

## "STUDENTS IN THE HOSPITAL WARD": VACCINATION COVERAGE OF MEDICAL STUDENTS OF A UNIVERSITY HOSPITAL IN SOUTHERN ITALY

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### ABSTRACT

Students enrolled in Medical school courses must be immunized as recommended by Italian law. Despite this, vaccination coverage (VC) remains low. The goal of our study was to analyse, using an online questionnaire, the VC of medical students and their intention to get vaccinated, to promote and plan immunization with digital devices and to evaluate the increase of VC following an educational extracurricular intervention. Despite VC was poor against some vaccine-preventable diseases (VPDs), the intention of the subjects enrolled in the study to get vaccinated resulted higher, particularly 39% for influenza vaccination, 71% and 73% for meningococcal ACWY and B vaccinations. After the survey, an increase in vaccination uptake was rapidly observed. During the 30 days following the intervention all the medical students enrolled were immunized, involving friends or colleagues by taking them to the vaccination service, and an increase of influenza and other VPDs awareness was noticed.

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### 1. Introduction

Students attending medical school and healthcare Professionals are required to be immunized for some vaccine preventable diseases (VPDs), according to the National immunization plan 2017-2019 and to Law decree n. 81 of 2008 (1, 2).

Specifically, it requires the evaluation of immunization status against hepatitis B, and eventually a booster dose if levels of anti-HBsAg are <10 mIU/mL (3).

Moreover, the Mantoux test should be carried out before attending hospital ward. Finally, a check of the immunization status against measles, mumps, rubella, chickenpox/varicella and diphtheria, tetanus, pertussis, poliomyelitis should be provided, with potential related vaccines administration if subjects were not immunized, and seasonal influenza vaccination is strongly recommended (4 - 6).

Despite these recommendations, vaccination coverage (VC) for these VPDs were still below the target required to ensure herd immunity and to limit transmission of these diseases in health care settings (7-10).

Major issues that limit VC among HCWs are fear of adverse events and an erroneous self-perception of disease severity, contributing to increased vaccine hesitancy (VH) often among the general population (11- 13).

Considering that most of the healthcare professional courses require student's attendance in hospital wards and involve patient care, vaccination against VPDs should be considered essential and is recommended in the National Vaccination Plan for HCWs of the future (14).

Adequate information and training during study courses and trough extracurricular activities were recognized as some of the strategies to increase vaccination awareness and adherence and were also reported in the Italian national immunization plan 2017-2019 (1, 15, 16).

The goals of our study were to analyse, using an online questionnaire, the vaccination coverage of medical students and their intention to get vaccinated, to promote vaccination by planning vaccination sessions with the help of electronic devices and to evaluate the increase of vaccination coverage (VC) following the advice given by our survey.

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## 2. Methods

A cross sectional study was carried out through an online survey to the students of Medicine and Surgery attending the University of Messina starting from the 3rd year of studies (academic year in which students start their rotations in the hospital ward) at the beginning of 2019/2020 influenza season.

Medical school courses at the University of Messina account for about 260 students for each academic year. The overall study population therefore includes more than 1040 students, over the four-year program.

Questionnaires were submitted to students online through the Google<sup>®</sup> form platform and invitations were sent by telephone to the four student cohorts for each year.

The questionnaire included 30 items and divided in 5 sections (socio-demographics characteristics; students' knowledge about vaccinations recommended for healthcare workers in the National Vaccination Plan; vaccination adherence; intentions to get vaccinated; intention to plan vaccine recommended) was taken by students of the University of Messina.

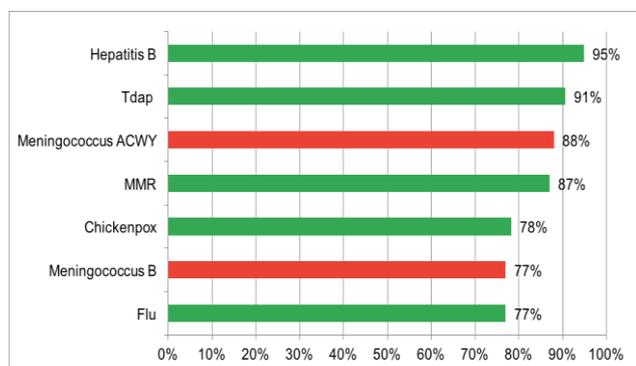
For students planning vaccinations recommended in the National Vaccination Plan, a telephone contact of the Hospital vaccination service was provided.

