Original Article

Influenza vaccination in healthcare workers

Hasan Naz,[1] Figen Cevik,[1] Nevil Aykın[1]

[1]*Department of Infectious Diseases, Eskisehir Yunus Emre State Hospital, Eskisehir, Turkey*

Abstract

Background: This study aims to determine side effects in healthcare workers receiving influenza vaccination, and to scrutinize the opinion of and attitude toward vaccination of healthcare workers.

Methods: Five hundred forty-seven hospital personnel employed by the Eskişehir Yunus Emre State Hospital were included in the study which was conducted in November 2006,. Hospital personnel were administered 0.5 ml inactivated influenza vaccine consisting of 2006/2007 strains. Inoculations were given intramuscularly into the deltoid muscle. A specially designated area in the emergency unit was used for the procedure.

Results: An evaluation on Day 10 following influenza vaccination demonstrated at least one adverse effect in 197 (36%) hospital personnel. There was no statistical relationship between side effects and age or gender (p=0.860, p=0.929), while side effects were significantly more frequent among subjects receiving their first vaccination (p=0.008) and nurses (p=0.021). The reasons for the lack of prior immunization in 420 (76.8%) HCWs included not considering influenza a serious disease in 124 (29.5%), disbelief in the efficacy of vaccination in 109 (26%), the lack of reimbursement of vaccination in 105 (25%), fear of the side effects of vaccination in 45 (10.7%), preference for other methods of protection in 75 (17.9%), and fear of injection in 29 (6.9%).

Conclusions: The increase in the rate of influenza immunization among healthcare personnel is possible through education, contestation of fear, amelioration of misconceptions, solution of financial issues, constitution of a registry system, and tracking of vaccination.

Key Words: influenza, vaccination, healthcare workers, side effects

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Introduction

Seasonal influenza is one of the principal causes of vaccine-preventable disease with up to 500,000 deaths per year worldwide [1]. Influenza vaccination has been reported to prevent influenza-related respiratory tract infection by 56%, pneumonia by 53%, hospitalization by 50%, and mortality by 68% [2].

Healthcare workers (HCWs) may be at increased risk for contracting influenza, especially during nosocomial outbreaks; they also may serve as vectors for transmitting influenza to others, including high-risk patients [3]. The most effective method of preventing these annual outbreaks and resulting morbidity and mortality is by influenza vaccination [4]. Since 1981, the Advisory Committee on Immunization Practices of the US Public Health Service has been recommending influenza vaccination for healthcare professionals who provide for patients at high risk for significant morbidity following influenza infection [5]. According to the pandemic influenza national action plan that was prepared in 2006 by the Health Ministry of the Turkish Republic, free influenza vaccination is recommended for the HCW's [6].

Influenza vaccination of HCWs decreases in-hospital influenza transmission, influenza infection, and absenteeism of HCWs, as well as influenza-related morbidity and mortality in high-risk patients [7-10]. This study aims to determine side effects in healthcare workers receiving influenza vaccination, and to scrutinize the opinion of and attitude toward vaccination of healthcare workers.

Materials and Methods

Our hospital is located in the middle of Anatolia. Designed as a second-step service hospital, it has 670 beds and a total of 911 workers comprised of 125 doctors, 232 nurses and 554 support staff. Educational seminars about influenza were held prior to immunization. All personnel were informed via printed documents and announcements. Vaccination was fully reimbursed. In November 2006, 547

hospital personnel employed by the Eskişehir Yunus Emre State Hospital were included in the study.

Hospital personnel were administered 0.5 ml inactivated influenza vaccine (sterile split virion) consisting of 2006/2007 strains intramuscularly into the deltoid muscle. A specially designated area in the emergency unit was used for the procedure. The 0.5 ml dose contained A/New Caledonia/20/99 (H_1N_1)-like strain IVR-116 (15 micrograms/0.5 ml), A/Wisconsin/67/2005 (H_3N_2)-like strain NYMC X-161 (15 micrograms/0.5 ml), B/Malaysia/2506/2004-like strain B/Malaysia/2506/2004 (15 micrograms/0.5 ml).

The study questionnaire included inquiries pertaining to the identification of the hospital personnel, previously diagnosed diseases, egg allergies, acute febrile diseases, current knowledge about vaccination and related side effects, and attitude toward vaccination. Multiple answers were allowed. The study questionnaire was completed prior to vaccination as well as on Day 10 day and Month 3 post-vaccination, with physical examinations being performed as needed. Erythema in the injection site > 2 cm, low-grade fever 37–37.7^{o}C, and fever > 37.8^{o}C were described as side effects. Work power loss was defined as a full day's absence because of the side effects related to the influenza vaccine.

