Shiraz E-Med J. 2021 May; 22(5):e102493. doi: 10.5812/semj.102493.

Published online 2020 December 21. **Research Article**

Factors Associated with Seasonal Influenza Vaccination Among Nursing Staff of Three Teaching Hospitals Affiliated to Kerman University of Medical Sciences, Iran

Ali Khalooei [1,*] and Mehdi Shafiei Bafti [2]

[1] Social Determinants of Health Research Centre, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran
[2] Research Center For Tropical and Infectious Diseases, Kerman University of Medical Sciences, Kerman, Iran

[*] *Corresponding author*: Department of Community Medicine, Kerman Medical School, 22 Bahman Blvd, Postal code/P.O. Box: 7616914115, Kerman, Iran. Email: dr_khalooei@yahoo.com

Received 2020 March 10; **Revised** 2020 June 17; **Accepted** 2020 June 17.

Abstract

Background: Although seasonal influenza vaccination decreases infection rate and associated complications, its coverage rate is suboptimal in healthcare workers worldwide.

Objectives: The present study aimed at assessing the predictors of influenza vaccination and reasons for accepting or refusing it among nursing staff.

Methods: The present study was conducted from February to March 2019 on nurses of three teaching hospitals affiliated to Kerman University of Medical Sciences in the Southeast of Iran. Data were collected using a validated questionnaire, including demographic data, knowledge, and attitude toward influenza and its vaccine, and reasons for accepting or refusing the vaccine. Data were analyzed by SPSS version 22. Independent samples t- and the chi-squared tests and the binary logistic regression were employed for data analysis.

Results: The influenza vaccination coverage rate was 10.1% among the nursing staff. Male gender (adjusted odds ratio (AOR) = 4.77, 95% confidence interval (CI) =2.13 - 10.64), receiving a recommendation for influenza vaccination in hospital (AOR = 1.86, 95% CI = 1.06 - 3.26), influenza vaccination of the family members (AOR = 2.61, 95% CI = 1.55 - 4.41), and a higher score of attitude toward influenza vaccination (AOR = 1.05, 95% CI = 1.03 - 1.07) increased the likelihood of influenza vaccination in the nursing staff. Fear of vaccine adverse effects (64.7%), lack of trust in vaccine manufacturers (36.0%), and being healthy (29.7%) were the most common reasons for refusing vaccination. Likewise, self-protection (79.6%), patient protection (73.0%), and family protection (72.4%) were the most common reasons for undergoing vaccination. The odds of influenza vaccine uptake was four times more among males than females (AOR = 4.77, 95% CI = 2.13 - 10.64), and odds of influenza vaccination was 1.86 times more among nursing staff receiving recommendations for influenza vaccination in hospital than the ones not receiving such recommendations (AOR = 1.86, 95% CI = 1.06 - 3.26). Also, odds of influenza vaccination increased 2.73 times in nursing staff whose family members received influenza vaccine (AOR = 2.61, 95% CI = 1.55 - 4.41). Furthermore, the model showed that one unit increase in the attitude score increased odds of influenza vaccination by 1.05 units (AOR = 1.05, 95% CI = 1.03 - 1.07).

Conclusions: The influenza vaccination rate was suboptimal among the nursing staff. Also, there were poor knowledge and improper attitude toward influenza and its vaccine among healthcare workers. Therefore, appropriate policies should be made at national and regional levels on increasing the rate of influenza vaccination.

Keywords: Influenza, Influenza Vaccine, Nursing Staff, Iran

1. Background

Influenza is an acute viral infection of the respiratory tract with a high transmission rate that can lead to an epidemic and pandemic of the disease (1). The annual global infection rate of influenza is estimated by 5% - 10%, 20% - 30%, and 10% - 20% among adults, children, and the total population, respectively (2). Regarding 3 - 5 million severe cases and 290,000 - 650,000 deaths attributed to the disease, influenza is considered a public health threat and challenge. It is estimated that the economic burden of influenza is annually more than USD11 billion in the USA, imposing a considerable burden on the health system (3).

Influenza can affect all groups of a population; some subgroups, such as children, pregnant women, patients with chronic diseases, and the elderly, are more vulnerable

and considered high-risk (2). Healthcare workers are at increased risk of exposure to influenza infection due to close contact with patients while providing health care services. Furthermore, the affected healthcare workers can transmit the disease to vulnerable patients and their families (4). They may be a reservoir of influenza for their patients and provoke nosocomial infection outbreaks among hospitalized patients, particularly those with underlying diseases (4).

Influenza vaccination is a key intervention to decrease the rate of morbidity, hospitalization, mortality, complications, and absenteeism related to the disease (5). Despite recommendations for influenza vaccination to healthcare workers by the World Health Organization, compliance with influenza vaccination by them is suboptimal worldwide, particularly in low -and medium-income countries (4, 6). Studies demonstrate a wide range of influenza vaccination rates across countries (7-9). A study reported influenza vaccination coverage among healthcare workers over 78% in the USA; however, another study found that less than 30% of their counterparts were vaccinated in European countries (7, 8). A study in 11 countries of the Eastern Mediterranean region reported the range of influenza vaccination rates from 1% in Pakistan to over 70% in Qatar (10). Several studies in Iran found a low coverage of influenza vaccination among hospital staff and other target groups (10-13).

