Acceptance of Seasonal Influenza Vaccination by Healthcare Workers in Security Forced Hospital, Riyadh, Saudi Arabia

Meshari Zayed Almutari[1], Abdulmajeed Mualla M Alotaibi[2], Abdullah Mohammad Alluhaidan[1],
Yazid Saad Alotaibi[1], Ryan Mohammed Alamri[1], Mohamed Saud Alshamari[3],
Turki Khalid Alotaibi[4], Nora Talal Alnashri[5]

[1]Imam Mohammad bin Saud University, [2]Gdansk Medical University, [3]King Saud bin Abdulaziz University for Health Sciences, [4]King Saud University, [5]Royal College of Surgeons Ireland (RCSI)
*Corresponding author: Meshari Zayed Almutairi - Mr.mesho1@hotmail.com , Tel: +966564001088

ABSTRACT
Background: influenza is a major respiratory tract infection that can cause substantial morbidity and mortality. The World Health Organization (WHO), United States (US) Center for Disease Control and Prevention (CDC) and the immunization guidelines set by many countries including Saudi Arabia recommended the influenza vaccination of healthcare workers (HCWs).
Objectives: to estimate the influenza vaccination rate among HCWs in Security Forced Hospital and to study the effect of the HCWs' beliefs about influenza vaccine and influenza disease on acceptance of influenza vaccine by HCWs in Security Forced Hospital.
Methods: the study is a retrospective study conducted in Security Forced Hospital between September and December 2017. Data were collected using a self-administrated well-structured questionnaire to get the relevant data needed in our study.
Results: out of the 249 participants, 126 (50.6%) have received the influenza vaccine. Most of our participants were Saudi (70.3%), married (70.7%) and Muslims (78.3%). While, 33% of them were degree holder, 36.5% were university students and 30.5% were having less education level. The income of most of the participants (36.1%) was more than 15000 SAR per month.
Conclusion: the vaccination against influenza plays an important role in prevention of infection.Further studies with lager population in different societies are recommended.
Keywords: Seasonal Influenza, Vaccination, Healthcare Workers.

INTRODUCTION

Influenza is a major respiratory tract infection that can cause substantial morbidity and mortality [1].Influenza caused by influenza virus types A, B or C [2]. Influenza type A is considered the most severe type of influenza. H1N1, a typeA virus, was the first influenza virus recovered (1933) and was responsible for the recent influenza pandemic [3]**.**

Influenza infections among hospitalized patients can have much more serious consequences than among the general population because an increasing proportion of hospital patients are elderly and immunocompromised [4].Influenza vaccination is universally recognized as the essential intervention to limit the spread of the virus particularly among elderly and patients with comorbidities [5]. The World Health Organization (WHO), United States (US) Center for Disease Control and Prevention (CDC) and the immunization guidelines set by many countries including Saudi Arabia recommended the influenza vaccination of healthcare workers (HCWs) [6].

Annually about 9% of the world's population are affected by influenza [7]. In Saudi Arabia during the pilgrimage season there is a high risk for transmission of influenza infection posing major threat to the health of airport personnel, healthcare staff, security personnel and civilians. Hence Saudi Thoracic Society had issued guidelines recommending adoption of strict vaccination strategies [8].

The WHO[9] and the CDC[10] have endorsed the promotion of the flu vaccine. The WHO has aggressively campaigned for the importance of the flu vaccine program both nationally and internationally. Further, they declared that the seasonal flu vaccine is safe, and the most effective in the protection against the flu and avoidance of severe complications that result in hospitalization.

There are many studies at the local and global level that are interested in studying awareness and knowledge of influenza vaccine [11-15].The current study aimed to investigate the influenzavaccination rate among HCWs in Security Forced Hospital and to

study the effect of the HCWs' beliefs about influenza vaccine and influenza disease on acceptance of influenza vaccine by HCWs in Security Forced Hospital.

SUBJECTS AND METHODS
Study design
The study is a retrospective study conducted in Security Forced Hospital between September and December 2017. **The study was done after approval of ethical board of Imam Mohammad bin Saud university**.

Study area:
The study targets healthcare workers in Security Forced Hospital, Riyadh, Saudi Arabia.

