

Brief Original Article

Enhanced influenza vaccination among healthcare personnel prevents cases despite community burden

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Abstract

Introduction: Influenza vaccination for healthcare personnel is not obligatory in Mexico, and compliance relies on promotion and persuasion. The objective of this study was to determine the impact of influenza vaccination compliance on the reduction of influenza and influenza-like illness among healthcare personnel throughout two consecutive influenza seasons.

Methodology: A retrospective study comparing cases of influenza and influenza-like illness among vaccinated and unvaccinated healthcare personnel registered in a Mexican 500-bed University Hospital surveillance and immunization registry during seasons 2015-16 and 2016-17.

Results: Total influenza immunization compliance was 21.3% and 42.7%, respectively. Reduction of the number of influenza-like illness (58 in 2015-16 and 15 in 2016-17; $P = 0.0001$) and confirmed influenza cases (28 in 2015-16 and 13 in 2016-17; $P = 0.036$) was evident. During 2016-17, influenza activity in the community was higher than 2015-16 (4800 and 1338 cases, respectively).

Conclusions: Increased influenza vaccination compliance among healthcare personnel was associated with reduction of the overall number of influenza and influenza-like illness cases, even in the setting of high activity of the disease in the community through 2016-17 and reported suboptimal vaccine effectiveness during both seasons.

Key words: Influenza; influenza-like illness; healthcare personnel; influenza immunization; immunization compliance.

J Infect Dev Ctries 2019; 13(2):165-168. doi:10.3855/jidc.10241

(Received 08 February 2018 – Accepted 23 January 2019)

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Introduction

Among healthcare personnel (HCP) annual vaccination against influenza reduces morbidity and mortality [1]. During the 2013-2014 influenza season coverage among HCP in the United States reached 75.2% [2]. Although the Advisory Committee on Immunization Practices recommends that healthcare personnel receive an annual influenza vaccine, there is a wide variance in vaccination [3,4]. Higher rates of vaccination have been associated with a reduction in absenteeism and influenza-associated complications [5]. In Mexico, influenza vaccination for HCP is not obligatory, and compliance relies on promotion and persuasion. The objective of this study was to determine the impact of enhancing influenza vaccination compliance on the reduction of influenza and influenza-

like illness (ILI) in HCP throughout two consecutive influenza seasons.

Methodology

Study design and setting

We carried out a retrospective study comparing vaccinated and unvaccinated HCP from two seasons: September 1, 2015 through April 1, 2016 and from September 1, 2016 through April 1, 2017. The study was performed at the University Hospital Dr. José Eleuterio González, a 500-bed teaching hospital in Monterrey, Mexico, with an average of 22,000 hospitalizations annually. Hospital regulations underscores that all HCP with upper respiratory tract signs and symptoms with must be evaluated by the

infectious disease specialist who determined the need for workup and therapy.

Population

All HCP that were evaluated during the study periods were included in the database. Demographic, clinical and workup variables were recorded, including history of immunization. We excluded all administrative personnel that have no direct contact with patients.

Vaccination registry

Compliance or non-compliance with influenza vaccination was based on the hospital influenza vaccination registry; HCP vaccinated outside of the hospital registry required to present written proof of vaccination. We analyzed the vaccination registry, searching for validation of influenza immunization of all the hospital personnel, and related it with the database of the evaluated HCP.

Definitions

Healthcare personnel was defined as all professionals and students that have direct contact with patients. A student was defined as personnel that have direct contact with patients and is a registered student in the healthcare field (medical, nursing or respiratory technician students). A resident was defined as a postgraduate medical student. Influenza-like illness was defined as sudden onset of two or more of the following signs and symptoms: fever ($> 38^{\circ}\text{C}$), cough, or headache; and at least one of the following: sore throat, rhinorrhea, shortness of breath, malaise, or myalgia. Influenza was defined as a patient with ILI and a positive influenza test (detection of influenza virus nucleic acids in a clinical specimen and/or identification of influenza virus antigen).

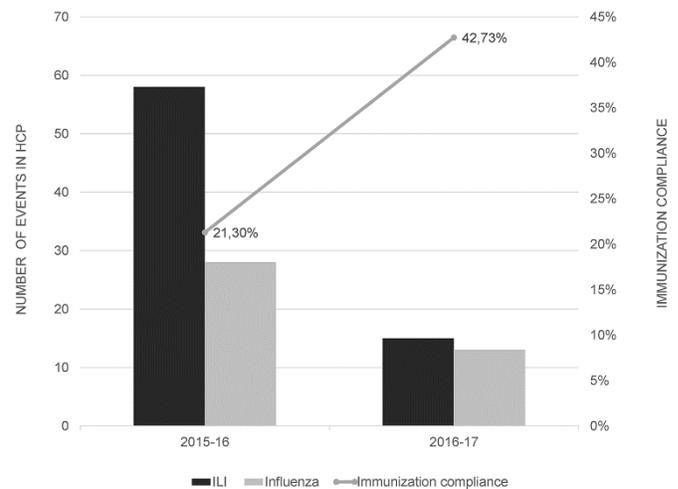
Statistical analysis

Data was analyzed with descriptive statistics and calculated χ^2 for different group variables. We considered a *P* value of < 0.05 as significant for univariate analysis.