Many factors at the individual and organizational levels are reported as motivators and barriers to influenza vaccination among healthcare workers (9, 10, 14). Demographic and personal characteristics, such as age, gender, educational level, occupational group, work setting, and work experience, were reported as factors influencing influenza vaccination in several studies (10, 14). Some studies found a relationship between uptake of the vaccine and knowledge and attitudes toward influenza and its vaccine among healthcare workers (6, 9, 15, 16). Results of many studies indicated other factors, such as misconceptions about side effects, the cost and availability, policies on the health system, and training, as determinants of compliance with influenza vaccination in healthcare workers (8, 15-17).

Although understanding the determinants of vaccine uptake is necessary to design a proper plan for promoting influenza vaccination, few studies reported factors influencing influenza vaccination among nurses in Iran (10-13, 18).

2. Objectives

The present study aimed at assessing factors influencing influenza vaccination and reasons for accepting or refusing it among nursing staff of teaching hospitals affiliated to Kerman University of Medical Sciences in the Southeast of Iran.

3. Methods

The present case-control study was conducted on the nursing staff of three teaching hospitals affiliated to Kerman University of Medical Sciences from February to March 2019. The cases were selected from all nursing staff of the hospitals vaccinated against seasonal influenza in 2018. The case group was identified based on the influenza vaccination forms archived in the hospitals; moreover, the list of the vaccinated nursing staff of the hospitals was requested. The control group subjects were selected using a simple random sampling method from the lists of nurses who did not receive any vaccines in the same year. The number of participants in the control group was twice more than that of the case group, and the ratio was the same for the three hospitals. Nurses directly involved in patient care, with at least one year of working experience, were included in the study, but part-time nurses were excluded.

A questionnaire consisting of four sections was used for data collection. The 1st section included demographic items, such as gender, age, work experience, occupational group, marital status, and educational level. More items such as the workplace, underlying diseases, influenza vaccination of family members, receiving a recommendation for influenza vaccination in hospital, receiving education about the influenza vaccine, and intent on influenza vaccination in the next year, were also included in this section. The 2nd section had 11 yes/no/I do not know items on influenza and its vaccine to assess the level of knowledge. The 3rd section had 12 items scored based on a five-point Likert scale (absolutely agree/agree/uncertain/disagree/absolutely disagree) to assess attitude toward influenza and its vaccine. The 4th section included items on the reasons for accepting or refusing influenza vaccination.

Content validity of the questionnaire was approved by an expert panel, including six experts in the disease prevention field. The content validity index was calculated as 0.82 and 0.86 for knowledge and attitude sections, respectively. A pilot study was performed on 30 nursing staff of the hospitals. The results of this assessment indicated the

Kuder-Richardson coefficient for the knowledge and Cronbach's alpha value for the attitude sections as 0.78 and 0.76, respectively. Exploratory factor analysis by the principal components method was used to confirm the construct validity. The result showed that the 11 items of the knowledge and 12 items of the attitude sections fell in two distinct factors. Factor loadings for attitude and knowledge ranged from 0.35 to 0.81 and 0.31 to 0.80, respectively.

In terms of scoring the knowledge section, incorrect and I do not know answers were given 0, and a correct answer 1; therefore, the possible knowledge score ranged from 0 to 11. Positive items of the attitude section were scored from 1 (absolutely disagree) to 5 (absolutely agree) and the negative ones reversely. Therefore, the possible score for each item and possible total score for the attitude section (summation of all items scores) could range from 1 to 5 and 12 to 60, respectively.

The questionnaire was completed by the participants. The study objectives and instructions to fill the questionnaire were provided for each subject. The questionnaires were completed after obtaining written consent. The study protocol was approved by the Ethics Committee of Kerman University of Medical Sciences (ethical code: IR.KMU.REC.1398.289).

Data were transferred to SPSS version 22. Descriptive results were expressed as mean, standard deviation (SD), and percentage. Independent samples t- and chi-squared tests were employed for univariate data analysis. Also, the binary logistic regression was used to determine the predictor variables of compliance with influenza vaccination. Accordingly, variables with P-values less than 0.2 in univariate analysis were used for regression modeling. A P-value of 0.05 was considered as the level of significance.

4. Results

Out of 555 participants (185 vaccinated and 370 unvaccinated), 480, including 160 in the vaccinated and 320 in unvaccinated groups, completed the questionnaire; 35 questionnaires were excluded due to incomplete data (8 and 37 questionnaires in the vaccinated and unvaccinated groups, respectively). In the end, data of 435 respondents (overall response rate = 78.4%), including 152 in the vaccinated (response rate = 82.2%) and 283 in unvaccinated groups (response rate = 76.5%), were entered in data analysis. The mean ± SD and median age of the participants were 35.88 ± 8.64 and 37 years, respectively; 53% aged 36 years or above. The majority of the participants were female (87.7%), and more than three-fourths of them (76.7%) were married. Moreover, 74.7% of the participants were nurses, and the rest were nurse assistants. The educational level of 76.1% of all the participants was a bachelor or higher degree, and over 62% worked in the internal medicine wards. The mean ± SD and median work experience of the subjects were 12.17 ± 8.26 and 12 years, respectively.

