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RESEARCH PAPER



Medical students' attitude toward influenza vaccination: Results of a survey in the University of Bari (Italy)

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ABSTRACT

Influenza vaccination is strongly recommended for Italian healthcare professionals, but vaccine coverage is low. Since 2012, vaccination is also offered to medical students as part of the National Immunization Plan; however, few Medical Schools has implemented the plan so far. To study determinants of vaccination compliance, we conducted a survey among medical students at the University of Bari, where influenza vaccination has been actively offered since 2013. Information was obtained by means of an online anonymous questionnaire administered in April 2014. We enrolled 669 students, 383 (57%) vaccinated; 54% were female and the average age was 23.9 ± 4.9 y. Determinants of getting vaccinated were analyzed in a multivariate logistic model. Receiving invitation from the University (aOR = 3.8; 95%CI = 1.2–12.3; $p = 0.026$), the opinion that vaccine is safe (aOR = 2.8; 95%CI = 1.5–5.0; $p = 0.001$) and useful (aOR = 3.4; 95%CI = 1.7–6.7; $p < 0.0001$), a specific training about influenza vaccination during the course (aOR = 1.5; 95%CI = 1.1–2.1; $p = 0.043$), and considering himself as at a major risk of influenza complication (aOR = 1.8; 95%CI = 1.1–2.9; $p = 0.001$) were significantly associated with vaccine acceptance. Active invitation and training are confirmed as key actions (as in children vaccination strategies) and, according to our results, they could be routinely used to promote vaccination in hard-to-reach groups such as healthcare workers.

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Introduction

Annual influenza epidemics cause severe morbidity and mortality, especially in high-risks groups such as older people, younger children and subjects affected by chronic conditions. Every year seasonal influenza infects approximately 10 to 30 per cent of European population and causes hundreds of thousands of hospitalisations across Europe.¹

Influenza vaccination is the most important tool to prevent the infection and is a public health priority worldwide.² Recommendations for annual influenza vaccination are widely different in the EU and in the US countries; nevertheless, almost all countries formulated official recommendations on vaccination of Healthcare Workers (HCWs) because they can be means of influenza transmission for patients.^{2,3}

Several studies demonstrated that the achievement of high flu coverage among HCWs is related to the reduction of patients morbidity and mortality, especially in long-term facilities or in high-intensity wards, such as Oncology and Intensive Care Units; high coverage could also reduce absenteeism among staff.^{4,5} Despite the strong evidence of vaccine effectiveness and the easy access to influenza vaccination, the uptake rate of influenza vaccine among HCWs remains low and below recommended targets in many countries.^{2,3,6,7}

In Italy, influenza vaccination is strongly recommended for healthcare professionals, but a national figure about the coverage achieved among HCWs is not current available; according to several *ad hoc* studies, vaccine coverage among this group remains much lower than target established by the Ministry of Health.^{8,9}

Many studies have largely examined the reasons for rejecting or accepting influenza vaccination among HCWs and the most effective interventions for improving vaccine acceptance, some of them seem to indicate that oldest HCWs, who never got vaccinated, are quite difficult to immunize.^{10–20} In contrast a study performed in 2011 indicates that vaccination coverage was significantly more frequent in medical residents who were vaccinated against influenza at least once in the previous 5 influenza seasons.²¹

In fact educating and promoting the importance of influenza vaccination early in a medical student's career with a multifaceted intervention is described as an effective strategy to improve vaccination compliance and a positive attitude toward influenza prevention among future physicians.²² Medical and paramedical students could represent a special group sharing a major awareness of the significance of high vaccine coverage but only few studies investigated the vaccination coverage and

the opinion about flu vaccination of Medical Schools students.²³⁻²⁶ Moreover easy access to the vaccine is not always offered to medical students, even when they have regular patients contact.¹⁰

In Italy, since 2012, National Immunization Plan recommends the active and free offer of vaccination against flu to medical students but few Medical Schools has implemented the plan so far.²⁷

Finding out factors associated with medical students' acceptance of vaccination against influenza can have important implications to build up a positive attitude toward flu vaccines and to fill knowledge gap. Some evidence seems to suggest that appropriate university education can improve vaccination acceptance and that is why students are a key-figure to increase vaccination coverage.²⁸

To study determinants of vaccination compliance, we conducted a survey among medical and paramedical students at the University of Bari, where influenza vaccination has been offered actively and for free since 2013.