Statistical analysis was performed using SPSS 10.0 software. P-values $\leq$ 0.05 were considered statistically significant. Categorical variables were analyzed using the chi-square test, and continuous variable analysis was performed with the Student t test.

Results

A total of 547 (60%) persons out of 911 hospital personnel employed by the Eskişehir Yunus Emre State Hospital were administered influenza vaccines in November 2006. The vaccinated group consisted of 57 physicians (45.6%), 172 nurses (74.1%) and 319 (57.6%) other HCWs. Thirty-four hospital personnel were vaccinated following completion of treatment for acute febrile infections, and three hospital personnel with egg allergies were not vaccinated. The mean age of hospital personnel included in the study was 34.48±8.85 years (range: 18-63 years), while gender distribution was 296 (54.1%) female and 251 (45.9%) male.

An evaluation on Day 10 following influenza vaccination demonstrated at least one side effect in 197 (36%) hospital personnel. Side effects included pain in 139 (25.4%), fatigue in 94 (17.2%), headache in 14 (2.6%), erythema in 8 (1.5%), swelling in 8 (1.5%), low-grade fever in 8 (1.5%), fever in 8 (1.5%), and short-term dyspnea in 1 (0.18%) subjects. An evaluation at Month 3 following influenza vaccination determined 45 severe influenza-like symptoms in 25 (4.5%) subjects. We did not confirm work power loss in any HCW after the influenza vaccine. There was no statistical relationship between side effects and age or gender (p=0.860, p=0.929), while side effects were significantly more frequent among subjects receiving their first vaccination (p=0.008) and nurses (p=0.021).

Four hundred twenty (76.8%) of the 547 vaccinated HCWs were asked why they had not been vaccinated in past year. The responses were as follows: they did not think influenza is a serious disease 124 (29.5%); they did not think the vaccine is effective 109 (26%); they thought the vaccine is expensive 105 (25%); they feared having side effects from the vaccine 45 (10.7%); they preferred other ways for protection 75 (17.9%); they feared the injection 29 (6.9%). Factors influencing current immunization included in-hospital administration in 344 (81.9%), prevention of disease in 250 (59.5%), and free-of-charge administration in 127 (30.2%) subjects. Answers to questions investigating the opinions about and attitude towards influenza vaccination of hospital personnel and distribution according to occupation are summarized in Table 1. When we compared the answers from three different occupational groups, the belief that the vaccine is not useful was significantly higher among physicians (12/29) (p=0.001). When reasons for lack of previous immunization and factors influencing current immunization were questioned, cost was a frequent reply to both questions by other HCWs, and the difference was statistically significant in both cases (***p*<0.001** [90/269] and ***p*<0.001** [170/269]).

Discussion

The influenza vaccine is generally very well

Table 1. Opinions about and attitude towards influenza vaccination of 420 HCWs receiving their first vaccine

Answers to questions about vaccination	Physicians (n=29)	Nurses (n=122)	Other HCWs (n=269)	*p*
Why you were not immunized before?				
• I don't consider influenza to be a risky disease	4 (%13.8)	40 (%32.8)	80 (%29.7)	0.128
• I don't believe vaccination is effective	12 (%41.4)	43 (%35.2)	54 (%20)	0.001
• Vaccinations are not reimbursed	2 (%6.9)	13 (%10.7)	90 (%33.5)	<0.001
• I prefer other methods of prevention	4 (%13.8)	17 (%13.9)	54 (%20)	0.289
• I'm afraid of the side effects of vaccination	6 (%20.7)	14 (%11.5)	25 (%9.3)	0.170
• I'm afraid of injections	3 (%10.3)	8 (%6.6)	18 (%6.7)	0.823
Why did you decide to become immunized?				
• In-hospital administration	23 (%79.3)	101 (%82.8)	220 (%81.8)	0.915
• Prevention of infection	14 (%48.3)	76 (%62.3)	160 (%59.5)	0.391
• Free-of-charge administration	3 (%10.3)	17 (%13.9)	107 (%39.8)	<0.001

Other HCW's (technicians, cleaners, porters, secretaries)

tolerated in adults. The most common side effect is pain in the local administration site, and generally persists less than two days. Local reactions are typically mild, and seldom have a limiting effect on daily activities. The most common systemic side effects are fever, fatigue and myalgia. These symptoms become apparent 6 to 12 hours after vaccination, and disappear within 1 to 2 days. These symptoms are more prevalent in subjects without previous exposure to the influenza virus antigen. Allergic reactions to egg proteins in the vaccine and delayed local reactions to thimerosal are rare [11-14].

