

Seasonal influenza vaccination coverage and barriers among healthcare workers in an Egyptian Province

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PAROLE CHIAVE: Vaccinazione antinfluenzale stagionale; lavoratori sanitari; barriere

ABSTRACT

Background: Influenza vaccination uptake by Egyptian healthcare workers remains sub-optimal despite local initiatives and infection control programs to increase it. **Objective:** To assess vaccination coverage and investigate health care workers' barriers and also motivators toward seasonal influenza vaccination. **Methods:** An interview questionnaire survey and focus group sessions were conducted to measure uptake and assess barriers to seasonal influenza vaccination among HCWs in main hospitals and primary care centers in Ismailia city. **Results:** There were 980 participants, of whom 131 (13.4%) reported having received influenza vaccination in last season 2018/2019. Females were 76.8% of participants, and nurses were the main occupational category of study sample (80.4%). The most commonly reported motivator (97.7%) was "protection of oneself and family members" among the vaccinated participants. The top barriers among non-vaccinated ranked by their Relative Importance Index (RII), included lack of instruction by supervisors RII=0.82, lack of awareness about vaccine benefits RII=0.79 and lack of awareness from where to get the vaccine RII=0.71. Predictors of non-vaccination included belief that the vaccine itself may induce influenza (OR: 1.9 $p<0.05$, CI, 1.3-2.8) and the perception that vaccination is ineffective (OR: 2.8 $p<0.05$, CI, 1.5-5.2), and lack of knowledge about the vaccinations recommended for health care workers (OR: 1.9 $p<0.05$, CI, 1.2-2.8). **Conclusions:** Addressing specific barriers to influenza vaccination uptake among healthcare workers may improve vaccination rate. Targeted evidence-based promotion campaigns and programs should be established to overcome identified barriers.

RIASSUNTO

«Copertura e barriere alla vaccinazione antinfluenzale stagionale tra gli operatori sanitari in una provincia egiziana». **Introduzione:** La vaccinazione antinfluenzale da parte degli operatori sanitari egiziani rimane al di sotto dei livelli ottimali nonostante le iniziative locali e i programmi di controllo delle infezioni per aumentarla. **Obiettivi:** Valutare la copertura vaccinale e indagare le barriere comportamentali degli operatori sanitari e le motivazioni verso la vaccinazione contro l'influenza stagionale. **Metodi:** L'indagine è stata condotta attraverso un'intervista con questionario e sessioni di focus group per misurare l'adozione e valutare le barriere alla vaccinazione antinfluenzale tra gli operatori sanitari nei principali ospedali e centri di assistenza primaria nella città di Ismailia. **Risultati:** I partecipanti sono stati 980, di cui 131 (13,4%) hanno riferito di aver ricevuto la vaccinazione antinfluenzale nell'ultima stagione 2018/2019. Le donne sono il 76,8% dei partecipanti e gli infermieri sono la principale

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categoria occupazionale del campione di studio (80,4%). La motivazione più comunemente riportata (97,7%) tra i partecipanti vaccinati è stata la "protezione di se stessi e dei membri della famiglia". Le principali barriere tra i non vaccinati, classificati in base all'Indice di importanza relativa (RII), includono la mancanza di indicazione da parte dei supervisori RII = 0,82, la mancanza di consapevolezza sui benefici del vaccino RII = 0,79 e la mancanza di informazioni su dove ottenere il vaccino RII = 0,71. I predittori di non vaccinazione includono la convinzione che il vaccino stesso induca l'influenza (OR: 1,9 $p < 0,05$, CI, 1,3-2,8), la percezione che la vaccinazione sia inefficace (OR: 2,8 $p < 0,05$, CI, 1,5-5,2) e la mancanza di informazione su quali vaccinazioni sono raccomandate per gli operatori sanitari (OR: 1,9 $p < 0,05$, CI, 1,2-2,8). **Conclusioni:** Affrontare le barriere specifiche alla diffusione della vaccinazione antinfluenzale tra gli operatori sanitari può migliorare il tasso di vaccinazione. Dovrebbero essere istituite campagne e programmi di promozione mirati per superare le barriere identificate.

