

Attitudes of health care workers to influenza vaccination: Why are they not vaccinated?

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Background: Compliance rates with influenza vaccination among health care workers (HCW) are historically low. Although a safe and effective vaccine is available, the reasons for such poor compliance are not well understood.

Methods: After a campaign encouraging HWC to vaccinate against influenza, we conducted an epidemiologic survey to evaluate the reasons for compliance and accompanied the impact of these measures (campaign and questionnaire) during the subsequent 2 years.

Results: Compliance rate was 34.4%. Multivariate analysis showed that "older age" ($P = .008$), "believing that most departmental colleagues had been vaccinated" ($P < .0001$), and "having cared for patients suffering from severe influenza" ($P = .031$) were significantly associated with compliance with influenza vaccination. The main reason given for being vaccinated was "individual protection" and, to a lesser extent, "protection for the patient." In subsequent years, compliance rates among those participating in the survey fell to 20.2% in 2004, when the only measure taken was the questionnaire, and to 12.75% in 2005, when no educational intervention was scheduled.

Conclusion: We conclude that a better understanding of HCW's negative attitude regarding influenza vaccination is needed as are more appealing and convincing continuous education programs, to ensure motivation for influenza vaccination over a longer period. (Am J Infect Control 2007;35:56-61.)

Influenza remains one of the major causes of morbidity and mortality among all age groups, especially in patients over 65 years of age, and in those suffering from chronic diseases, including cardiovascular, pulmonary, and metabolic diseases.¹ Owing to close contact with patients and/or infected material, health care workers (HCW) are particularly exposed to infectious agents such as the influenza virus, against which protection can be provided by vaccination. Furthermore, HCW are potential sources of transmission to other staff members and patients. Influenza transmission among health professionals is responsible for a high level of absenteeism and reduced workplace productivity during the winter months.²

Several studies have shown that vaccination of HCW is associated with reduced absence from work and with a reduced number of deaths among hospitalized patients.³⁻⁶ The historically low compliance with influenza vaccination by health professionals in response to campaigns, however, hinders prevention among these professionals and, consequently, among the patient population.⁷ Compliance rates of only 34% and 36% have been reported in surveys carried out in the United States in 1997 and 2001, respectively.³

The factors most often associated with better compliance with influenza vaccination among HCW are older age, previous vaccination against influenza, and contact with hospitalized patients. The factors most often associated with noncompliance are perception that the vaccine is ineffective,^{4,8} fear of adverse effects including prior experience of postvaccination adverse effects,^{4,6-9,10} inconvenience including insufficient time for vaccination,^{6-9,11} and dislike of injections or medication.^{4,6,9,11} Other factors have been identified in a number of studies in other centers,^{12,13} and knowledge of these factors is essential if annual campaigns aimed at increasing compliance are to be better focused.

There are no studies assessing compliance with influenza vaccination by health professionals in response to vaccination campaigns in Brazil. This study analyzes factors associated with compliance or noncompliance with influenza vaccination by HCW at a university hospital.

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METHODS

Study group

Three hundred seventy-six HCW at the Hospital das Clínicas-University of São Paulo Medical School who had participated in an educational program on influenza prevention in 2003 were invited to take part in the survey. The Hospital das Clínicas is a 2000-bed tertiary teaching hospital consisting of 5 buildings attached to the University of São Paulo. The main building has approximately 900 beds and contains most of the surgical and clinical wards and 12 intensive care units. The HCWs with respiratory symptoms are not prohibited from working. The health professionals participating in the study worked in departments in which patients are at a greater risk of complication and death because of influenza: bone marrow transplant outpatient unit ($n = 11$), nursery ($n = 70$), dialysis ($n = 41$), geriatrics ($n = 19$), hematology/bone marrow transplant ($n = 52$), infectious diseases ($n = 62$), nephrology ($n = 11$), liver transplant ($n = 43$), intensive care unit ($n = 46$), and kidney transplant unit ($n = 23$). Each participant received a questionnaire to be completed and returned or was interviewed by a medical student, nurse, or physician taking part in the project.

Vaccination policies

Influenza vaccination is provided annually to all HCW free of charge and is available from late autumn to early spring. During the study period, the vaccines were administered at the Center for Special Immunobiologicals of the Hospital das Clínicas. At vaccination, information concerning the HCW's name, age, gender, address, and workplace was entered into a computerized database.

Campaign ad measures

In 2003, an educational campaign based on classes and posters was undertaken to encourage health professionals to accept vaccination against influenza. The campaign targeted health professionals working in departments in which patients were at a greater risk of complication and death because of influenza, as specified above. The main focus of the campaign was influenza transmission within the hospital and protection of immunocompromised patients. The survey was carried out in 2004, 4 months prior to the 2004 influenza vaccination. To assess the impact of the questionnaire as a possible predictor of HCWs' subsequent attitudes to vaccination, we compared data for compliance in 2003 (campaign), in 2004 (questionnaire), and in 2005, when neither campaign nor questionnaire was used.