Results

In 2013/14 academic years, 4,216 students attended the Bari School of Medicine; of these, 882 (20.9%) were vaccinated. The number of students vaccinated who accepted to participate in the study was of 383 (39% of students who were vaccinated). Among 3,334 medical and paramedical students not vaccinated, 286 were enrolled as controls (Fig. 1). Of 669 enrolled subjects, 54% (n = 363) were female and the average age was 23.9 ± 4.9 y.

Among vaccinated, 304 were medical students and 79 paramedical students. Among unvaccinated, 222 were medical students and 64 paramedical students. No significant differences in the distribution of vaccinated and unvaccinated by degree courses were found (chi-square = 0,2987; p = 0,585).

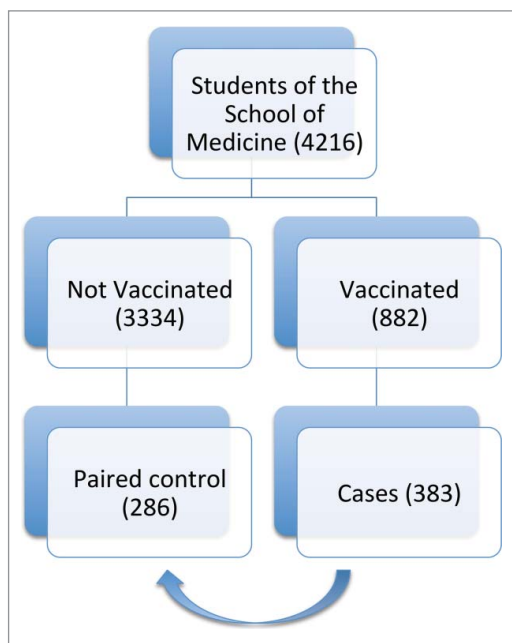


Figure 1. Flow chart of subjects enrollment.

Table 1. Proportion of students that received the invitation to be vaccinated from general practitioners, university, other health care professional, friends and/or colleagues.

	Cases N (%) (n = 366)*	Controls N (%) (n = 207)*	OR	95% CI	P value
General practitioners	27 (7.4)	23 (11.1)	0.6	0.3 – 1.2	0.1
University	361 (98.6)	195 (94.2)	4.4	1.4 – 16.3	0.003
Medical Specialist	7 (1.9)	10 (4.8)	0.4	0.1 – 1.1	0.05
Other health care professional	4 (1.1)	12 (5.8)	0.2	0.04 – 0.6	0.001
Friends and/or colleagues	53 (14.5)	21 (10.1)	1.5	0.9 – 2.7	0.1

*96 students (17 cases and 79 controls) did not respond

The proportion of respondents who said they had received the invitation to be vaccinated was 96% (n = 367; 95% CI: 93.9 – 97.8) among the cases and 73% (n = 207; 95% CI = 67.2 – 77.5) among controls (chi-square = 76.9; p = 0.00). Three students (2 cases and 1 control) have not answered the question.

Table 1 describes the proportion of students who received the invitation to be vaccinated from general practitioners, universities, other health care professional, friends and/or colleagues. Overall 75.4% (n = 289/383) of cases and 57% (n = 163/286) of controls received at least one call to get vaccinated against seasonal influenza. Having received at least one call to get vaccination was associated to the execution of the vaccination (OR = 9.9; 95% CI = 5.4 – 17.9; z = 5.5; p = 0.00) while number of received invitations didn't change the probability to get vaccinated (OR = 0.9; 95% CI = 0.7 – 1.3, z = -0.06; p = 0.56).

Table 2 describes the determinants of vaccination compliance of the enrolled students, with specific regard to the perception of risk.

The univariate analysis was performed also for each source of information about vaccination.