Results

During the study period a total of 3968 HCP for the 2015-16 season and 3840 for the 2016-17 season were analyzed; compliance with vaccination was 21.3% vs 42.7%, respectively. There was a reduction of 43 ILI cases (58 in 2015-16 vs 15 in 2016-17; $P = 0.0001$), and 15 less cases of influenza reported in the second season (28 in 2015-16 vs 13 in 2016-17; $P = 0.036$) (Figure 1).

Figure 1. ILI and Influenza cases among HCP.



Distribution of ILI and Influenza cases among HCP, and immunization compliance (%) during Influenza seasons 2015-16 and 2016-17. HCP: Healthcare personnel. ILI: Influenza-like illness.

Overall, the number of events (ILI plus influenza) was reduced by 67.4% (86 in 2015-16 vs 28 in 2016-17; $P = 0.0001$). Subgroup analysis showed that immunization of medical residents, medical and nursing students increased significantly from the first to the second season ($P = 0.0001$); however, there was no difference in registered nurses ($P = 0.82$). For the subgroups of residents and medical students there was a significant reduction in the ILI cases from 2015-16 to 2016-17 ($P = 0.001$) (Table 1).

Discussion

The World Health Organization (WHO) recommends annual influenza vaccination for all persons over the age of 6 months [6], and the Centers of Disease Control and Prevention (CDC) recommends that HCP be vaccinated because of their likeliness of exposure to ill patients infected with influenza is high [7]. Signed declinations policies, administrative strategies, and personnel education seem to enhance compliance, although have demonstrated to be insufficient to increase to an optimal uptake [8,9].

Throughout season 2016-17, there was a noticeable increase of influenza activity in the community, comparing both seasons (2015-16 and 2016-17) state wide, 1338 vs 4800 cases, respectively [10]. This was reflected as increased number of hospitalized patients in the University Hospital: 37 patients during 2016-15 (8% mortality), and 114 patients during 2016-17 (22.8% mortality; unpublished data). Furthermore, there was a reduction in vaccine effectiveness (VE) by the CDC during 2015-16 (VE 47% [95% CI: 39-53])

and 2016-17 (VE 42% [95% CI: 35-48]) [11]. These facts underscore that enhanced vaccination, although still suboptimal, reduce the risk of developing influenza and ILI in vaccinated HCP in the setting of high community activity of the disease. Increased compliance was accomplished by vaccine promotion and providing personalized chats with HCP before 2016-17 season. Multiple department directors were involved, including the office of postgraduate affairs along with the head nurse.

Rates of vaccination for seasonal influenza among medical students have been reported in the range of 38.4% [12] to 58.7% [13]; compared with our data in the first season the compliance was well below that range, however, in the second season compliance was considerably higher than the reported literature.

Although many elements form the complex equation of legislation [14-15], we believe that these findings will aid in decision making regarding

regulation of a formal vaccination protocol among HCP in Mexico, and hopefully, in other regions where no legal position has been settled.

Conclusion

Increasing influenza vaccination compliance among HCP is associated with a significant reduction in influenza and ILI cases, even in seasons with increased activity of the disease and reduced vaccine effectiveness.

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Table 1. Influenza and ILI distributed by vaccination status of HCP during two seasons (2015-16 and 2016-17).

Categories		Influenza seasons				P
		2015-2016		2016-2017		
		Vaccinated	Non-vaccinated	Vaccinated	Non-vaccinated	
Medical Residents	ILI	5	20	3	4	0.323
	Influenza	1	7	4	2	0.091
	ILI + Influenza	6	27	7	6	0.039
	Sick total		33		13	0.001
	Total active during the season		552		615	---
	Total vaccinated during the season		138		414	---
	Percentage vaccinated per season		25.00%		67.32%	0.0001
Nursing Students	ILI	1	5	0	0	
	Influenza	1	1	0	1	0.386
	ILI + Influenza	2	6	0	1	0.573
	Sick total		8		1	0.161
	Total active during the season		472		222	---
	Total vaccinated during the season		93		164	---
	Percentage vaccinated per season		19.70%		74%	0.0001
Medical Students	ILI	2	21	3	4	0.067
	Influenza	2	13	2	1	0.107
	ILI + Influenza	4	34	5	5	0.016
	Sick total		38		10	0.0001
	Total active during the season		2053		2083	---
	Total vaccinated during the season		197		633	---
	Percentage vaccinated per season		9.59%		30.38%	0.0001
Nurses	ILI	2	2	1	0	0.363
	Influenza	2	1	2	1	NA
	ILI + Influenza	4	3	3	1	0.553
	Sick total		7		4	0.399
	Total active during the season		891		920	---
	Total vaccinated during the season		421		430	---
	Percentage vaccinated per season		47.25%		46.73%	0.827
Totals	Total ILI		58		15	0.0001
	Total Influenza		28		13	0.036
	Total events		86		28	0.0001
	Total HCP		3968		3840	---
	Total vaccinated HCP		849		1641	---
	% vaccinated HCP		21.30%		42.73%	0.0001

HCP: Healthcare personnel. ILI: Influenza-like illness.

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Conflict of interests: No conflict of interests is declared.