Study population:
The study population would include all HCWs in Security Forced Hospital. They would be stratified by their occupation to physicians, nurses, and others. A random sample of 249 participants would be selected from them. After signing an informed consent form, each participant completed a questionnaire on their socio-demographic characters, knowledge and health status regarding influenza vaccine.

Inclusion criteria
HCWs in Security Forced Hospital.

Exclusion criteria
Staffs whose covering peripheral clinic or on leave during data collection.

Sample size calculation:
The study's sample size was calculated using the following formula for simple random sampling:

$$n = \frac{z^2 pq}{d^2}$$

Where:
a) (p) is anticipated prevalence (proportion), and it was chosen to be 50% since there is no literature evidence for previous prevalence; the choice of 50% insures that we have maximized our sample size.
b) (z) is the normal distribution value (1.96) with 95% confidence and 5% error.
c) (q) is the complement of the proportion $(1 - p)$.
d) (d) is delta, the error tolerance around the estimation.

Study variables
Independent variables: Socio-demographic characteristics such as age, nationality, level of education, occupation, and income.
Dependent variable: Level of influenza vaccine awareness.

Data collection
Data were collected using a self-administered well-structured questionnaire to get the relevant data needed in our study. The questionnairewas initially prepared in English then translated into Arabic and packed to English by using cross culturing translator guidelines. The first part of the questionnaire included introduction and instructions. The second part consists of ten questions about socio-demographics including age, gender, marital status, nationality, occupation, income, nature of work and number of experience years. The third partconsisted of six questions and was carefully designated to ask about the acceptance of influenza vaccine among HCWs.

Statistical analysis
Statistical analysis was done using SPSS 16.0 statistical software package. Results were presented as mean and standard deviation for quantitative data, frequencies and percent for qualitative data. Independent t-test was used to compare quantitative variables between two study groups ANOVA test was used when comparing score between more than two groups. Chi-square test was used for comparing qualitative variables between groups. A probability value of less than or equal 0.05 was considered statistically significant. Scoring system for beliefs about influenza disease and vaccine question (11 questions) was used. Scoring 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 55.

RESULTS
Out of the 249 randomly selected HCWs have completed and returned the questionnaires. 126 (50.6%) have received the influenza vaccine.

Socio-demographics Characteristics of Participants:
The first part of the questionnaire, nine questions, was designed to assess the socio-

demographics characteristics of the participants. Responses to the questions of this part were expressed as frequency and percent and were represented in **Table (1)**.

About half (52.6%) of the respondents were males. The age median was 57 years. Most of our participants were Saudi (70.3%), married (70.7%) and Muslims (78.3%). While 33% of them were adegree holder, 36.5% were university students,and 30.5% had less education level.The income of most of the participants (36.1%) was more than 15000 SAR per month. Most of theparticipants having a clinical work in nature (85.9%) where most of them(53%) were physicians, 24.5% were nurses,and the rest (22.5%) were classified as others which included pharmacists, administrator, technicians,and others. Most of theclinical health co-workers (62.7%) have less than five years of experience in this field.

Work and Heath related Characteristics of the Participants:

The second part consisted of six questions. The first one was about if the participant was previously diagnosed with influenza infection or not. The following four questions were asked about if the participants have received the influenza vaccine if the answer was yes who many times they received it, if the participant received the vaccine for this season (2016-2017) and if they would receive it for the next season or not. The last one concerned with the history of chronic diseases. Responses to these questions have also been expressed as frequency and percent in **Table (2)**.

38.2% of the respondents have no history of seasonal influenza. While 29.7% declared that they have never received the vaccine in their life, 20.9% received the vaccine only one time, 18.5% received the vaccine two times,and 30.9% claimed that they had received it more than two times. Health wise, 14.1% of the respondents gave a history of chronic diseases.

The relationship between socio-demographic Characteristics of the participants and the influenza vaccine status:

A statistically significant association existed between most of the socio-demographic factors and vaccination acceptance (**Table 3**). However; Age, marital status, education, income, nature of work and years of experience in clinical workwere notsignificantly associated with the vaccination status. Males were 1.5 times more to accept the flu vaccine than female,and a Saudi HCW was 3.7 times more to accept it compared to the non-Saudi one. Also, Muslims HCWs were 5.6 more to accept vaccination. Physicians were more willing to receive the influenza vaccine than nurses and other HCWs.

