccinated nurses in Hong Kong was independently associated with the perceived usefulness and cues to vaccinate [48]. Perceived risk of influenza and perceived usefulness of the vaccine were independently associated with intention to vaccinate, as shown in a study done in Italy [48].

Conclusion

Despite restrict recommendations, rate of flu vaccine uptake was still suboptimal. While both vaccinated and unvaccinated HCWs held negative beliefs about the influenza disease similarly, a positive association existed between beliefs in influenza vaccine as beneficial, safe and effective mean to control and prevent influenza, and vaccination among vaccinated HCWs. Moreover, non-Saudi and staff doing clinical work were also independently keener to vaccinate against the influenza. The suboptimal vaccination uptake may reflect the attitude of unvaccinated HCWs towards their patients as they may not be keen to recommend vaccination to them. The study was limited by self-reporting of vaccination status. Furthermore, the study have not considered for other influencers like cues to vaccinate and self-efficacy. More studies on different societies and larger sample size are needed to confirm the findings of this study. More elaborated studies are needed to find about knowledge, psychological, and health related perspectives of influenza immunization. As this study is limited to a single source of sample population, generalizability is restricted.

References

1. Hooper CR, Breathnach A, Iqbal R (2014) Is there a case for mandating influenza vaccination in healthcare workers? Anesthesia 69: 95-100.
2. Bridges CB, Thompson WW, Meltzer MI, Reeve GR, Talamonti WJ, et al. (2000) Effectiveness and cost-benefit of influenza vaccination of healthy working adults: a randomized controlled trial. JAMA 284: 1655-1663.
3. Girard MP, Cherian T, Pervikov Y, Kieny MP (2005) A review of vaccine research and development: human acute respiratory infections. Vaccine 23: 5708-5724.
4. Thompson MG, Shay DK, Zhou H, Bridges CB, Cheng PY, et al. (2010) Estimates of deaths associated with seasonal influenza United States, 1976-2007. MMWR 59: 1057-1062.
5. Zeitouni Mohammed O, Al Barrak Ali M, Al-Moamary Mohamed S, Alharbi NS, Idrees Majdy M (2015) The Saudi Thoracic Society guidelines for influenza vaccinations. Ann Thorac Med 10: 223-230.
6. Smith NM, Bresee JS, Shay DK, Uyeki TM, Cox NJ, et al. (2006) Advisory Committee on Immunization Practices. Prevention and control of influenza: recommendations of the advisory committee on immunization practices (ACIP). MMWR Recomm Rep 55: 1-42.
7. Preaud E, Durand L, Macabeo B, Farkas N, Sloesen B, et al. (2014) Annual public health and economic benefits of seasonal influenza vaccination: a European estimate. BMC Public Health 14: 813.
8. World Health Organization (2014) Influenza (seasonal). Fact Sheet no 211.
9. Barbadoro P, Marigliano A, di Tondo E, Chiatti C, di Stanislao F, et al. (2013) Determinants of influenza vaccination uptake among Italian healthcare workers. Hum Vaccin Immunother 9: 911-916.
10. CDC (2011) Immunization of health-care personnel: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 60: 1-45.
11. Salgado CD, Giannetta ET, Hayden FG, Farr BM (2004) Preventing nosocomial influenza by improving the vaccine acceptance rate of clinicians. Infect Control Hosp Epidemiol 25: 923-928.
12. Carman WF, Elder AG, Wallace LA, McAulay K, Walker A, et al. (2000) Effects of influenza vaccination of health-care workers on mortality of elderly people in long-term care: A randomised controlled trial. Lancet 355: 93-97.
13. Hayward AC, Harling R, Wetten S, Johnson AM, Munro S, et al. (2006) Effectiveness of an influenza vaccine programme for care home staff to prevent death, morbidity, and health service use among residents: Cluster randomized controlled trial. BMJ 333: 1241.
14. Burls A, Jordan R, Barton P, Olowokure B, Wake B, et al. (2006) Vaccinating healthcare workers against influenza to protect the vulnerable-Is it a good use of healthcare resources? A systematic review of the evidence and an economic evaluation. Vaccine 24: 4212-4221.
15. Thomas RE, Jefferson T, Lasserson TJ (2010) Influenza vaccination for healthcare workers who work with the elderly: Systematic review. Vaccine 29: 344-356.
16. Van den Dool C, Bonten MJ, Hak E, Heijne JC, Wallinga J (2008) The effects of influenza vaccination of health care workers in nursing homes: Insights from a mathematical model. PLoS Med 5: e200.
17. Music T (2012) Protecting patients, protecting healthcare workers: A review of the role of influenza vaccination. Int. Nurs Rev 59: 161-167.
18. Cella MT, Corona G, Tuccillo E, Franco G (2005) Assessment of efficacy and economic impact of an influenza vaccination campaign in the personnel of a health care setting. Med Lav 96: 483-489.
19. Arriola CS, Anderson EJ, Baumbach J, Bennett N, Bohm S, et al. (2015) Does influenza vaccination modify influenza severity? Data on older adults hospitalized with influenza during the 2012-2013 season in the United States. J Infect Dis 212: 1200-1208.
20. Fiore AE, Shay DK, Broder K, Iskander JK, Uyeki TM, et al. (2009) Prevention and control of seasonal influenza with vaccines: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR Recomm Rep 58: 1-52.
21. World Health Organization (2014) Influenza (Seasonal).
22. Centers for Disease Control and Prevention (2012) Influenza vaccination coverage among health-care personnel-2011-12 season, United States. Morbidity Mortality Weekly Report 61: 753-757.
23. Clack SJ, Cowan AE, Wortley PM (2009) Influenza vaccination attitudes and practices among US registered nurses. Am J Infect Control 37: 551-556.
24. King WD, Woolhandler SJ, Brown AF, Jiang L, Kevorkian K, et al. (2006) Brief report: Influenza vaccination and health care workers in the United States. J Gen Intern Med 21: 181-184.
25. Yang KS, Fong YT, Koh D, Lim MK (2007) High coverage of influenza vaccination among HCWs can be achieved during heightened awareness of impending threat. Ann Acad Med Singapore 36: 384-387.
26. Feemster KA, Prasad P, Smith MJ, Feudtner C, Caplan A, et al. (2011) Employee designation and health care worker support of an influenza vaccine mandate at a large pediatric tertiary care hospital. Vaccine 29: 1762-1769.
27. Hubble M, Zontek T, Richards M (2011) Predictors of influenza vaccination among emergency medical services personnel. Prehospital Emergency Care 15: 175-183.
28. Raftopoulos V (2008) Attitudes of nurses in Greece towards influenza vaccination. Nursing Standard 23: 35-42.
29. Tanguy M, Boyeau C, Pean S, Marijon E, Delhumeau A, et al. (2011) Acceptance of seasonal and pandemic a (H1N1) 2009 influenza vaccination by healthcare workers in a French teaching hospital. Vaccine 29: 4190-4194.
30. Chor J, Ngai K, Goggins WB, Wong M, Wong S, et al. (2009) Willingness of Hong Kong health care workers to accept pre-pandemic influenza vaccination at different WHO alert levels: Two questionnaire surveys. British Medical Journal 339.
31. Abu-Gharbieh E, Fahmy S, Rasool BA, Khan S (2010) Influenza vaccination: healthcare workers attitude in three Middle East countries. Int J Med Sci 7: 319.
32. Al-Tawfiq JA, Antony A, Abed MS (2009) Attitudes towards influenza vaccination of multi-nationality health-care workers in Saudi Arabia. Vaccine 27: 5538-5541.
33. Madani TA, Ghabrah TM (2007) Meningococcal, influenza virus, and hepatitis B virus vaccination coverage level among health care workers in Hajj. BMC Infectious Diseases 7.