Out of 1830 nursing staff of the hospitals, 185 received influenza vaccines in 2018, representing the vaccination rate of 10.1%. Gender was significantly associated with the influenza vaccination in the participants ($P < 0.001$); however, the frequency of females in the vaccinated group (75.0%) was lower than that of the unvaccinated one (94.6%). In terms of occupational group, the frequency of nurses in the unvaccinated group was higher than that of the vaccinated one (80.4% vs. 64.5%), while the frequency of nurse assistants was higher in the vaccinated group (35.5% vs. 19.6%). A significantly higher proportion of the unvaccinated ones (80.6%) had a bachelor or higher degree compared to the vaccinated group (67.8%) ($P = 0.002$). Moreover, the frequency of influenza vaccination in the family members was significantly higher among the vaccinated ones (50.3%) compared to the unvaccinated group (25.4%) ($P < 0.001$). The majority of vaccinated ones (80.1%) received a recommendation for influenza vaccination in hospitals compared to the unvaccinated group (54.8%) ($P < 0.001$). Furthermore, a higher proportion of vaccinated ones (78.8%), compared to the unvaccinated group (34.1%), reported an intent to uptake influenza vaccine in the next year ($P < 0.001$). There was no significant difference ($P > 0.05$) between the vaccinated and unvaccinated groups in terms of age, marital status, work experience, ward type, underlying diseases, and receiving an education about the influenza vaccine (Table 1).

Frequencies of the correct answer to knowledge items are presented in Table 2, indicating no significant differences for most items between the groups (Table 2). The mean ± SD score of knowledge of influenza and the vaccine among all the participants was 5.89 ± 1.87 (out of 11). The mean score of knowledge was significantly higher in the vaccinated group (6.23 ± 1.82) than the unvaccinated one (5.70 ± 1.88) ($P < 0.001$).

The mean ± SD and median scores of attitude toward influenza and the vaccine were 42.60 ± 7.17 and 42 (out of 60) among the participants, respectively. Also, the mean score of attitude in the vaccinated ones was significantly higher than that of the unvaccinated group (46.01 ± 6.67 vs. 40.81 ± 6.77) ($P < 001$). In addition, the median scores of 11 (out of 12) items in the attitude section was higher in the vaccinated group compared to the unvaccinated one (Table 3).

Table 1. Distribution Frequency of Demographic and Background Characteristics of Nursing Staff in the Three Teaching Hospitals

Variable	Total, No. (%)	Case Group, No. (%)	Control Group, No. (%)	P-Value
Gender				< 0.001
Female	378 (87.7)	114 (75.0)	264 (94.6)	
Male	53 (12.3)	38 (25.0)	15 (5.4)	
Age, y				0.520
≤ 35	201 (46.9)	71(47.0)	130 (46.8)	
> 35	228 (53.1)	80 (53.0)	148 (53.2)	
Occupational group				< 0.001
Nurse	319 (74.7)	98 (64.5)	221 (80.4)	
Nurse assistant	108 (25.3)	54 (35.5)	54 (19.6)	
Marital status				0.495
Married	326 (76.7)	113 (76.4)	213 (76.9)	
Single/divorced	99 (23.3)	35 (23.6)	64 (23.1)	
Educational level				0.002
Bachelor and higher degrees	328 (76.1)	103 (67.8)	225 (80.6)	
Below bachelor's degree	103 (23.9)	49 (32.2)	54 (19.4)	
Work experience, y				0.416
≤ 10	192 (45.3)	69 (46.3)	123 (44.7)	
> 10	232 (54.7)	80 (53.7)	152 (55.3)	
Ward				0.379
Surgical	160 (37.8)	54 (36.5)	106 (38.5)	
Internal	263 (62.2)	94 (63.5)	169 (61.5)	
Underlying diseases				0.061
No	391 (90.5)	132 (87.4)	259 (92.5)	
Yes	41 (9.5)	19 (12.6)	21 (7.5)	
Influenza vaccination of the family members				< 0.001
Yes	147 (34.2)	76 (50.3)	71 (25.4)	
No	283 (65.8)	75 (49.7)	208 (74.6)	
History of hospitalization				0.385
Yes	31 (7.3)	12 (8.1)	19 (6.8)	
No	397 (92.7)	137 (91.9)	260 (93.2)	
Receiving a recommendation for influenza vaccination in hospital				< 0.0001
Yes	284 (66.0)	121 (80.1)	163 (54.8)	
No	146 (44.0)	30 (19.9)	116 (41.6)	
Education about influenza vaccine				0.106
Yes	353 (82.1)	130 (85.5)	223 (80.2)	
No	77 (17.9)	22 (114.5)	55 (19.8)	
Having an intent on influenza vaccination in the next year				< 0.001
Yes	206 (48.1)	119 (78.8)	87 (34.1)	
No	222 (51.9)	32 (21.2)	190 (68.6)	