Assessment of vaccination information

The database from the Center for Special Immunobiologicals was used to verify self-reported vaccinations in 2003 and to obtain correct information on influenza vaccinations in 2004 and 2005.

Questionnaire

Based on literature findings, a questionnaire with open-ended and close-ended queries was designed to assess the reasons the HCW accepted the vaccination or did not. The questionnaire, adjusted by an epidemiologist to avoid biased answers, aimed to assess the following: (1) characteristics of the study group (age, sex, function, workplace, length of time in same function, contact with patients, chronic disease, history of influenza, absence from work because of influenza, own health care, and smoking habits); (2) knowledge of influenza virus infection (main symptoms and complications); (3) knowledge of the influenza vaccine (composition, number of doses, frequency, effectiveness, recommended use, and adverse effects); (4) reasons for accepting vaccination; and (5) reasons for not accepting vaccination.

Responses to the questionnaire were given in writing. Responses to open-ended questions were transcribed by 3 examiners into one of the categories for accepting the vaccine or not. Disagreements among examiners were resolved by discussion. The same strategy was used for open-ended questions concerning influenza and the influenza vaccine. Interviews were scheduled in the case of incoherent answers or misunderstandings detected during questionnaire transcription to the study database.

Statistical analysis

Logistic regression was used for the univariate and multivariate analyses. First, univariate analyses were performed considering compliance with vaccination as the dependent variable and all the other items included in the questionnaire as independent variables. Two criteria were then used to select variables for the final, multiple logistic regression model: (1) P value $\leq .10$ in the univariate analysis and (2) a clear change in the estimates of the effects of the exposures produced by the other variables not selected in the first step of the analysis.

RESULTS

Of the 376 employees invited to take part in the survey, 258 (69%) replied partially or in full to the questions posed. The characteristics of this population are given in Table 1. There were no differences in the

Table 1. Characteristics of the study group responding to the survey questionnaire

Characteristics	N (% in the category)*
Age, yr	
21-35	110 (42.7)
36-49	112 (44.3)
50-62	33 (13.0)
Sex	
Male/female	38 (14.7)/220 (85.3)
Function	
Nurse's aide	162 (63.04)
Nurse	52 (20.23)
Physician	33 (12.84)
Administrative staff	10 (3.89)
Department	
BMT outpatient department	11 (4.3)
Nursery	41 (15.9)
Dialysis	32 (12.4)
Geriatrics	18 (6.9)
Hematology/BMT	27 (10.5)
Infectious diseases	42 (16.3)
Nephrology	11 (4.3)
Liver transplant	24 (9.3)
ICU	35 (13.5)
KTU	17 (6.6)
Length of service	
3 months to 9 yr	148 (58.27)
10 to 19 yr	80 (31.50)
20 to 42 yr	26 (10.23)
Work shift	
Day/night	189 (73.3)/69 (26.7)
Patient contact	
Yes/no	244 (94.6)/14 (5.4)
Suffering from a disease	
Cardiac, yes/no	8 (3.2)/241 (96.8)
Diabetes mellitus, yes/no	5 (2.1)/238 (97.9)

BMT, bone marrow transplant; ICU, intensive care unit; KTU, kidney transplant unit.

*Number of employees who answered the question.

characteristics of those HCW who did not respond to the questionnaire.

With regard to influenza, 243 of the 258 employees (94%) replied that they had come to work with influenza. One hundred forty-nine (58%) replied that they had been bedridden because of a strong bout of influenza, and 41% replied that they had cared for patients while showing symptoms of acute influenza.

When asked about influenza symptoms in an open-ended question, high temperature (77%), coryza (75%), weakness (69%), myalgia (57%), and headache (52%) were the symptoms most often noted in the 252 questionnaires answering that question. A smaller proportion of respondents mentioned cough (30%), blocked nose (11%), shivering (7%), sneezing (6%), irritated eyes (4%), dyspnea (2%), and hoarseness (0.4%).

With regard to the vaccine itself, 170 of 256 (66%) employees replied that they were informed about the vaccine, and 154 (91%) described the kind of information they had. Sixty-eight employees (44%) knew how

effective the vaccine was, 36 (23%) how often it should be taken, 31 (20%) its recommended use, 30 (19%) its adverse effects, and 23 (15%) that the vaccine used is inactivated (dead viruses). Some employees incorrectly replied that 1 of the adverse effects of the vaccine is that it may cause influenza itself (4% of the employees).