Receiving information from different sources such as the internet, mass-media, scientific papers, social networks and blogs is not associated with the probability to be vaccinated (OR: 0.9; 95% CI = 0.7 – 1.1, z = -1.3; p = 0.2).

The proportion of students who attended a specific university lesson on influenza vaccination is higher among cases (47.5%, 95% CI = 42.4–52.7; n = 182) than controls (32.9%, 95% CI = 27.4–38.6; n = 94; chi-square = 14.5; p = 0.0001). The participation at this lesson is associated with the execution of vaccination (OR = 1.8; 95% CI = 1.3 – 2.5, z = 3.8; p = 0.000).

The 88.3% (n = 591; 95% CI = 85.7–90.7) of respondents considered useful influenza vaccination for medical and paramedical students, this opinion is reported by 95.8% (n = 367/383; 95% CI = 93.3–97.6) of cases and 78.3% (n = 224/286; 95% CI = 73.1–82.9) of the controls and is associated with the vaccination execution (OR = 7.6; 95% CI = 2.9–21.8; z = 4.44; p < 0.0001).

Determinants of getting vaccinated were analyzed in a multivariate logistic model. Receiving an invitation from the University (aOR = 3.8; 95%CI = 1.2–12.3; p = 0.026), the opinion that vaccine is safe (aOR = 2.8; 95%CI = 1.5–5.0; p = 0.001) and useful (aOR = 3.4; 95%CI = 1.7–6.7; p < 0.0001), a specific training about influenza vaccination during the degree course (aOR = 1.5; 95%CI = 1.1–2.1; p = 0.043), and considering himself as at a major risk of influenza complication (aOR = 1.8; 95% CI = 1.1–2.9; p = 0.001) were significantly associated with vaccine acceptance. A lower perception of

Table 2. Univariate analysis of determinants of vaccination compliance among medical and paramedical students of the University of Bari.

Statement	Cases N(%)	Controls N(%)	OR	95% CI	P value
I'm a at-risk subject for disease and disease complications	105 (27.4)	53 (18.53)	1.7	1.1 – 2.4	0.01
I want to protect my family from the contagion risk	322 (84.1)	242 (84.6)	1.0	0.6 – 1.5	0.8
I want to protect my patients from the contagion risk	370 (96.6)	267 (93.4)	2.0	1.0 – 4.2	0.056
I don't want to get sick	344 (89.8)	234 (81.8)	2.0	1.2 – 3.1	0.003
Vaccination was strongly recommended by the institution where I work/I'm attending my internship	279 (72.8)	143 (50.0)	2.7	1.9 – 3.7	<0.0001
In my opinion vaccination is effective	326 (85.1)	193 (67.5)	2.8	1.9 – 4.1	<0.0001
In my opinion vaccination is safe	356 (93.0)	209 (73.1)	4.8	3.0 – 7.8	<0.001
Influenza risk doesn't require to get vaccinated	77 (20.1)	127 (44.4)	0.3	0.2 – 0.4	<0.0001

disease risk decreased the probability of getting vaccinated (OR = 0.5; 95% CI = 0.3 – 0.7, $z = -3.49$; $p = 0.000$).

Discussion

This survey aimed at analyzing determinants of vaccination compliance among medical and paramedical students of the University of Bari. According to our results, the invitation from the University and a specific training about influenza vaccination during the degree course are key strategies to improve medical students' acceptance of influenza vaccination. In view of these observations, the role of the Schools of Medicine and an active collaboration between academic and public health institutions are crucial for the achievement of high coverage among this group. The accomplishment of high coverage among medical and paramedical students nowadays is finalized to have high coverage among health-care workers in the future, because one of the most important determinants of getting vaccinated is to have been previously vaccinated.²¹

Only few studies focused on influenza vaccination among medical students. One study reports a lack of knowledge, while the others highlight the reasons for accepting or refusing influenza vaccination.^{23-26,29} Self-protection, patient protection, free offer were the reasons for vaccination acceptance. Forgetfulness, concerns about side-effects, low risk-perception were the reasons for vaccination refusal.^{23-26,29} One of the mentioned study demonstrated that occupational risk perception is greater for Hepatitis B than influenza.²³