Work and health status-related factors associated with uptake of influenza vaccine among HCWs:

A statistically non-significant association existed between all work and heath related factors and acceptance of the flu vaccine (**Table 4**). Respondents HCWs who do clinical work were found more wildlings to receive the vaccine.Unexpected results participants who arehaving less than five years of experience were found more accepting of the vaccine than more experienced ones.

Comparison of influenza score according to vaccination status and different demographic features:

Table (5)compared the means, standard deviations, medians, and interquartile ranges of scores of demographic features, across the vaccinated and unvaccinated HCWs. Our results reported a significant correlations between means of scores of vaccinated and non-vaccinated participants (P-value<0.001) (**Table 5**), means of scores of nature of work, occupations, and experience (P-value= 0.026, 0.028 and 0.031 respectively). However the difference in the means of chronic diseases, sex, marital status and nationality were statistically insignificant.

Table 1: Socio-demographic characters

Age	Mean±SD	112	
	Median	57	
	Range	20	
		N (249)	**%**
Sex	Male	131	52.6
	Female	118	47.4
Nationality:	Saudi	175	70.3
	Non-Saudi	74	29.7
Marital status	Married	176	70.7
	Single	73	29.3
Religion	Islam	195	78.3
	Christianity	50	20.1
	Other	4	1.6
Education	Graduate	43	17.3
	Postgraduate	39	15.7
	University student	91	36.5
	Less education	76	30.5
Income per month	< 5000 SR	45	18.1
	5000 – 10000 SR	77	30.9
	10001 – 15000 SR	37	14.9
	> 15000 SR	90	36.1
Occupation	Physician	132	53.0
	Nurse	61	24.5
	Pharmacist	5	2.0
	Administrator	11	4.4
	Technician	8	3.2
	Others	32	12.9
The nature of your work:	☐ Clinical	214	85.9
	☐ Non-clinical	35	14.1
Number of years working in health care field	☐< 5 years	156	62.7
	☐ 5 – 10 years	48	19.3
	☐> 10 years	45	18.1

Table 2: participants' Work and Heath related Characteristics:

		N (249)	%
diagnosed with seasonal influenza infection	Yes	72	28.9
	No	95	38.2
	or not sure	82	32.9
Having received the seasonal influenza vaccine	Yes	175	70.3
	No or not sure	74	29.7
times receiving an influenza vaccine	Never	74	29.7
	Once	52	20.9
	Twice	46	18.5
	Many	77	30.9
Have you received the influenza vaccine for this season (2016-2017)?	Yes	123	49.4
	No	126	50.6
Would you receive theflu vaccine for thecoming season?	Yes	121	48.6
	No	68	27.3
	or not sure	60	24.1
Having chronic disease	Yes	35	14.1
	No	214	85.9

Table 3: The relationship between socio-demographic Characteristics of the participants and the influenza vaccine status

			Non-vaccinated N=123	Vaccinated N=126	P value
Sex	Male	N	56	75	0.027
		%	42.7%	57.3%	
	Female	N	67	51	
		%	56.8%	43.2%	
Nationality	Saudi	N	76	99	0.004
		%	43.4%	56.6%	
	Non-Saudi	N	47	27	
		%	63.5%	36.5%	
Religion	Islamic	N	88	107	0.010
		%	45.1%	54.9%	
	Non-Islamic	N	35	19	
		%	64.8%	35.2%	
Occupation	Physician	N	63	69	0.039
		%	47.7%	52.3%	
	Nurse	N	38	23	
		%	62.3%	37.7%	
	Others	N	22	34	
		%	39.3%	60.7%	

Table 4: Work and health status-related factors associated with uptake of influenza vaccine among HCWs

			Non-vaccinated N=123	Vaccinated N=126	P value
Nature of work	Clinical	N	110	104	.118
		%	51.4%	48.6%	
	Nonclinical	N	13	22	
		%	37.1%	62.9%	
Experience	< 5y	N	76	80	.056
		%	48.7%	51.3%	
	5-10y	N	30	18	
		%	62.5%	37.5%	
	>10y	N	17	28	
		%	37.8%	62.2%	
Having chronic disease	Yes	N	107	107	.638
		%	50.0%	50.0%	
	No	N	16	19	
		%	45.7%	54.3%	
		%	107	107	