One hundred forty-six of the 258 employees said that they had been vaccinated at least once, and 145 declared that the main reasons for vaccination were self-protection (87%), protect the patient (56%), considered it was better to have the vaccine than to contract influenza (38%), recommendation by their immediate superior (28%), avoid missing work (28%), believed that the vaccine does not cause influenza (18%), a physician had recommended it (10%), or they had received a written request to comply with vaccination (10%).

With regard to vaccination compliance, 88 of 256 employees (34.4%) reported being vaccinated in 2003. Of the remaining 168, 161 commented that the main reasons for not being vaccinated were risk of serious adverse effects (22%), had forgotten (19%), were unaware that vaccination was necessary (14%), had insufficient time (13%), had serious adverse effects after previous vaccinations (8%), or considered the vaccine to be ineffective (6%) or unnecessary (6%).

When asked what steps could be taken to help increase compliance with influenza vaccination, 257 employees gave the following suggestions: take the vaccine to the workplace (61%), further information (classes) on the vaccine (60%), further information about the campaign (54%), and the use of noninjectable vaccines (28%).

Univariate analysis revealed the following significant factors for compliance: "older age" ($P = .017$), "having worked while suffering from influenza" ($P = .062$), "having information about the vaccine" ($P = .046$), "having been vaccinated previously" ($P < .0001$), "believing in the effectiveness of the vaccine" ($P = .018$), "believing that most colleagues had also been vaccinated" ($P < .0001$), "believing that the likelihood of contracting influenza from vaccinated patients is small" ($P = .009$), and "suffering from diabetes mellitus" ($P = .049$).

In the multivariate analysis, the main factors associated with compliance with vaccination were as follows: "older age" ($P = .008$), "believing that most departmental colleagues had been vaccinated" ($P < .0001$), and "having cared for a patient suffering from acute influenza" ($P = .031$) (Table 2). "Having information about the vaccine" and "believing that the chance of catching influenza from vaccinated patients is small" tended toward significance ($P = .067$ and $P = .062$, respectively).

Of the 258 employees who took part in the 2004 survey about compliance to influenza vaccination in 2003,

Table 2. Multivariate analysis of factors associated with acceptance of influenza vaccination among health professionals at the Hospital das Clínicas of the University of São Paulo Medical School

Variable	Adjusted OR	95% CI	P value
Age, yr			.008
21-35	1		
36-49	0.60	0.31-1.17	
50-62	0.22	0.08-0.59	
Percentage in the department believed to have been vaccinated			<.0001
<50%	1		
50%	0.24	0.09-0.63	
70%-90%	0.17	0.06-0.43	
Do not know	0.99	0.46-2.14	
Have cared for a patient with a severe influenza			.031
No	1		
Yes	2.01	1.05-3.86	

only 104 (40%) were still working at the Hospital das Clínicas in October 2005 and could be included in the assessment of compliance in 2004 and 2005. Of the 104 employees reassessed, 21 (20%) were vaccinated in 2004, and 11 (52%) were vaccinated in 2003. Of the 83 employees who chose not to be vaccinated in 2004, 69 (83%) had not been vaccinated in 2003 ($P = .0018$; Table 3).

This same trend was seen in 2005. Of the 103 employees assessed with regard to compliance in 2005, 13 (13%) were vaccinated, and 9 (69%) had been vaccinated in 2004. Of the 90 employees who chose not to be vaccinated in 2005, 78 (87%) had not been vaccinated in 2004 ($P = .0005$; Table 4).

DISCUSSION

Our survey carried out at the Hospital das Clínicas of the University of São Paulo Medical School showed that compliance with influenza vaccination by HCWs in this hospital is low (34.4%) and similar to that observed worldwide. Although 66% of the employees stated that they were aware of the vaccine, this study reveals a lack of information among these professionals as to the effectiveness, recommended use, adverse effects, and even composition of the vaccine, confirming the importance of continuous education programs and the need for a better understanding of the reasons for compliance with influenza vaccination in this group.

As reported in previous studies,⁵⁻⁷ we found that older employees tended to follow advice to have an annual influenza vaccination. This may reflect both the

Table 3. Compliance with influenza vaccination in consecutive years (2003-2004) among staff who took part in the survey

Compliance in 2003 (%)	*Compliance in 2004 (%)		
	Yes	No	Total
Yes	11 (52.4)	14 (16.8)	25 (24.1)
No	10 (47.6)	69 (83.2)	79 (75.9)
Total	21 (100)	73 (100)	104 (100)

$P = .0018$.

*In 104 HCW who participated in the survey; P value estimated by Fisher exact test.

Table 4. Compliance with influenza vaccination in consecutive years (2004-2005) among staff who took part in the survey

Compliance in 2004 (%)	*Compliance in 2005		
	Yes	No	Total
Yes	9 (69.2)	12 (13.3)	21 (20.4)
No	4 (30.8)	78 (86.7)	82 (79.6)
Total	13 (100)	90 (100)	103 (100)

$P < .0001$.