On August 8<sup>th</sup>, 2017, following an Extraordinary Commissioner Resolution, an agreement between the Local Health Unit of Messina and the University Hospital Policlinico "G. Martino" of Messina provided the first hospital vaccination service in Sicily.

This vaccination unit offered university staff, healthcare workers, students and patients all vaccines included in the Regional immunization schedule such as: hepatitis B, influenza, measles, mumps, rubella, chickenpox/varicella, diphtheria, tetanus, pertussis, hepatitis A, Haemophilus influenzae type B, Meningococcus ACW135Y or B and Pneumococcus 13-valent or 23-valent.

## 3. Results

The examined sample included 470 students, with a response rate of 45% (average age 23.64 years  $\pm$ SD 2.87). More than 90% of respondents correctly answered about HBV and Tdap, at least 80% about MMRV and 77% about influenza but only 33% of the sample was able to report all the vaccinations indicated for health care workers (Figure 1).



**Figure 1. Respondents who correctly (in green) and incorrectly (in red) indicated recommended vaccines for healthcare workers according to Italian National Vaccination Plan 2017/2019.**

In addition, a vaccination visit at the Messina University Hospital's vaccination centre was offered, with a positive response in only 25% of cases. Self reported vaccination status against most transmittable VPDs in healthcare settings, according to study sample before the intervention, are listed in Table 1.

Vaccination coverage results were not promising. Only 22% of the sample at the time of the survey was vaccinated against influenza in the previous flu season, 56.2 % was not or only partially immunized for chickenpox, 31% has not had a booster for DTP for more than 10 years. Meningococcal vaccination was carried out by 50% (ACWY) and 42.8% (B) of the sample.

Greater attention was given to other vaccinations, in fact, only 12.8% was not immunized or partially immunized for measles-mumps-rubella and 17% for hepatitis B (1% non-responder).

Following the advice given by our survey, a re-evaluation of immunization status was conducted after 30 days. Vaccination coverage data after the intervention are listed in Table 1.

Although a slight increase was detected for some vaccines such as MMR (+2.2%) and hepatitis B (+1 %), better results were found for Tdap (+5.3%) and meningococcus ACWY (+6.4%) e B (+46.8%).

Also one of the better result was obtained for influenza vaccination with an increase in adhesion of +26.2% and this could be related to beginning the survey at the start of the 2019/2020 season, as described in materials and methods.