Binary logistic regression analysis was employed to determine influenza vaccination predictors, and the result of the Hosmer-Lemeshow test showed a goodness-of-fit for the model (P = 0.097). Based on the model, four factors, including gender, influenza vaccination of the family members, receiving a recommendation for influenza vaccination in hospital, and the score of attitude toward influenza vaccination, were the predictors of influenza vaccination among the nursing staff. Odds of influenza vaccine uptake was four times higher in males than females (adjusted odds ratio (AOR) = 4.77, 95% confidence interval (CI) = 2.13 - 10.64), and odds of influenza vaccination was 1.86 higher in nursing staff receiving a recommendation for influenza vaccination than the ones not receiving it (AOR = 1.86, 95% CI = 1.06 - 3.26). Also, odds of influenza vaccination increased 2.73 times in nursing staff whose family members

Table 2. Frequency of Correct Answers to the Items on Knowledge of Influenza Vaccination Among Nursing Staff of the Three Teaching Hospitals

Items	Total, No. (%)	Case Group, No. (%)	Control Group, No. (%)	P
Signs and Symptoms typically appear 8 - 10 days after exposure to influenza virus	140 (33.1)	51 (34.7)	89 (32.2)	0.343
Fever and headache with sudden onset are the common symptoms of influenza.	362 (85.0)	136 (91.3)	226 (81.6)	0.007
Influenza infection can be transmitted through contact with blood and body fluids.	347 (81.6)	131 (87.9)	216 (78.3)	0.018
Infected people can transmit influenza only after the emergence of symptoms.	233 (55.5)	78 (53.4)	155 (56.6)	0.303
Healthcare workers can transmit influenza to their patients.	378 (88.9)	135 (90.6)	243 (88.0)	0.263
The best time to get the influenza vaccine is before winter.	233 (52.3)	77 (51.7)	146 (52.7)	0.840
Severe side effects and allergies are the rare interferences of influenza vaccination.	196 (46.3)	81 (54.4)	115 (42.0)	0.019
The flu shot contains live attenuated viruses.	37 (8.7)	15 (10.2)	22 (8.0)	0.472
The flu shot may cause some vaccinated people to get influenza.	57 (13.5)	21 (14.2)	36 (13.2)	0.767
The flu shot should be received every 3 to 5 years.	270 (63.4)	103 (69.1)	167 (60.3)	0.074
Immunity against influenza is developed about two weeks after vaccination.	255 (60.1)	95 (63.8)	160 (58.2)	0.299

Table 3. The Median and Interquartile Range of the Items on Attitude Toward Influenza Vaccination Among Nursing Staff of the Three Teaching Hospitals

Item	Total, Median (IQR)	Case Group, Median (IQR)	Control Group, Median (IQR)	P
The flu shot can cause severe side effects.	3.0 (3.0 - 4.0)	3.0 (2.0 - 4.0)	3.0 (2.0 - 4.0)	< 0.001
Healthcare workers need no influenza vaccine, as it cannot develop a critical illness.	4.0 (3.0 - 4.0)	4.0 (4.0 - 5.0)	4.0 (3.0 - 5.0)	< 0.001
I am healthy; therefore, I need no influenza vaccine.	4.0 (3.0 - 4.0)	4.0 (4.0 - 5.0)	3.0 (2.0 - 4.0)	< 0.001
The influenza vaccine is very effective in disease prevention.	4.0 (3.0 - 4.0)	4.0 (3.0 - 4.0)	3.0 (2.0 - 4.0)	< 0.001
The cost and time that should be spent on influenza vaccination are much more than that of its treatment.	4.0 (3.0 - 4.0)	4.0 (3.0 - 5.0)	3.0 (3.0 - 4.0)	0.010
The development of natural immunity by getting influenza is more effective than the one acquired by vaccination.	4.0 (3.0 - 4.0)	4.0 (3.0 - 4.0)	3.0 (2.0 - 4.0)	< 0.001
Influenza vaccination is recommended to make more money for manufacturing companies.	4.0 (3.0 - 4.0)	4.0 (3.0 - 4.0)	3.0 (3.0 - 4.0)	0.001
Healthcare workers get no influenza vaccine due to needle fear.	4.0 (3.0 - 4.0)	4.0 (3.0 - 5.0)	4.0 (3.0 - 4.0)	0.014
Influenza vaccination of healthcare workers reduces the risk of disease transmission to patients and family members.	4.0 (3.0 - 4.0)	4.0 (3.0 - 4.0)	3.0 (2.0 - 4.0)	< 0.001
Healthcare workers are at a higher risk of influenza compared to the general population.	4.0 (4.0 - 5.0)	4.0 (4.0 - 5.0)	4.0 (4.0 - 5.0)	0.570
Getting a flu shot can be harmful to the immune system.	4.0 (3.0 - 4.0)	4.0 (3.0 - 4.0)	4.0 (3.0 - 4.0)	< 0.001
Only the staff of infectious diseases wards should receive the influenza vaccine.	4.0 (3.0 - 4.0)	4.0 (4.0 - 5.0)	4.0 (3.0 - 4.0)	0.001

received influenza vaccine (AOR = 2.61, 95% CI = 1.55 - 4.41). Furthermore, the model showed that one unit increase in the attitude score increased the odds of influenza vaccine uptake by 1.05 units (AOR = 1.05, 95% CI = 1.03 - 1.07) (Table 4).