INTRODUCTION

Each year, seasonal flu affects 5-10% of the world's population, causing 3-5 million severe infections. The World Health Organization (WHO) estimated annual mortality burden of influenza ranging 250,000 to 500,000 global deaths. More recent estimates have suggested a substantially higher mortality burden, with 290,000 to 650,000 influenza associated deaths from respiratory causes alone, and 99,000 to 200,000 deaths from lower respiratory tract infections (17).

Influenza transmission within health care settings has been widely reported in the literature. According to WHO, healthcare workers are among occupational groups for whom seasonal influenza vaccination is strongly recommended (10, 11, 14, 18).

Influenza vaccination is the most efficient method of prevention of influenza virus infection and its complications (20, 23). Immunization against influenza virus not only reduces the risk of infection among HCWs, but also improves patient safety and reduces morbidity and mortality among vulnerable patients (4).

Despite a variety of promotional campaigns and interventions, influenza vaccination uptake among health care workers generally remains low and most studies report poor adherence to this recommendation (5).

Numerous studies that have examined health care workers' views on vaccination have divided reasons for rejecting the vaccine into two major groups. The first major group of reasons includes the misconception of influenza and its risks, the role of health care

workers and the possibility that they infect their patients, and also the importance of vaccination, its effectiveness and safety. The second major group is a lack of easy access to freely available vaccine (12, 13).

The influenza vaccination rate is variable among Middle East countries. A study conducted in the Gulf area to determine the vaccination rates of HCWs in three countries showed that the vaccination rate was 24.7%, 67.2% and 46.4% in United Arab Emirates (UAE), Kuwait and Oman, respectively (2).

Many personal and organizational factors have been identified to influence the uptake of seasonal influenza vaccine by HCWs (8, 9). Attitudes to one's health and to the value of influenza immunization affect the uptake as does the delivery of the immunization program, in addition to lack of knowledge about influenza infection and a lack of convenient access to vaccine (16).

Most of the Middle East countries adopt the recommendations and guidelines set by the international health agencies and provide vaccination programs to all HCWs against influenza virus both seasonal and pandemic (1, 2).

In Egypt, the Ministry of Health distributes the seasonal influenza vaccine through health care directorates freely for health care workers (8).

The present study was conducted to assess health care workers' attitudes toward influenza vaccination and the extent of their vaccine uptake. Subsequently, future interventions to improve influenza vaccination rates can be better targeted and, therefore, potentially more successful.

METHODS

This cross-sectional study was conducted to determine seasonal influenza coverage during the influenza season 2018-2019 and assess the barriers and motivators of seasonal influenza vaccine uptake among health care workers in different health care settings (major hospitals and primary care centers) in Ismailia province, Egypt.

Data collection took place from March 2019 to August 2019 using an interview form that included 31 items. This 31-item interview questionnaire was constructed based on literature review and focus group sessions (12, 15, 19, 24), with enquiring/retrieving data about the demographics, occupational history, medical history, and seasonal influenza vaccine uptake of the participants, in addition to factors for receiving or refusing the vaccine. The interview form was pre-tested with a convenience sample of 50 health care workers in different workplaces and different job categories to assess the clarity, filling time, and ease of administration. Refinements were made on the basis of feedback from that pilot test.

The study sites included 8 health care institutions. The study participants were all HCWs who have direct contact with patients with at least one year of work experience; including physicians and nurses from different work-places that included 4 hospitals and 4 primary care units. A random sample of 1008 subjects was drawn from the list of health care workers (physicians – nurses) at all health care facilities. This sample was calculated based on the variable vaccine safety/side effects, that were expressed by 11% of studied health care workers as one of the barriers affecting vaccine uptake/compliance (2). Taking this frequency into consideration, the sample size was calculated assuming a desired precision of 0.02; the sample size was 941 HCWs and an expected 5% drop out, the ultimate sample was 1000 and an actual 1008 health care workers were encountered.