34. Lambert LC, Fauci AS (2010) Influenza vaccines for the future. N Engl J Med 363: 2036-2044.

35. He D, Chiu APY, Lin Q, Cowling BJ (2015) Differences in the seasonality of MERS-CoV and influenza in the Middle East. Int J Infect Dis 40: 15-16.

36. Alshammari TM, AlFehaid LS, AlFraih JK, Aljadhey HS (2014) Health care professionals' awareness of, knowledge about and attitude to influenza vaccination. Vaccine 32: 5957-5961.

37. Betsch C, Wicker S (2012) E-health use, vaccination knowledge and perception of own risk: drivers of vaccination uptake in medical students. Vaccines 30: 1143-1148.

38. Brewer NT, Chapman GB, Gibbons FX, Gerrard M, McCaul KD, et al. (2007) Meta-analysis of the relationship between risk perception and health behavior: the example of vaccination. Health Psychol 26: 136-145.

39. Spadea A, Unim B, Ursillo P, Saulle R, Giraldi G, et al. (2013) Effectiveness of a training course on influenza vaccination in changing medical students' and healthcare workers' attitudes towards vaccination. Ig. Sanita Pubbl 69: 387-402.

40. Albano L, Matuozzo A, Marinelli P, di Giuseppe G (2014) Knowledge, attitudes and behaviour of hospital health-care workers regarding influenza A/H1N1: A cross sectional survey. BMC Infect Dis 14: 208.

41. Bonfiglioli R, Vignoli M, Guglielmi D, Depolo M, Violant FS (2013) Getting vaccinated or not getting vaccinated? Different reasons for getting vaccinated against seasonal or pandemic influenza. BMC Public Health 13: 1221.

42. Bonaccorsi G, Santomauro F, Porchia, BR., Niccolai G, Pellegrino E, et al. (2015). Beliefs and opinions of health care workers and students regarding influenza and influenza vaccination in Tuscany, Central Italy. Vaccines 3: 137-147.

43. Scatigna M, Fabiani L, Micolucci G, Santilli F, Mormile P, et al. (2017) Attitudinal variables and a possible mediating mechanism for vaccination practice in health care workers of a local hospital in L'Aquila (Italy). Hum Vaccin Immunother 13: 198-205.

44. Karafillakis E, Dinca I, Apfel F, Cecconi S, Wűrz A, et al. (2016) Vaccine hesitancy among healthcare workers in Europe: A qualitative study. Vaccine 34: 5013-5020.

45. Bish A, Yardley L, Nicoll A, Michie S (2011) Factors associated with uptake of vaccination against pandemic influenza: a systematic review. Vaccine 29: 6472-6484.

46. Asma S, Akan H, Uysal Y, Pocan AG, Sucakli MH, et al. (2016) Factors effecting influenza vaccination uptake among health care workers: a multi-center cross-sectional study. BMC Infect Dis 16: 192.

47. Torun SD, Torun F (2010) Vaccination against pandemic influenza A/H1N1 among healthcare workers and reasons for refusing vaccination in Istanbul in last pandemic alert phase. Vaccine 28: 5703-5710.

48. Mo PK, Wong CH, Lam EH (2019) Can the Health Belief Model and moral responsibility explain influenza vaccination uptake among nurses? J Adv Nurs 75: 1188-1206.