



ORIGINAL ARTICLE

Factors influencing flu vaccination in nursing students at Palermo University

OMAR ENZO SANTANGELO, SANDRO PROVENZANO, ALBERTO FIRENZE

Department of Health Promotion, Mother and Child Care, Internal Medicine and Medical Specialties "G. D'Alessandro", University of Palermo, Italy

Keywords

Surveys and questionnaires • Nursing students • Sicily • Cross-sectional study • Influenza vaccine

Summary

Introduction. *The purpose of this study was to ascertain the determinants of nursing students' compliance with flu vaccination.*

Methods. *In this cross-sectional study, an anonymous paper questionnaire was administered to students attending the 3-year nursing course at the University of Palermo. Adjusted Odds Ratios (aOR) are presented.*

Results. *403 nursing students (65% female) completed the questionnaire (response rate 98.5%). The average age of the respondents was 22.0 years ($SD \pm 3.04$). The dependent variable: "In the next season, do you intend to be vaccinated against flu? Yes",*

displayed a statistically significant association with the following independent variables: "year of study: second" (aOR 2.66), "year of study: third" (aOR 1.72), "Perceived health status: medium-high" (aOR 6.61), "Did you get vaccinated against seasonal flu last year? Yes" (aOR 22.47).

Conclusions. *Although nursing students are not yet health professionals, they spend part of their time in health facilities for their clinical training and will be the health workers of the future. Involving nursing students in influenza vaccination campaigns can also help them take better care of themselves and their patients.*

Introduction

In a period in which the sustainability of health systems is at risk, disease prevention is of fundamental importance and constitutes a valid "investment" in health. Vaccinations are the most effective and safe public health interventions for the primary prevention of infectious diseases, and their impact goes well beyond health [1]. Indeed, the infectious diseases for which vaccination is available have been drastically reduced and remarkable results have been achieved, such as the eradication of smallpox and, in most countries, of polio. Determining the burden and the resulting economic costs attributable to influenza viruses is critical to directing decisions regarding public health programs. The burden of influenza disease can vary widely and is determined by a number of factors, including the characteristics of circulating viruses, the timing of the influenza season and the number of people who are vaccinated. Seasonal influenza imposes a yearly disease burden in terms of morbidity and mortality. It causes illnesses that range in severity and sometimes lead to hospitalization and death. The World Health Organization (WHO) estimates that seasonal influenza may result in 290,000-650,000 deaths each year due to respiratory diseases alone [2].

In Italy, in accordance with the provisions of the 2017-2019 National Vaccine Prevention Plan, flu vaccination is actively recommended and offered free of charge to certain groups of people whose professional exposure or health conditions place them at higher risk [3]. The "ideal" vaccination coverage objective is 95%, while the "minimum" target is 75%.

However, influenza vaccination coverage in both the global population and at-risk categories is far below these targets. In the 2017-2018 season, coverage was 15.3% in the general population, while in the period 2014-2017, the average coverage among people aged 18-64 with at least 1 chronic disease was 20.3%, ranging from 15% to 29% according to the specific pathology and the region considered [4]. Influenza prevention, control and preparedness are vital to ensuring the sustainability of national programs, which constitute an investment in healthcare systems and improve pandemic preparedness. As the resources available for health promotion and disease prevention are limited, one reason to increase influenza vaccination is to reduce the impact of virus-associated morbidity and mortality in the population, especially in the groups at greatest risk (elderly, children, patients with chronic medical conditions and pregnant women). Protecting subjects at risk also involves implementing policies to increase the immunization of healthcare workers (HCWs), who are at increased risk of contracting infections and further transmitting them to colleagues and patients [5]. While immune HCWs act as a barrier against the spread of infections, vaccine uptake rates in HCWs have often been low [5]. Therefore, the aim of this study was to ascertain the determinants of vaccination uptake in nursing students.

Methods

This cross-sectional descriptive study was approved by the Ethics Committee of the Paolo Giaccone University

Hospital in Palermo, Minutes No. 07/2019 (No. 25) of July 17, 2019. In May 2019, a survey was administered to students attending mandatory daily lectures on the 3-year nursing science course at the University of Palermo. Informed consent was provided by all participants. The questionnaire was adapted from another study [6] by the authors and consisted of three sections. The first section gathered socio-demographic information. In the second section, participants were asked if they had been vaccinated during the previous flu campaign, if they intended to be vaccinated during the next campaign and if, as health workers, they felt more at risk of contracting infectious diseases. In the third section, respondents were asked to indicate the single main reason why they were or were not vaccinated during the previous vaccination campaign. A multivariable logistic regression analysis was performed, in which the dependent variable was: “Do you intend to be vaccinated against the flu during the next season? Yes”, in order to evaluate the role of the variables in the questionnaire. The statistical significance level chosen for the entire analysis was 0.05. For all the qualitative variables, absolute and relative frequencies were calculated. Results are expressed as adjusted Odds Ratios (aOR) with 95% Confidence Intervals (CI). The data were analysed by means of the STATA statistical software version 14 [7].