*In 103 HCW who participated in the survey, P value estimated by Fisher exact test.

greater appeal of the vaccination campaigns aimed at those over 60 years of age and the greater professional experience and scientific knowledge of older health professionals. This supposition is supported by our observation that having cared for patients with severe influenza was significantly associated with vaccination compliance in logistic regression modeling. The probability of witnessing the progression of a severe case of influenza increases over time and consequently reflects the HCW's age and experience. Similar findings have been reported in other studies.⁶⁻⁸

The multivariate analysis also revealed that "believing that most of one's colleagues had been vaccinated" is associated with greater compliance. Chapman and Coups reported a similar finding.¹² This observation suggests a motivational strategy for use in annual campaigns for influenza vaccination, namely, exhorting all health professionals to encourage their colleagues to be vaccinated.

The roles that other factors play in vaccination compliance are the subject of some controversy in the literature. Doebbeling et al suggest that female sex and employment as a physician are associated with greater compliance.¹⁴ Nichol and Hauge, however, report that in addition to employment as a physician, male sex was a factor associated with compliance in their study.¹¹ Heimberger et al made the opposite observation, namely that employment in a nonmedical position is important for compliance with vaccination.⁹ No statistically significant difference was found in our

study in terms of gender or the nature of the health professional's employment.

We found that the main reason given in the open-ended questions for being vaccinated was individual protection and, to a lesser extent, protection for the patient, which was the focus of the campaign carried out at our hospital in 2003. This observation, together with the significance of compliance in employees who had cared for severe cases of influenza, underlines health professionals' concern for contracting influenza through exposure at the workplace. A strategy in line with these findings, including educational programs highlighting worker protection, should enable us to achieve higher compliance rates, which in turn should result in better patient protection. Other authors have obtained similar results.^{7,12}

With regard to the reasons for noncompliance, the main cause identified in our study was fear of adverse effects (23%). Data in the literature agree with this finding, as well as that regarding previous postvaccination adverse effects.^{4,6-8,11,12}

Next, in order of frequency, was the lack of importance given to the recommendation, reflected in the high proportion of interviewees who reported forgetting about the vaccination (20%) compared with the approximately 6% mentioned in the literature. A similar rate was reported in another study⁹ including resident physicians (21%), who are generally very busy with a range of activities, but was not found in other health professionals.

Some HCW did not consider themselves to be part of the group targeted for vaccination (approximately 14%); others affirmed insufficient time for vaccination (14%) or admitted that they were afraid of injections (12%). Only 8% of employees reported that they had suffered serious adverse effects from previous vaccinations, which would be a strong reason for avoiding further vaccination.

A number of studies have reported similar reasons for noncompliance, such as inconvenience, insufficient time to get vaccinated,^{6-9,12} and dislike of injections or medication.^{4,6,8,9} Some health professionals do not believe they form part of the group targeted for influenza vaccination.⁷ Other reasons, such as forgetting to take the vaccine,^{4,6-9} cost,^{4,7} and allergy^{4,6,9} to the vaccine, were also noted in a large number of the studies, although less frequently.

In our study, the false belief that the vaccine can cause influenza was not a frequent reason for noncompliance (4%) compared with other studies that report frequencies from 30% to 45%.^{4,12} However, we feel that it is particularly important to use more appealing and more convincing continuous education programs to ensure motivation over a longer period to guarantee vaccination. Among those employees who took part

in the survey and were reassessed in the subsequent years, compliance fell to 20% in 2004, when the only measure taken was the questionnaire, and to 13% in 2005, when no educational intervention was scheduled.

Thus, *some degree of intervention*, even employing the "patient protection" focus used in the 2003 campaign, is better than *no intervention*. We stress that the decline in compliance in general terms is not seen on analyzing the behavior shown by the interviewees vaccinated the previous year. Approximately 50% to 70% of employees who had been vaccinated tend to repeat vaccination the following year, even if there is no campaign, whereas more than 80% of those who had not been vaccinated tend to remain unvaccinated.

Almost 2 decades later, the question of low compliance with influenza vaccination among health professionals remains. Although vaccine coverage among the elderly has historically been as low as or less than that recorded among health professionals, policies adopted to improve compliance in this group have been successful in a number of countries.¹⁵

Why can't we improve vaccine coverage among health professionals? Recently, when assessing factors related to positive or negative parental attitudes regarding the inclusion of new vaccines in Dutch children's vaccination calendar, Hak et al observed, among other aspects, that employment as a health professional was strongly associated with a totally negative attitude.¹⁶ These data emphasize the importance of both a better understanding of health professionals' reasons for this attitude and a global effort to run campaigns that are more effective in convincing this important group of workers.

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