Table 5: Comparison of influenza score according to vaccination status

Mean score	N	Mean	SD	P value
Vaccinated	123	39.2846	4.92155	<0.001
Non-vaccinated	126	36.7619	4.44959	

Table 6: Comparison of influenza score according to demographic features

		Mean	SD	P value
Nature of work	clinical	38.3551	4.97930	0.026
	No	35.8857	3.26092	
Experience	<5 y	38.5192	5.16873	0.028
	5-10	37.9167	4.25683	
	>10	36.3333	3.89055	
Chronic disease	Yes	38.2009	4.99594	0.121
	No	36.8286	3.65003	
Occupation	Physician	38.7576	5.09471	0.031
	Nurse	37.3443	4.13878	
	Others	36.9643	4.74040	
Sex	Male	38.3282	5.14773	0.273
	Female	37.6525	4.48431	
Marital	Single	38.1989	4.63283	
	Married	37.5479	5.33344	
Nationality	Saudi	38.0743	5.04009	0.741
	Non-	37.8514	4.38454	

DISCUSSION

It is well-established fact that the vaccination of medical students and other healthcare staff against the influenza virus reduces the transmission of infection [16]. Influenza is given high priority in Saudi Arabia where numerous reports of different types of influenza outbreaks have occurred in recent years [17].The current study documented the prevalence and associated factors of influenza vaccination among health coworkers in Saudi Arabia.

Our results revealed that about half of participants do not receive the influenza vaccine. Most of our participants were Saudi, married and Muslims. The income of most of the participants was more than 15000 SAR. Most of theparticipants have a clinical work in nature where most of them were physicians. A statistically significant association was existed between most of the socio-demographic factors and vaccination acceptance. However;age, marital status, education, income, nature of work and years of experience in clinical workwere notsignificantlyassociated with the vaccination status. A statistically non-significant association was existed between all work and heath related factors and acceptance of the flu vaccine. Respondents HCWs who do clinical work were found more wildlings to receive the vaccine.Unexpected results of participants who arehaving less than 5 years of experience were found more accepting to the vaccine than more experienced ones. Our results also reported a significant correlations between means of scores of vaccinated and non-vaccinated participants, means of scores of nature of work, occupations and experience, however the difference in the means of chronic diseases, sex, marital status and nationality were statistically insignificant.

There were many similar studies were performed, **Al-Tawfiq *et al*.**[1]conducted a study in the Saudi Arabia and they reported that, of the total respondents, 51 (20.9%) were Saudi, 114 (46.7%) were other Arabs, 21 (4%) were North American, 21 (8.6%) were from theUK or South Africa,and 48 (19.7%) did not indicate their nationalities. There were 32 (13.1%) physicians and 132 (54.1%) nurses. The overall influenza vaccination rate was 41% in the preceding year and 69% in the precedingfive years, and 49.2% ($n = 110$) of the latter group received one to three vaccines. Another Saudi study was done by Madani and Ghabrah 2007 [12]stated that a total of 392 HCWs were studied including 215 (54.8%) nurses

and 177 (45.2%) doctors. One hundred and sixty-four (41.8%) HCWs were from Makkah,and the rest were recruited from other regions in Saudi Arabia. Only 23 (5.9%) HCWs received the current year's influenza virus vaccine. Al Shammari reported vaccination rates as low as 38% among healthcare professionals and enormously low knowledge levels wherein 75% were unaware of CDC's influenza vaccination guidelines [13]. While another study reported that the vaccination rate was 24.7%, 67.2% and 46.4% in UAE, Kuwait,and Oman, respectively and concluded that the vaccination rate among the health care workers was sub optimal in theMiddle Eastern region [14]. A European study highlighted the role of theprevalence of low knowledge among its sample of 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 [15].

CONCLUSION

The vaccination against influenza plays an important role in theprevention of infection.Most of our participants were Saudi, married and Muslims. Most of theparticipants have a clinical work in nature where most of them were physicians. A statistically significant association existed between most of the socio-demographic factors and vaccination acceptance. However, age, marital status, education, income, nature of work and years of experience in clinical workwere notsignificantlyassociation with the vaccination status.