Results

A total of 403 nursing students took part in the survey, 65.01% of whom were females; all participants were

born in Italy, and their mean age was 22.02 (SD \pm 3.04) years. All students attending the 3-year nursing course at the University of Palermo received a questionnaire and an informed consent form. The total number of students enrolled in the nursing degree course was 409; the response rate was therefore 98.53%.

Almost 38% of respondents were attending the first year of the nursing science course. A description of the sample is shown in Table I: 82.88% of respondents perceived themselves as having a medium-high economic status and 95.04% perceived their health status to be medium-high; 62.53% consider themselves to have a higher risk of contracting infectious diseases owing to their future profession, but only 21.09% had been vaccinated against seasonal flu the previous year. Table II show the reasons why flu vaccination was/was not carried out.

The results were somewhat contradictory: 37.65% of participants underwent vaccination because they considered themselves to be at greater risk of infection, and 36.47% in order to protect their family and the general population from the flu virus. By contrast, 35.54% did not have flu vaccination because they did not consider themselves to be at greater risk of infection, and 26.11% because it was not strongly recommended during their studies.

Table III shows the results of the multivariable logistic regression and Adjusted Odds Ratios. Considering as a dependent variable: “During the next season, do you intend to be vaccinated against flu? Yes”, the independent variables showing a statistically significant association were: “year of study: second” (aOR 2.66, 95%CI 1.45-

Tab. I. Sample description.

		N (%)
Gender	Female	262 (65.01)
	Male	141 (34.99)
Country of birth	Italy	403 (100.00)
	Other	0 (0.00)
Off-site, on-site or commuter students	Off-site	112 (27.79)
	Commuter student	106 (26.30)
	On-site	185 (45.91)
Year of study	First	153 (37.97)
	Second	115 (28.54)
	Third	135 (33.50)
Perceived economic status	Medium-high	334 (82.88)
	Low	69 (17.12)
Perceived health status	Medium-high	283 (95.04)
	Low	20 (4.96)
Do you have chronic diseases (more than 6 months)?	No	363 (90.07)
	Yes	40 (9.93)
Considering your future profession and your state of health, do you consider yourself to have a higher risk of contracting infectious diseases?	No	151 (37.47)
	Yes	252 (62.53)
Were you vaccinated against seasonal flu last year?	No	318 (78.91)
	Yes	85 (21.09)
Do you intend to be vaccinated against flu during the next season?	No	215 (53.35)
	Yes	188 (46.65)
Age	22.02 (SD \pm 3.04)*	

*mean (Standard Deviation)

Tab. II. Reasons why flu vaccination was/was not carried out.

I decided to get vaccinated because:	N (%)
I consider myself to be at greater risk of infection	32 (37.65)
To avoid infecting my family or other people	31(36.47)
To avoid infecting patients	17(20.00)
It was strongly recommended by the facility where I study or do my internship	5 (5.88)
I decided not to get vaccinated because:	N (%)
I don't consider myself to be at greater risk of infection	113 (35.54)
It wasn't strongly recommended by the facility where I study or do my internship	83 (26.11)
I forgot to be vaccinated	52 (16.36)
I do not think it is an effective vaccination	32 (10.02)
I do not consider myself to be a source of infection for my family or others	29 (9.13)
I do not consider myself to be a source of infection for patients	9 (2.84)

4.90, $p = 0.002$), “year of study: third” (aOR 1.72, 95%CI 1.13-3.14, $p = 0.010$), “Perceived health status: medium-high” (aOR 6.61, 95%CI 1.15-37.86, $p = 0.034$), “Did you get vaccinated against seasonal flu last year? Yes” (aOR 22.47, 95%CI 9.28-54.39, $p < 0.001$). Each independent variable is adjusted for all the other independent variables (based on 403 observations) in Table III.

Discussion

Among young university students, the quality of information, the modes of communication and the development of critical skills towards a non-imposed choice of lifestyles and behaviors in line with public health policies are important [8, 9]. Nursing students are fu-

ture healthcare professionals and, as such, will have a major influence on patients' health choices. Reducing the influenza burden is important and the most effective means of achieving this is influenza vaccination [10].

According to the European Centre for Disease Prevention and Control, the term “determinants of vaccination” covers barriers to and enablers of vaccination uptake, reasons for refusing vaccination, beliefs and attitudes towards vaccination, and system design-mediated factors [11]. The SAGE Working Group “Model of determinants of vaccine uptake” categorized [12] these determinants as contextual, individual and group influences and vaccine- and vaccination-specific issues. Contextual influences include the historic, social, cultural, environmental, economic, political and institutional factors which might influence vaccine hesitancy. Individual and group influences include personal percep-

Tab. III. Multivariable logistic regression. Adjusted Odds Ratio are presented. Each independent variable is adjusted for all the other independent variables. Based on 403 observations.