As presented in Table 5, the most common reason for not receiving the influenza vaccine was the fear of vaccine adverse effects (64.7%), and more than one-third of the unvaccinated subjects cited the lack of trust in vaccine manufacturers (36.0%) as a reason for refusing vaccination. Moreover, three reasons were reported for refusing the vaccine in over one-fourth of the unvaccinated subjects as being healthy (29.7%), lack of effectiveness of the vaccine (29.3%), and not considering influenza as a serious and severe disease (26.1%).

The three most frequent reasons given for vaccine

Table 4. Binary Logistic Regression Analysis to Determine Influenza Vaccination Predictors of Nursing Staff in the Three Teaching Hospitals

Predictor	B	SE	AOR	95% CI for AOR
Gender				
Female	Reference			
Male	1.563	0.409	4.77	2.13 - 10.64
Occupational group				
Nurse	Reference			
Nurse assistant	1.030	0.815	2.80	0.56 - 13.84
Influenza vaccination of the family members				
No	Reference			
Yes	0.961	0.267	2.61	1.55 - 4.41
Educational level				
Bachelor and higher degrees	Reference	0.829	0.73	0.14 - 3.72
Below bachelor's degree	-0.311			
Underlying diseases				
No	Reference			
Yes	-0.017	0.443	0.98	0.41 - 2.34
Receiving a recommendation for influenza vaccination in hospital				
No	Reference			
Yes	0.623	0.286	1.86	1.06 - 3.26
Attitude score	0.052	0.010	1.05	1.03 - 1.07
Knowledge score	-0.093	0.070	0.911	0.79 - 1.04
Constant	-4.578	0.673	0.010	-

Table 5. Main Reasons for Acceptance or Refusal of Influenza Vaccination Among Nursing Staff of the Three Teaching Hospitals

Reasons	No (%)
Reasons cited by the Unvaccinated Nursing Staff for Refusing Influenza Vaccination	
Fear of influenza vaccine adverse effects	183 (64.7)
I did not trust in vaccine manufacturers.	102 (36.0)
I did not need the vaccine uptake because I was healthy.	84 (29.7)
Belief in the vaccine ineffectiveness	83 (29.3)
Influenza is not a serious and severe disease.	74 (26.1)
Fear of needles	55 (19.4)
I did not receive any recommendations for influenza vaccination.	53 (18.7)
The vaccine was not available in the hospital.	50 (17.7)
Pregnancy or lactation	31 (11.0)
Reasons cited by the Vaccinated Nursing Staff for Accepting Influenza Vaccination	
Self-protection	121 (79.6)
Patient protection	111 (73.0)
Family protection	110 (72.4)
Recommendations by the Ministry of Health	66 (43.4)

uptake were self-protection (79.6%), patient protection (73.0%), and family protection (72.4%). A recommendation for vaccination by hospital managers was cited by 43.4% of the vaccinated subjects as a reason for accepting it (Table 5).

5. Discussion

The result of the present study showed that a high proportion (~ 90%) of the nursing staff did not have compliance with influenza vaccination. Studies conducted on healthcare workers of the Middle-East and most European

countries revealed that the influenza vaccination rate was suboptimal; however, more than three-fourths of healthcare workers received the vaccine in the USA in 2017 (6, 9). In four studies performed in Iran, compliance with influenza vaccination among healthcare workers was 27.7%, 30.7%, 51%, and 57.7% (10-13). Some studies reported suboptimal adherence to preventive and therapeutic measures in patients and healthcare workers (19, 20). Suboptimal compliance with protective and personal safety measures may lead to some consequences, such as increased morbidity, mortality, and healthcare expenditure (19).

The present study showed a knowledge gap between influenza and its vaccine in the participants; however, the vaccinated nursing staff had a higher knowledge than the unvaccinated ones. Consistent with the present study, research demonstrated a positive relationship between knowledge level and influenza vaccine uptake in healthcare workers (9, 21, 22). Insufficient information and misconceptions about influenza and the vaccine were reported as primary factors influencing noncompliance with the vaccination in some studies (14, 23, 24). Increasing the knowledge of the disease and its vaccine leads to making an informed decision on the vaccination (25).s

The present study revealed that attitude toward influenza vaccination among the nursing staff was suboptimal but more positive in the vaccinated subjects than the unvaccinated ones. In line with the present study findings, several studies revealed that most healthcare workers had a negative attitude and incorrect belief in the influenza vaccine (9, 26, 27). A negative attitude toward the influenza vaccine was reported as the main barrier to vaccination (9). In addition, a proper understanding of the risk of the disease and a positive attitude toward safety, efficacy, and benefits of influenza vaccine are associated with a higher rate of adherence to influenza vaccination among healthcare workers (6, 28, 29).