Six focus-group discussions were conducted among the physicians and the nurses at different health care facilities (hospitals and primary care centers). The sessions included 50 participants in groups that ranged from 6 to 9 health care workers. Different items for discussions included organizational factors like the availability of the vaccine, perception of in-

fluenza risk and vaccine effects and side effects along with other factors raised by the participants. Data collected from focus groups (written format) were analyzed by two experts in qualitative studies; the focus group sessions were conducted for two purposes the first as a tool to design the questionnaire and the second as a confirmatory study for the vaccination barriers and facilitators (9-10, 21-22, 25).

To identify the top ranked barriers toward influenza vaccination among HCWs, a Relative Importance Index (RII) was calculated for each of the statements. The RIIs Formula is

$$RII = \Sigma W / (A N)$$

where W = Weightage given to each factor by the respondents; A = Highest weight (i.e., 3 in this case); N = the total number of respondents calculated according to Ali et al (3).

$$W = (1n_1 + 2n_2 + 3n_3)$$

where: n_1 = number of participants who selected “no/disagree”, n_2 = number of participants who selected not sure, n_3 = number of participants who selected “yes/agree”. The score for each factor is calculated by summing up the scores given to it by the participants. For data analysis, SPSS®V 23.0 (IBM Corp., Armonk, NY, USA) was used.

To identify the predicting factors affecting non-vaccination status a logistic regression analysis was conducted using non-vaccination status as the dependent variable while using perception, beliefs and knowledge of influenza vaccination and as independent variables. A p-value of < 0.05 was set significant for all of the statistical tests.

The study project was approved by the Research Ethics Committee (REC) No. 3480 (16/5/2018) at the faculty of medicine, Suez Canal University. This manuscript is based on WHO-funded project entitled: Influenza Vaccine Uptake and Compliance: Addressing Barriers and Promoting Motivators among Health Care Workers (RPPH 18-77) WHO Reference: 2019/887004-0.

RESULTS

Out of 1008 health care workers encountered, 980 valid interview-forms were eligible for statis-

Table 1 - Characteristics of participants and their vaccination status (n=980)

Characteristics	Vaccinated n=131 No. (%)	Not-vaccinated n=849 No. (%)
Age: mean \pm (SD)	31.7 (10.1)	30.4 (7.8)
Gender		
Male	33 (25.2)	194 (22.9)
Female	98 (74.8)	655 (77.1)
Smoking status		
Non-smoker	119 (90.8)	776 (91.4)
Current smoker	11 (8.4)	64 (7.5)
Ex-smoker	1 (0.8)	9 (1.1)
Occupational categories		
Nurse (technical certificate)	104 (79.4)	602 (70.9)
Nurse (bachelor degree)	9 (6.9)	73 (8.6)
Physician (resident/general practitioner)	14 (10.7)	117 (13.8)
Physician (specialist)	2 (1.5)	51 (6)
Physician (consultant)	2 (1.5)	6 (0.7)
Employment duration (years): mean \pm (SD)	11.2 (10.7)	9.5 (8.6)

tical analysis. Distributions of socio-demographic and occupational characteristics of the participants are presented in Table 1.

The influenza vaccination uptake for the last season (October 2018/March 2019) was 13.4%, and among vaccinated health care workers, nursing staff had the highest vaccination uptake rate (86.3%).

Most of studied health care workers (91.7%) were not aware about the Ministry of Health recommendations regarding seasonal influenza vaccination.

Among health care workers who received the vaccine, 83.9% were working at three hospitals, namely Fever, Chest and General Hospital of Ismailia city. Most of them (82.4%) received the vaccine through the hospital-based infection control program. The three most commonly reported reasons for taking the influenza seasonal vaccine were «protection of oneself and family members» (97.7%), protection of colleagues and patients (96.1%) and risk of getting infection at work (87%) (Table 2).