Independent variables		Dependent variable: during the next season, do you intend to be vaccinated against flu? Yes		
		aOR	95% CI	p-value
Gender	Female	1		
	Male	0.68	0.41-1.15	0.150
Are you an off-site, on-site or commuter student?	Off-site	1		
	Commuter student	1.11	0.59-2.08	0.739
	On-site	1.17	0.66-2.08	0.601
Year of study	First	1		
	Second	2.66	1.45-4.90	0.002
	Third	1.72	1.13-3.14	0.010
Perceived economic status	Medium-high	1.29	0.67-2.48	0.450
	Low	1		
Perceived health status	Medium-high	6.61	1.15-37.86	0.034
	Low	1		
Do you have chronic diseases (more than 6 months)?	No	1		
	Yes	0.61	0.27-1.38	0.237
Considering your future profession and your state of health, do you consider yourself to have a higher risk of contracting infectious diseases?	No	1		
	Yes	1.03	0.62-1.71	0.911
Did you get vaccinated against seasonal flu last year?	No	1		
	Yes	22.47	9.28-54.39	< 0.001
Age	As unit increase	1.04	0.96-1.15	0.332

tions of, or beliefs about, vaccines and influences from the social environment. Vaccine- and vaccination-specific issues include risk and benefit (scientifically based), vaccination schedule, mode of administration, introduction of new vaccines or new formulations, role of healthcare professionals and costs. We therefore decided to investigate only some of these determinants, which are shown in Table II. Of the 403 students who took part in our survey, only 21% stated that they had undergone flu vaccination; this is a fairly low percentage, but is in line with the percentages found in other similar studies, which have reported coverage rates ranging between about 10% and 50% [13, 14]. The results reported in Table II are worrying, in that almost 36% of students declared that they had not been vaccinated because they did not feel that they were at greater risk than the general population; this is a misconception, as demonstrated by Lietz et al. [15] who have estimated that health professionals have about a 6% higher occupational risk of influenza infection. There are several factors that influence vaccination uptake among health professionals; according to a previous Italian study, one of these factors was whether these subjects considered themselves at greater risk of infection [10]. Although 63% of our respondents considered themselves to be at higher risk, this did not emerge as a statistically significant factor in the multivariable analysis. Students in the second and third course years displayed a significantly higher probability of being vaccinated during the next vaccination campaign; this was probably because the knowledge and experience acquired during their course raised their awareness of the importance of vaccination as a public health tool [16, 17]. Contrary to what one would expect, those who reported a perceived medium-high state of health were more likely to be vaccinated in the next vaccination campaign than those with a perceived low state of health. A similar result emerged from a previous study [18], in which a perceived low state of health made subjects more inclined to be afraid of vaccinations and therefore less likely to be vaccinated. In our study, other factors were also seen to favor vaccination uptake, such as having been vaccinated in the previous vaccination campaign; this is in line with the results of other studies [19]. The findings in this study are subject to at least three limitations. Firstly, as it was a cross-sectional study, it was not possible to draw any conclusions about causal relationships of the results. Secondly, as vaccination status was self-reported, it might have been subject to recall bias. Finally, this study yielded a general overview of the behavior and attitudes of these specific nursing students, and should not be regarded as providing a complete description of the behavior of nursing students at other universities. Thus, although our results are in line with those reported in the literature, they should not be generalized to all university students.

Conclusions

Implementing comprehensive evidence-based intervention strategies is important, in order to ensure that future healthcare personnel and patients are protected against

influenza. Although nursing students are not yet health professionals, they spend part of their time in healthcare facilities for their clinical training and will be the health workers of the future. Educating nursing students in active immunization should be an essential step in promoting vaccination in the general population. Involving nursing students in influenza vaccination campaigns can also help them take better care of themselves and their patients. The scientific literature shows that it is relatively easy to educate medical or nursing students with regard to the importance of vaccination is [20]. Indeed, universities can, with minimal resources, implement education programs to improve vaccination adherence and inculcate a positive attitude toward influenza prevention in future healthcare workers.

Ethical approval

The study was approved by the Ethics Committee of the Paolo Giaccone University Hospital in Palermo, Minutes No. 07/2019 (No. 25) of July 17, 2019.

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Conflict of interest statement

The authors declare no conflict of interest.

Authors' contributions

AF, SP, OES conceived, designed, coordinated and supervised the research project. AF, SP, OES collected samples. OES, SP performed the data quality control, optimized the informatics database, performed the statistical analyses and evaluated the results. OES, SP wrote the manuscript. All authors revised the manuscript and contributed to improving the paper. All authors have read and approved the final manuscript.

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Correspondence: Sandro Provenzano, Dipartimento di Scienze per la Promozione della Salute, Materno Infantile, di Medicina Interna e Specialistica d'Eccellenza "G. D'Alessandro", via del Vespro 133, 90127 Palermo, Italy - Tel. +39 091 6553641. Fax +39 091 6553697 - E-mail: provenzosandro@hotmail.it

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