The present study demonstrated that the fear of vaccine adverse effects was the most common reason (64.7%) among the nurses for refusing the influenza vaccination. A study in some Middle-Eastern and North-African countries reported that the fear of vaccine side effects was one of the main barriers to influenza vaccination in Algeria, Turkey, Libya, Lebanon, and Iran (9). Furthermore, the prevalence of fear of vaccine adverse effects as a reason for noncompliance with the vaccination in healthcare workers was reported in three studies in Iran as 14.3%, 23.1%, and 51%; in the present study, it had a considerable higher frequency (11, 12, 30). Awareness of vaccine safety may result in lower concerns about vaccine adverse effects and increased vaccine acceptance (6).

Mistrust in pharmaceutical companies was another reason for refusing vaccination against influenza. Consistent with the present study result, Freimuth et al. (31), found a low trust in vaccine manufacturers in the USA; lack of confidence in the vaccine, health system, and vaccine manufacturers were identified as factors influencing the refusal of influenza vaccination (31, 32).

Self-protection, patient protection, and family protection were the main reasons for influenza vaccine uptake in the vaccinated group; recommendations by the Ministry of Health were the reasons for vaccination only in 43.4% of the participants. Several studies, consistent with the present study, reported self-protection as the primary motivating factor of vaccination; however, there were inconsistencies with the present study results as patient protection was less motivating (22, 28, 33, 34). According to a review study, 23 out of 40 studies found that self-protection and family protection were the most common reasons for influenza vaccine uptake (35). Some authors stated that to improve vaccination coverage in healthcare personnel, highlighting self-protection and family protection as a personal gain is more effective than patient protection as a moral consideration or organizational regulation (33, 34).

The present study showed gender, occupational group, and educational level as the personal characteristics contributing to influenza vaccine uptake. Unlike the present study findings, studies in Iran did not report any differences in the influenza vaccination rate between genders (10, 11, 13). A review study found that sociodemographic characteristics, such as gender and age, were the most commonly reported factors for influenza vaccine uptake; however, the knowledge and attitude toward influenza vaccine and workplace conditions were more influential than sociodemographic factors (15).

To the best of the authors' knowledge, it was the first case-control study on factors contributing to the acceptance of influenza vaccine in Iran; however, self-selection bias may be a possible limitation of the study as the participants were more likely to have information about the influenza vaccine.

5.1. Conclusions

The current study results revealed that the influenza vaccination rate was suboptimal among the nursing staff. Also, there was poor knowledge and improper attitude toward influenza and its vaccine among healthcare workers. Furthermore, the present study found that male gender, receiving a recommendation for influenza vaccination in hospital, influenza vaccination of family members, and attitude toward influenza vaccination were the predictors

of adherence to influenza vaccination. In addition, self-protection and patient protection were the common reasons for compliance with influenza vaccination, and fear of vaccine adverse effects and mistrust in vaccine manufacturers were the most common reasons for incompliance with it.

Footnotes

Authors' Contribution: Ali Khalooei and Mehdi Shafiei Bafti did study conception and design, and drafting of the manuscript. Mehdi Shafiei Bafti did data collection. Ali Khalooei did data analysis and interpretation, and critical revision of the manuscript.

Conflict of Interests: The authors declared no conflicts of interest.

Ethical Approval: The study protocol was approved by the Research Ethics Committee of Kerman University of Medical Sciences (ethical code: IR.KMU.REC.1398.289).

Funding/Support: The present study was supported by Kerman University of Medical Sciences.

Informed Consent: The objectives of the study and confidentiality of data were explained to each participant and written consent was obtained.