Among the different barriers reported by non-vaccinated health care workers, Relative Importance Index (RII) calculated for different barriers statements showed that the most important three barriers included “Not instructed by supervisors to take the vaccine as indicated” RII=0.82, “Not aware

Table 2 - Reasons reported for vaccination uptake among vaccinated health care workers (n=131)

Reasons	Frequency	%
Protection of oneself and family members	128	97.7
Protection of colleagues and patients	126	96.1
Risk of getting infection at work	114	87.0
Vaccination available at workplace	102	77.8
Vaccination available free	67	51.1
Compulsory vaccination policy for all workers	58	44.3
Having co-morbidities (COPD-DM)	14	10.6
Older age (above 50 years)	7	0.05

about its value, administration and dose” RII= 0.79 and “Not aware from where to get the vaccine” RII=0.71 (Table 3).

Beliefs, perception and knowledge are the major divers for vaccination compliance. As shown in Table 4, 40% of those who did not received the vaccine (849) believed that the vaccine itself can induce influenza, also 74.9% and 59% of non-vaccinated were not sure about vaccine effectiveness and lacked the proper knowledge about the recommended list of vaccination for health care workers respectively. The belief, perception and knowledge showed significant

Table 3 - Vaccination barriers as reported by the non-vaccinated health care workers and ranked by their Relative Importance Index RII (n=849)

Barriers Items	Participants Responses Number			RII Rank
	Disagree/no	Not Sure	Agree/yes	
Not instructed by supervisors to take the vaccine	228	0	621	0.82
Not aware about its value, administration and dose	272	0	577	0.79
Not aware from where to get the vaccine	359	9	481	0.71
Not available all time as indicated	364	45	440	0.70
The vaccine is not obligatory	395	7	447	0.69
Never took it before	417	1	431	0.67
Seasonal influenza is a trivial health problem – no need for vaccination	464	2	383	0.63
Not sure of its efficiency	539	26	284	0.57
My perception of being infected is low	586	4	259	0.54
The vaccine will not prevent influenza	594	40	215	0.52
Concerns about vaccine safety and side effects	628	80	141	0.48
Fear to get influenza if vaccinated	671	15	163	0.47
Vaccine high cost	635	113	101	0.46
Fear of effects on pregnancy/breastfeeding@	574	0	81	0.42
Contracting the influenza will provide immunity so no need for vaccination	758	2	89	0.40
The vaccine is only for elderly people	768	40	41	0.38
The possibility of getting influenza is low	785	10	54	0.38
I took the vaccine before and also contracted flu	790	0	59	0.38
Health problems that make vaccination contraindicated	812	2	35	0.36
I took the vaccine last season and no need to take it	820	0	29	0.36

@ based on total of 655 (non-vaccinated female participants)

Table 4 - Health care workers responses toward main potential barriers to seasonal influenza vaccination

Potential Barriers	Vaccination Status		OR (95% CI)	Sig. P-value
	Not-vaccinated n=849 N (%)	Vaccinated n=131 N (%)		
Belief that vaccine may induce influenza:				
No	509 (60)	51 (38.9)	2.3 (1.6-3.4)	<0.001
Yes	340 (40)	80 (61.1)		
Perception of vaccination infectiveness:				
No	213 (25.1)	12 (9.2)	3.3 (1.7-6.1)	0.000
Yes	636 (74.9)	119 (90.8)		
Lack of knowledge about recommended vaccinations for health care workers:				
No	342 (40.3)	33 (25.2)	2.1 (1.3-3.1)	<0.001
Yes	507 (59.7)	98 (74.8)		

association with the vaccination status (p<0.05) and perception of vaccine infectiveness has the highest odds ratio (3.3; CI: 1.7-6.1).