The determinants of vaccination acceptance highlighted in the cited surveys are similar to ones analyzed in our study, but none of these studies analyzed the potential role of academic institution in the vaccine promotion and this is the principal strength of our study. Only a study performed in Israel in 2011 showed that students are the more disposed category to accept vaccination in the context of "Intervention Programs."³⁰ Also the ECDC, in a recent review, has confirmed that a specific promotion and an improved access to vaccination has significant positive effects in vaccine uptake.²⁰

The main limitation of our study is the low adhesion rate, especially for control group, that could be related to insufficient sensibility to the topic and inadequate confidence with online surveys. Moreover, we performed the study at the end of the flu season and we didn't advertise for the survey. Both these factors could have led to the low response rate. In the same way students who joined the study could be more sensible to the topic and prone to having a positive attitude toward influenza prevention whether they got flu vaccination or not.

Future studies have to examine in depth the role of educational training course and to identify all the opportune occasions to purpose flu vaccination to medical and paramedical students during academic courses. Moreover the opportunity of establishing the mandatory vaccination (e.g. for students that perform clerk-ship into high risk wards) has to be debated; evidence from 2 observational studies performed in the US suggests that mandatory vaccination policies are more successful in reaching vaccination rates of above 95% than relying on enabling approaches.^{31,32} In this debate, authors need to consider that the low status of students in the healthcare hierarchy makes them more susceptible to injunctive norms and that university procedures (e.g., the annual membership) could be opportune occasions to check the attendance to the mandatory vaccination.

Material and methods

Study population and procedure

To evaluate determinants of vaccination compliance, we designed and performed a case control study among students attending medical and paramedical degree courses at the University of Bari, located in Apulia (South of Italy).

Cases were defined as students who got flu vaccination at the Vaccination Service during 2013 – 2014 seasonal flu. The list of cases was available in the Vaccination Service. For each case, authors planned to enrol almost a control among unvaccinated students; controls were paired considering gender, age, degree course and year of course. The list of all the medical and paramedical students and their email addresses were required and obtained from the University Administration Office. Data were treated according to Italian privacy law.

The survey was conducted in April 2014 by an online, anonymous self-administered questionnaire, available on the web service of Google Drive. Students were invited to participate to the survey by e-mail and a maximum of 3 recall emails were sent to non-responders. As specified in the email, filling in the questionnaire implied giving consent to participate in the study.

The questionnaire

The questionnaire consisted of 14 closed questions, 12 were dichotomous (yes/no) and 2 were multiple choices. The questionnaire was designed to be completed in less than 15 minutes. Questions were created to assess: vaccination status for

influenza during 2013 – 2014 seasonal flu, invitation to get vaccinated, opinion on usefulness of influenza vaccination, determinants for accepting or rejecting the vaccine, attendance to specific educational training about influenza vaccination. This specific training was organized by the Hygiene Section of the University of Bari School of Medicine. It consisted in one lecture of 2 hours performed by the Chief of the Hygiene section. The themes of the lessons were: epidemiology of influenza, flu vaccines characteristics, data about vaccine efficacy and effectiveness, pros and cons about vaccination.

Data analysis

The database of completed questionnaire was exported from Google Drive online storage and Stata 11.0/MP was used to analyze the data. A descriptive analysis of the sample (e.g., frequencies percentages) was computed. The frequency distributions of the investigated variables between the 2 groups, cases and controls, were assessed. The association with the outcome (to get vaccinated or not) was measured through the calculation of odds ratio (OR) with the respective 95% confidence intervals (95%CI) for each determinant investigated (invitation to get vaccinated or not, opinion on usefulness of influenza vaccination, perception of risk related to influenza, attendance to specific educational training about vaccine). The univariate associations were computed by z-score test.

A multivariate logistic regression model, including all the associations found in the univariate analysis, was performed to examine the determinants to get vaccinated or not.

For all test, significance was set at $p < 0.05$.

Abbreviations

EU	European Union
HCWs	Healthcare Workers
OR	Odds Ratio
aOR	adjusted Odds Ratio
US	United States

Disclosure of potential conflicts of interest

Conflicts of interest: none declared.

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