References

1. Moghadami M. A Narrative Review of Influenza: A Seasonal and Pandemic Disease. *Iran J Med Sci*. 2017;**42**(1):2–13. [PubMed: 28293045]. [PubMed Central: PMC5337761].
2. Puig-Barbera J, Tormos A, Trushakova S, Sominina A, Pisareva M, Ciblak MA, et al. The Global Influenza Hospital Surveillance Network (GIHSN): a new platform to describe the epidemiology of severe influenza. *Influenza Other Respir Viruses*. 2015;**9**(6):277–86. doi: 10.1111/irv.12335. [PubMed: 26198771]. [PubMed Central: PMC4605407].
3. Putri W, Muscatello DJ, Stockwell MS, Newall AT. Economic burden of seasonal influenza in the United States. *Vaccine*. 2018;**36**(27):3960–6. doi: 10.1016/j.vaccine.2018.05.057. [PubMed: 29801998].
4. World Health Organization. *How to implement seasonal influenza vaccination of health workers: an introduction manual for national immunization programme managers and policy makers: pilot version 2019*. 2019. Contract No.: 9241515597.
5. Costantino C, Vitale F. Influenza vaccination in high-risk groups: a revision of existing guidelines and rationale for an evidence-based preventive strategy. *J Prev Med Hyg*. 2016;**57**(1):E13–8. [PubMed: 27346934]. [PubMed Central: PMC4910437].
6. Dini G, Toletone A, Sticchi L, Orsi A, Bragazzi NL, Durando P. Influenza vaccination in healthcare workers: A comprehensive critical appraisal of the literature. *Hum Vaccin Immunother*. 2018;**14**(3):772–89. doi: 10.1080/21645515.2017.1348442. [PubMed: 28787234]. [PubMed Central: PMC5861785].
7. Black CL, Yue X, Ball SW, Fink RV, de Perio MA, Laney AS, et al. Influenza Vaccination Coverage Among Health Care Personnel - United States, 2017-18 Influenza Season. *MMWR Morb Mortal Wkly Rep*. 2018;**67**(38):1050–4. doi: 10.15585/mmwr.mm6738a2. [PubMed: 30260944]. [PubMed Central: PMC6188123].
8. Mereckiene J. *Seasonal Influenza Vaccination in Europe: Overview of Vaccination Recommendations and Coverage Rates in the EU Member States for the for the 2012-13 Influenza Season*. ECDC; 2015.
9. Zaraket H, Melhem N, Malik M, Khan WM, Dbaibo G, Abubakar A. Review of seasonal influenza vaccination in the Eastern Mediterranean Region: Policies, use and barriers. *J Infect Public Health*. 2019;**12**(4):472–8. doi: 10.1016/j.jiph.2018.10.009. [PubMed: 30446255].
10. Palizi F, Mehrdad R, Izadi N. Influenza Vaccination attitudes of healthcare workers in Iran. *Int J Pharm Technol*. 2016;**8**:13978–86.
11. Hosamirudsari H, Kanavee AR, Ghanbari M, Akbarpour S, Alimohamadi Y. Assessment of the belief and attitudes of Iranian healthcare personnel's toward the influenza infection and influenza vaccination. *J Prev Med Hyg*. 2019;**60**(3):E178–83. doi: 10.15167/2421-4248/jpmh2019.60.3.1056. [PubMed: 31650051]. [PubMed Central: PMC6797887].
12. Kamali Aghdam M, Shojaeyan Z, Diaz D, Eftekhari K. Causes of Non-Vaccination of Influenza in Healthcare Workers at Zanjan Educational Hospitals, Iran. *Int J Pediatrics*. 2019;**7**(10):10167–74.
13. Aliyari R, Imani S, Rezaiy T, Shariati M, Hanifehzad Masooleh P, Mirrezaie SM. Seasonal Influenza Vaccination Uptake and Its Socioeconomic Determinants in Patients and Staff of Hospitals in Shahroud, Northwest of Iran. *Shiraz E-Med J*. 2019;**In Press**(In Press). doi: 10.5812/semj.82898.
14. Petek D, Kamnik-Jug K. Motivators and barriers to vaccination of health professionals against seasonal influenza in primary healthcare. *BMC Health Serv Res*. 2018;**18**(1):853. doi: 10.1186/s12913-018-3659-8. [PubMed: 30428886]. [PubMed Central: PMC6234642].
15. Schmid P, Rauber D, Betsch C, Lidolt G, Denker ML. Barriers of Influenza Vaccination Intention and Behavior - A Systematic Review of Influenza Vaccine Hesitancy, 2005 - 2016. *PLoS One*. 2017;**12**(1). e0170550. doi: 10.1371/journal.pone.0170550. [PubMed: 28125629]. [PubMed Central: PMC5268454].
16. Collange F, Verger P, Launay O, Pulcini C. Knowledge, attitudes, beliefs and behaviors of general practitioners/family physicians toward their own vaccination: A systematic review. *Hum Vaccin Immunother*. 2016;**12**(5):1282–92. doi: 10.1080/21645515.2015.1138024. [PubMed: 27078723]. [PubMed Central: PMC4963063].
17. Stead M, Critchlow N, Patel R, MacKintosh AM, Sullivan F. Improving uptake of seasonal influenza vaccination by healthcare workers: Implementation differences between higher and lower uptake NHS trusts in England. *Infect Dis Health*. 2019;**24**(1):3–12. doi: 10.1016/j.idh.2018.09.082. [PubMed: 30541694].
18. Nakhaeizadeh M, Bahar S, Khalooei A. The Prevalence of Seasonal Influenza Vaccination in Pregnant Women Referring to Tertiary Hospitals of Kerman, Iran. *Shiraz E-Med J*. 2020;**In Press**(In Press). doi: 10.5812/semj.100583.
19. Porto JS, Marziale MH. Reasons and consequences of low adherence to standard precautions by the nursing team. *Rev Gaucha Enferm*. 2016;**37**(2). e57395. doi: 10.1590/1983-1447.2016.02.57395. [PubMed: 27253597].
20. Benrazavy L, Khalooei A. Medication Adherence and its Predictors in Type 2 Diabetic Patients Referring to Urban Primary Health Care Centers in Kerman City, Southeastern Iran. *Shiraz E-Med J*. 2019;**20**(7). doi: 10.5812/semj.84746.
21. Jaiyeoba O, Villers M, Soper DE, Korte J, Salgado CD. Association between health care workers' knowledge of influenza vaccine and vaccine uptake. *Am J Infect Control*. 2014;**42**(1):69–70. doi: 10.1016/j.ajic.2013.06.020. [PubMed: 24176601].
22. Smith S, Sim J, Halcomb E. Nurses' knowledge, attitudes and practices regarding influenza vaccination: an integrative review. *J Clin Nurs*. 2016;**25**(19-20):2730–44. doi: 10.1111/jocn.13243. [PubMed: 27206347].