| Vaccination status  | Before Intervention | After Intervention | % Increase           |
|---|---------------------|--------------------|----------------------|
|   | N (%)               |                    |                      |
| <b>MMR (measles, mumps, rubella)</b>                                    |                     |                    |                      |
| <i>Not Immunized (not vaccinated, not contracting the disease)</i>      | 60(12.8)            | 54(11.5)           |                      |
| <i>Not completely immunized (received only one dose of vaccination)</i> | 128(27.2)           | 128(27.2)          | + 2.2%               |
| <i>Immunized</i>  | 282(60.0)           | 288(61.3)          |                      |
| <b>Chickenpox/varicella</b>   |                     |                    |                      |
| <i>Not Immunized (not vaccinated, not contracting the disease)</i>      | 166 (35.3)          | 166 (35.3)         |                      |
| <i>Not completely immunized (received only one dose of vaccination)</i> | 98(20.9)            | 98(20.9)           | No variation         |
| <i>Immunized</i>  | 206(43.8)           | 206(43.8)          |                      |
| <b>HBV (hepatitis B)</b>  |                     |                    |                      |
| <i>Naturally immunized or vaccinated, with antiHBsAg &gt;10 mIU/mL</i>  | 388(82.6)           | 392(83.4)          |                      |
| <i>Vaccinated, with antiHBsAg &lt;10 mIU/mL (needing Booster dose)</i>  | 2 (0.4)             | 0(0)               | + 1%                 |
| <i>Not immunized (not contracting the disease or not vaccinated)</i>    | 80(17)              | 78(16.6)           |                      |
| <b>Tdap (diphtheria, tetanus, pertussis)</b>                            |                     |                    |                      |
| <i>More than 10 years from last booster dose</i>                        | 142(30.2)           | 124 (26.4)         |                      |
| <i>Less than 10 years from last booster dose</i>                        | 320(68.1)           | 338(71.9)          | + 5.3%               |
| <i>Never vaccinated</i>   | 8(1.70)             | 8(1.70)            |                      |
| <b>Influenza (last season)</b>  |                     |                    |                      |
| <i>Vaccinated during 2018/2019 influenza season</i>                     | 102 (21.7)          | -                  |                      |
| <i>Vaccinated against influenza but not during 2018/2019 season</i>     | 86 (18.3)           | -                  | + 26.2% <sup>^</sup> |
| <i>Never vaccinated against influenza</i>                               | 282 (60)            | -                  |                      |
| <i>Vaccinated during 2019/2020</i>                                      | -                   | 311 (66%)          |                      |
| <b>Meningococcal ACW135Y</b>  |                     |                    |                      |
| <i>Vaccinated</i>   | 235 (50)            | 251 (53.4)         | + 6.4%               |
| <i>Not Vaccinated</i>   | 235 (50)            | 219 (46.6)         |                      |
| <b>Meningococcal B</b>  |                     |                    |                      |
| <i>Vaccinated</i>   | 201 (42.8)          | 295 (62.8)         | + 46.8%              |
| <i>Not Vaccinated</i>   | 269 (57.2)          | 175 (37.2)         |                      |

<sup>^</sup> Respect to vaccinated in at least one previous influenza season (n=188); intervention conducted at the beginning of 2019/2020 influenza season

**Figure 1. Self reported vaccination status against VPDs before and after the intervention among the study sample.**

#### 4. Discussion

The results of our study showed a general positive attitude towards immunization of health care professional students enrolled with acceptable knowledge of vaccination recommended according to National Immunization Plan 2017-2019.

Some vaccines not included such as Men B and Men ACWY were incorrectly reported as recommended, probably due to a greater perceived risk of transmission of these diseases (17, 18).

Otherwise, influenza vaccination was the lowest cited as recommended vaccination for HCWs, and vaccination coverage rates during the last influenza seasons was very poor.

As reported in the literature, this data should be related to a low risk perception of contracting and transmitting influenza diseases to patients (14, 19, 20).

Considering that our sample included health care professional students who, attending hospital wards, should have a high level of knowledge, awareness and predisposition on being immunized against VPDs, this topic could be considered a major health issue for future studies (21, 22).

Analyzing immunization coverage, poor levels of adherence were observed, particularly with regards to vaccinations with a low risk perception of contracting the disease (such as influenza). However, after the educational intervention, providing the sample with adequate immunization advice with digital support, a considerable increase in vaccination coverage rates was achieved within one month.

These results confirm that any educational intervention, if conducted as a simple immunization advice/reminder using a web-based platform, could contribute to a substantial increase of vaccination adherence and awareness among health care students (23).

The possibility to offer directly at work every VPDs recommended by National Immunization Plan, in the Hospital Vaccination service of the University of Messina, represents the strength of this study. In fact, one of the main reasons associated with vaccine hesitancy is the lack of structure or time to access vaccination services during working hours (24).

The limits of our study are that the data about vaccination coverage were self-reported and also that we studied only 45% of the students enrolled in the medical courses at University of Messina.

Probably, a better increase in vaccination coverage could be reached through a mandatory intervention of the University, but today no indications are present in Italy with exception of HBV vaccination for students of medical area.

In conclusion, although the benefits on health care settings and economy of vaccines are well known and supported by substantial and solid scientific evidences, low vaccination coverage were still observed especially among HCWs, where the vaccine recommendation by National and International Health Authorities were not adequately applied (1, 2, 25).

Only some vaccinations against VPDs have a spontaneous adherence from HCWs, due to higher risk perception of contracting diseases (26).

Otherwise, a greater commitment is needed with the support of appropriate advocacy actions to support immunization programs in European countries and to counteract vaccine hesitancy among HCWs, such as mandatory immunization programs (27, 28).

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