Table 5 presents the model predictors and associated odds ratios of non-vaccination among study participants included; the perception that the vac-

Table 5 - Logistic regression model for predictors of non-vaccination

Predicting Variables	β	S.E.	Sig. p-value	Odds Ratio	95% C.I. Odds Ratio	
					Lower	Upper
Belief that vaccine may induce influenza	0.638	0.200	0.001	1.9	1.3	2.8
Perception of vaccination ineffectiveness	1.026	0.320	0.001	2.8	1.5	5.2
Lack of "knowledge" about recommended vaccinations for health care workers	0.616	0.220	0.004	1.9	1.2	2.8
Constant	-5.750	0.732	0.000	0.003		

cine itself may induce influenza (OR: 1.9 $p < 0.05$, CI, 1.3-2.8) and a belief that vaccination is ineffective (OR: 2.8 $p < 0.05$, CI, 1.4-5.2). Also lack of knowledge about the vaccinations recommended for health care workers (OR: 1.9 $p < 0.05$, CI, 1.2-2.8).

Focus group sessions analysis supported the current findings that most important reasons for taking the influenza seasonal vaccine are related to safety/personal issues including protection of oneself, family members, colleagues and patients, then being aware of the risk of getting infection at work and other occupational exposures.

As regards barriers of vaccination, two categories of variables were identified: those related to awareness, perception and beliefs about the safety and effectiveness of the vaccine; and the other group of factors included those related to organizational/administrative aspects that included vaccine availability, schedules, proper instructions and access to vaccination.

DISCUSSION

Influenza vaccination of health care workers is a cost effective intervention, reducing the productivity losses associated with influenza illness and minimizing the transmission of the disease from health care workers to their patients.

This study revealed low uptakes of the influenza vaccine with only 13% of studied health care workers being vaccinated. This rate is lower than what has been reported in the United States (34.7%) (15), Italy (26.4%) (7), United Arab Emirates (27%), Oman (46.4%) and Kuwait (67.2%) and most countries in the Eastern Mediterranean Region (2, 15, 26).

This low vaccination uptake rate among health

care workers in Ismailia could be due to lack of appropriate information about influenza vaccine and the low perception of severity of influenza and vaccine benefits, which could constitute an important reason for not being vaccinated (26).

The current study findings, revealed also that the most important reasons for taking the influenza seasonal vaccine were related to safety/personal issues including protection of oneself, family members, colleagues and patients, and also being aware of the risk of getting infection at work and other occupational exposures. These findings are in agreement with previous work done by Durando in 2016 and Dini in 2018 (6, 7).

As regards barriers of vaccination, two categories of variables were identified: those related to awareness, perception and beliefs about the safety and effectiveness of the vaccine; and the other group of factors included those related to organizational/administrative aspects that included vaccine availability, schedules, and proper instructions, also this has been reported by Hollmeyer (2009), Ali (2018) and Petek (2018) (3, 8, 18).

The beliefs of respondents in our study align with the Health Belief Model constructs of perceived susceptibility and perceived benefits, which are consistently found to predict influenza vaccination status among health care workers (24, 25). Several studies are in agreement.

Perception about vaccine nature and efficiency remain a barrier to vaccination uptake, representing an entrenched attitude among the non-vaccinated (21). The highest uptake of influenza vaccination was by nursing staff, which is consistent with other studies (21, 22).

A common barrier for unvaccinated workers is

their belief that they have a low risk of infection (21, 22). More focus on those aspects related to risk perception should be emphasized in further studies.

Interventions to increase vaccine uptake in young health care workers and even students may be required before they start their clinical placements. Qualitative studies may further elucidate specific misconceptions and attitudes in HCWs, which may be modifiable through targeted interventions. Conventional interventions have largely focused on information, education and facilitating access to vaccination. These have achieved only modest success in most countries (22). More innovative interventions may be needed to change entrenched negative attitudes (24), perhaps targeted to specific occupational groups.

Strengths of our study include the relatively large sample size. This study provides new data relevant to the Egyptian healthcare workers, adding to the limited data on influenza vaccination coverage in Egypt. Our study also has a number of limitations. Selection bias to some extent may have taken place, as some health care facilities may have been over or under represented. Causal inferences cannot be obtained because of the cross sectional design of the study. Comparison of previous cannot be made because of lack of data in previous years for vaccination coverage.

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