23. Couto CR, Pannuti CS, Paz JJ, Fink MC, Machado AA, de Marchi M, et al. Fighting misconceptions to improve compliance with influenza vaccination among health care workers: an educational project. *PLoS One*. 2012;**7**(2). e30670. doi: 10.1371/journal.pone.0030670. [PubMed: 22328920]. [PubMed Central: PMC3273463].
24. Committee On Infectious D. Influenza Immunization for All Health Care Personnel: Keep It Mandatory. *Pediatrics*. 2015;**136**(4):809–18. doi: 10.1542/peds.2015-2922. [PubMed: 26347432].
25. Nowak GJ, Sheedy K, Bursey K, Smith TM, Basket M. Promoting influenza vaccination: insights from a qualitative meta-analysis of 14 years of influenza-related communications research by U.S. Centers for Disease Control and Prevention (CDC). *Vaccine*. 2015;**33**(24):2741–56. doi: 10.1016/j.vaccine.2015.04.064. [PubMed: 25936726]. [PubMed Central: PMC5856146].
26. Stead M, Critchlow N, Eadie D, Sullivan F, Gravenhorst K, Dobbie F. Mandatory policies for influenza vaccination: Views of managers and healthcare workers in England. *Vaccine*. 2019;**37**(1):69–75. doi: 10.1016/j.vaccine.2018.11.033. [PubMed: 30470641].
27. Ermenlieva NM, Tsankova GS, Todorova TT. Seasonal influenza vaccination: knowledge, attitude and practice in Varna, Bulgaria. *Ther Adv Vaccines Immunother*. 2019;**7**:2515135519868152. doi: 10.1177/2515135519868152. [PubMed: 31598582]. [PubMed Central: PMC6763941].
28. Durando P, Alicino C, Dini G, Barberis I, Bagnasco AM, Iudici R, et al. Determinants of adherence to seasonal influenza vaccination among healthcare workers from an Italian region: results from a cross-sectional study. *BMJ Open*. 2016;**6**(5). e010779. doi: 10.1136/bmjopen-2015-010779. [PubMed: 27188810]. [PubMed Central: PMC4874132].
29. Alshammari TM, Yusuff KB, Aziz MM, Subaie GM. Healthcare professionals' knowledge, attitude and acceptance of influenza vaccination in Saudi Arabia: a multicenter cross-sectional study. *BMC Health Serv Res*. 2019;**19**(1):229. doi: 10.1186/s12913-019-4054-9. [PubMed: 30992004]. [PubMed Central: PMC6469139].
30. Khazaeipour Z, Ranjbarnovin N, Hoseini N. Influenza immunization rates, knowledge, attitudes and practices of health care workers in Iran. *J Infect Dev Ctries*. 2010;**4**(10):636–44. doi: 10.3855/jidc.1152. [PubMed: 21045356].
31. Freimuth VS, Jamison AM, An J, Hancock GR, Quinn SC. Determinants of trust in the flu vaccine for African Americans and Whites. *Soc Sci Med*. 2017;**193**:70–9. doi: 10.1016/j.socscimed.2017.10.001. [PubMed: 29028558]. [PubMed Central: PMC5706780].
32. Karlsson LC, Lewandowsky S, Antfolk J, Salo P, Lindfelt M, Oksanen T, et al. The association between vaccination confidence, vaccination behavior, and willingness to recommend vaccines among Finnish healthcare workers. *PLoS One*. 2019;**14**(10). e0224330. doi: 10.1371/journal.pone.0224330. [PubMed: 31671115]. [PubMed Central: PMC6822763].
33. Lorenc T, Marshall D, Wright K, Sutcliffe K, Sowden A. Seasonal influenza vaccination of healthcare workers: systematic review of qualitative evidence. *BMC Health Serv Res*. 2017;**17**(1):732. doi: 10.1186/s12913-017-2703-4. [PubMed: 29141619]. [PubMed Central: PMC5688738].
34. Yu J, Ren X, Ye C, Tian K, Feng L, Song Y, et al. Influenza Vaccination Coverage among Registered Nurses in China during 2017-2018: An Internet Panel Survey. *Vaccines (Basel)*. 2019;**7**(4). doi: 10.3390/vaccines7040134. [PubMed: 31569475]. [PubMed Central: PMC6963313].
35. Cohen DL, John Casken RN. Why are healthcare workers so resistant to the acceptance of influenza vaccine? A review of the literature to examine factors that influence vaccine acceptance. *Int J Caring Sci*. 2012;**5**(1):26.