Factors influencing flu vaccination in nursing students at Palermo University

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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 ± 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.

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 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 ± 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-
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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 future 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. 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) |

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                |                                               |     |        |         |
| Male                  | 0.68                                          | 0.41-1.15 | 0.150   |
| Are you an off-site, on-site or commuter student? |   |     |        |         |
| Off-site              |                                               |     |        |         |
| Commuter student      | 1.11                                          | 0.59-2.08 | 0.739   |
| On-site               | 1.17                                          | 0.66-2.08 | 0.601   |
| Year of study         |                                               |     |        |         |
| First                 |                                               |     |        |         |
| 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                   |                                               |     |        |         |
| Perceived health status |                                           |     |        |         |
| Medium-high           | 6.61                                          | 1.15-37.86 | 0.034  |
| Low                   |                                               |     |        |         |
| Do you have chronic diseases (more than 6 months)? | |     |        |         |
| No                    |                                               |     |        |         |
| 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                    |                                               |     |        |         |
| Yes                   | 1.03                                          | 0.62-1.71 | 0.911   |
| Did you get vaccinated against seasonal flu last year? | |     |        |         |
| No                    |                                               |     |        |         |
| Yes                   | 22.47                                         | 9.28-54.39 | < 0.001 |
| Age                   |                                               |     |        |         |
| As unit increase      | 1.04                                          | 0.96-1.15 | 0.352   |
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 [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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