RECOMMENDATIONS

- Further studies with lager population in different societies arerecommended.
- Administration of clinical courses among HCWS to increase their awareness about influenza disease and importance of vaccine.

REFERENCES

1. **Opstelten W, van Essen GA, Heijnen ML, Ballieux MJ, Goudswaard AN (2010):** High vaccination rates for seasonal and pandemic (A/H1N1) influenza among healthcare workers in Dutch general practice. Vaccine,28(38):6164-8.
2. **Hooper CR, Breathnach A, Iqbal R(2014):** Is there a case for mandating influenza vaccination in healthcare workers?. Anaesthesia,69(2):95-100.
3. **Bridges CB, Thompson WW, Meltzer MI, Reeve GR, Talamonti WJ, Cox NJ, Lilac HA, Hall H, Klimov A,**

Fukuda K(2000): Effectiveness and cost-benefit of influenza vaccination of healthy working adults: a randomized controlled trial. Jama.,284(13):1655-63.

4. **Hollmeyer HG, Hayden F, Poland G, Buchholz U(2007):** Influenza vaccination of health care workers in hospitals—a review of studies on attitudes and predictors,27(30):3935-44.

5. **Bénet T, Régis C, Voirin N, Robert O, Lina B, Cronenberger S, Comte B, Coppéré B, Vanhems P(2012):** Influenza vaccination of healthcare workers in acute-care hospitals: a case-control study of its effect on hospital-acquired influenza among patients. BMC infectious diseases,12(1):30.

6. **Fiore AE, Shay DK, Broder K, Iskander JK, Uyeki TM, Mootrey G, Bresee JS, Cox NJ(2009):**Prevention and control of seasonal influenza with vaccines: recommendations of the Advisory Committee on Immunization Practices (ACIP), 2009. Morbidity and Mortality Weekly Report: Recommendations and Reports,58(8):1-52.

7. **Thompson MG, Shay DK, Zhou H, Bridges CB, Cheng PY, Burns E, Bresee JS, Cox NJ(2010):**Estimates of deaths associated with seasonal influenza-United States, 1976-2007. Morbidity and Mortality Weekly Report,59(33):1057-62.

8. **Zeitouni Mohammed O, Al Barrak Ali M, Al-Moamary Mohamed S, AlharbiNasser S, Idrees Majdy M, Al Shimemeri Abdullah A, Al-Hajjaj Mohamed S(2015):**The Saudi Thoracic Society guidelines for influenza vaccinations. Ann ThoracMed.,10(4):223–30.

9. **World Health Organization. (2014):***Influenza (Seasonal).* Retrieved from http://www.who.int/mediacentre/factsheets/fs211/en/Retrieved.

10. **Centers for Disease Control and Prevention. (2012):** Influenza vaccination coverage among health-care personnel -- 2011-12 season, United States. *Morbidity Mortality Weekly Report., 61*(38), 753-757.

11. **Al-Tawfiq JA, Antony A, Abed MS(2009):** Attitudes towards influenza vaccination of multi-nationality health-care workers in Saudi Arabia. Vaccine,27(40):5538-41.

12. **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(1):80.

13. **Alshammari TM, AlFehaid LS, AlFraih JK, Aljadhey HS(2014):** Health care professionals' awareness of, knowledge about and attitude to influenza vaccination. Vaccine,32(45):5957-61.

14. **Abu-Gharbieh E, Fahmy S, Rasool BA, Khan S(2010):** Influenza vaccination: healthcare workers attitude in three Middle East countries. International journal of medical sciences,7(5):319.

15. **Betsch C, Wicker S(2012):** E-health use, vaccination knowledge and perception of own risk: drivers of vaccination uptake in medical students. Vaccine,30(6):1143-8.

16. **Lambert A.S(2010):** FauciInfluenza vaccines for the future N Engl J Med., 363 (1):2036-2044.

17. **He D, Chiu AP, Lin Q, Cowling BJ(2015):** Differences in the seasonality of MERS-CoV and influenza in the Middle East. International journal of infectious diseases: IJID: official publication of the International Society for Infectious Diseases,40(1):15.