In a double-blind randomized study in an elderly (>60 years of age) population, the investigation of the side effects of influenza vaccination in 904 subjects revealed pain, swelling, and hyperthermia as the most common local side effects, and fatigue, headache and fever as the most common systemic side effects. At least one side effect was reported in 210 (23%) subjects who were vaccinated. There was no significant difference in terms of systemic side effects between vaccinated and placebo groups [12]. Similarly, a double-blind randomized study in 424 subjects consisting of healthy adults did not find any significant difference between vaccinated and placebo groups in terms of systemic side effects [15]. In our study, at least one side effect was determined in 195 (35.6%) hospital personnel. While the frequency of side effects seems high, no patients exhibited side effects that interfered with daily activities or any serious side effects. The fact that the study group consisted of healthcare personnel suggests a high sensitivity for side effects. Similar to our findings, severe influenza-like symptoms were observed in 4% of 214 healthcare workers who received influenza vaccination [16]. Since we did not conduct any microbiological assessment, the severe influenza-like symptoms observed may have been due to different or similar influenza, or other viral or bacterial infections.

Hofmann *et al.* evaluated 32 publications reporting influenza immunization in HCWs between 1985 and 2002, and determined immunization rates of 2.1–82% [17]. While this rate of vaccination is low considering free-of-charge vaccination, previous announcement and education, it is nevertheless successful compared to rates obtained in similar studies.

In previous studies, the most common causes of non-vaccination of healthcare workers have been reported as fear of side effects, development of influenza due to the vaccine, the unsuitability of the place and time of vaccination, not considering influenza as a serious disease, disbelief in the efficacy of vaccination, and fear of injection [17]. We obtained similar responses in our study.

Influenza is the sixth leading cause of death among adults in the United States, killing an average of 36,000 Americans annually [18]. Vaccination is considered to be 70–90% effective in the prevention of influenza in healthy adults under 65 years of age [19,20]. Influenza vaccination reduces otitis media in children, absenteeism from work in adults, hospitalization and mortality in high-risk groups, and the number of physician visits and influenza-related respiratory tract infections in all age groups [21]. When questioned about the cause of non-vaccination in the previous year, the most common responses were not considering influenza as a serious disease and disbelief in the efficacy of vaccination. In the study by Elder *et al.* on 518 healthcare personnel, serologically apparent infections were determined in 23%, but 59% of these did not remember having

experienced an influenza infection, and 28% did not remember having experienced any respiratory tract infections [22]. The reason for influenza not being considered a serious disease may be the high rate of asymptomatic influenza in HCWs. Upon evaluation of responses according to occupations, an interesting finding was the significantly high percentage of physicians who did not believe in the efficacy of immunization ($p = 0.001$). This misconception may be due to coincidental post-vaccination viral infections being appraised as influenza.

Free-of-charge and in-hospital administration intensified HCWs' interest in immunization. The immunization of a group who does not consider influenza as a serious disease and believes that vaccination is inefficient is considered to be the benefit of educational seminars about influenza pandemics. The intense attention to influenza in the visual and printed media following the avian influenza cases in our country last year may also have been effective [23].

The increase in the rate of influenza immunization among healthcare personnel is possible through education, contestation of fear, amelioration of misconceptions, solution of financial issues, constitution of a registry system, and tracking of vaccination [24,25]. In conclusion, we determined that the side effects of influenza vaccination are mild, transient, and do not cause absenteeism from work. When compared with data from the previous year, it can be seen that although our vaccination rate is getting higher because of the effects of education, media, communication vehicles and free vaccine, we found our staff is not interested in receiving influenza immunizations. Therefore, we plan to maintain in-hospital and free-of-charge vaccination, to determine educational strategy in accordance with occupational groups, to establish an immunization registry system, and to track vaccinations.

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Corresponding Author: Hasan NAZ, Eskişehir Yunus Emre State Hospital, Department of Infectious Disease, Eskişehir, TURKEY
Phone&Fax: +(90) 222 3350650/1717&+(90) 222 3352041, GSM: 0505 7989873
e-mail:hasannaz73@mynet.com