ECRONICON OPEN ACCESS

EC PAEDIATRICS
Research Article

Flu Vaccine Administered to Health Care Personal Working with Children at a Private Health Provider in Uruguay. 2019 and 2020

Elizabeth Assandri[1]*, María Noel Cuadro[2], Ana Inés Boix[3], Patricia De los Santos[4] and Stella Gutierrez[5]

[1]*Former Assistant Professor of Pediatrics, Faculty of Medicine of the University of the Republic (FDMED. UDELAR), Uruguay*

[2]*Former Assistant Professor of Pediatrics, FDMED, UDELAR Dr. María Florencia Núñez, Specialist in Pediatrics, Uruguay*

[3]*Specialist in Pediatrics, Uruguay*

[4]*Pediatrics Resident, Uruguay*

[5]*Former Associate Professor of Pediatrics, FDEMED, UDELAR, Uruguay*

***Corresponding Author:** Elizabeth Assandri, Former Assistant Professor of Pediatrics, Faculty of Medicine of the University of the Republic (FDMED, UDELAR), Uruguay.

Received: February 02, 2024; **Published:** March 05 2024

Abstract

Introduction: Influenza virus infection causes morbidity and mortality. Health personnel are one of the priority groups to be vaccinated.

Objective: To determine the influenza vaccination coverage of health personnel working with children in a private health provider in Uruguay in 2019 and 2020, and the reasons why they were vaccinated or not.

Materials and Methods: Observational, descriptive, cross-sectional study. Data collection in 2020 through an anonymous questionnaire. Registered the Following variables: age place of work (emergency, hospitalization or polyclinic), function, risk of severe disease, vaccination or non-vaccination in 2019 and 2020, and reasons for vaccination or non-vaccination.

Results: 204 workers completed the survey. In 2019, 73% were vaccinated and in 2020, 77.5% ($p > 0.05$). Emergency health personnel in Montevideo had the highest vaccination rate (90.7% in 2019; 93% in 2020), followed by emergency health personnel in Ciudad de la Costa and hospitalization. According to occupation, more than 95% vaccination was recorded for physicians (2019 and 2020); for nursing graduates and auxiliaries, 68.6% in 2019 and 75.7% in 2020; for non-clinical staff, 33% in 2019 and 41% in 2020. The increase in vaccinated people in 2020 was not significant in any of the occupations.

21% of respondents were at risk of severe disease; 65% of these were vaccinated in 2019 and 74.4% in 2020. All pregnant women in the sample were vaccinated.

Most frequent reasons mentioned for vaccination (2019 and 2020): "prevention" (50.5%), and "being health personnel" (36%). Those who were not vaccinated were "never sick" (19%). Those who did not get the vaccine in 2019, but did in 2020, more frequently cited the "pandemic" as a reason.

Conclusion: In this health provider, the percentage of workers in contact with children who adhered to influenza vaccination in 2019 and 2020 was greater than 70%. There was no significant increase due to the pandemic. Coverage in polyclinics and for non-medical health personnel, particularly health personnel with risk factors for severe disease, should be improved.

Keywords: *Influenza Vaccines; Health Personnel*

Introduction

Influenza virus infection occurs annually in epidemic form in the cold months. This infection can cause significant morbidity and mortality, mainly in the so-called "at-risk" groups. This group includes children under 5 years of age, pregnant women, people over 65 years of age, and individuals with chronic diseases (obesity, immunodeficiencies, diabetes, cardiovascular, metabolic, and kidney diseases, among others) [1]. The flu is a very contagious disease. There are different non-specific measures that can prevent it, such as avoiding contact with sick people, crowded spaces and frequent hand washing. However, it has been proven that the most effective measure to prevent this infection is vaccination [2,3]. The periodic antigenic variations of this virus make annual vaccination with a corresponding variation in its composition necessary [2,4].

In Uruguay, flu vaccination is carried out in annual campaigns from the year 1999 [5] and is preferably indicated prior to the start of the winter season (March/April). It is given as a single dose for adults (including pregnant women) and two doses for children who are vaccinated for the first time. The vaccine can be given as early as 6 months of age [4-7]. Annual information campaigns are carried out on the importance and safety of this vaccine [5,6].

Health workers are one of the priority groups to be vaccinated. Due to their work activity, they are more likely to be infected [3-5,7]. Vaccination seeks individual protection, prevent transmission to patients and reduce absenteeism from work. Health personnel are considered to be those in direct contact with patients and/or potentially infectious material (doctors, nurses, nurses, physiotherapists, psychologists, dentists, among others) and those people who, although they are not in direct contact with the sick, are potentially more exposed to infectious agents (administrative, kitchen service, cleaning, security, etc.) [3,8].

Despite this increased risk of becoming infected, the percentage of health personnel vaccinated annually in Uruguay is much lower than desired. Between 2010 and 2019, the percentage of health personnel immunized with influenza vaccine ranged from 32.7% to 69.7% [6].

In March 2020, the first cases of SARS CoV 2 infection were detected in Uruguay. Coinciding with this new epidemiological reality, the number of influenza vaccines administered by the different health providers was much higher than in previous years, with an estimated percentage close to 100% in health personnel [6].

Aim of the Study

The aim of this study was to determine the coverage of influenza vaccination among health personnel working with children in a private provider of Uruguay (CASMU IAMPP) during 2 periods: 2019 and 2020. It is also intended to know the reasons that led to this behavior and to provide useful information that can encourage an increase in future vaccination coverage in this population.

Methodology

An observational, descriptive, cross-sectional study was conducted in 2020. The study population consisted of health personnel who work or are in contact with children in CASMU IAMPP, in the city of Montevideo and in Ciudad de la Costa. The choice of care sites was made by taking a convenience sample that included the staff of the pediatric emergency department of Montevideo and Solymar, the pediatric moderate care sector and 17 primary care medical centers of the institution. All staff who work with or are in contact with children in these care facilities were invited to participate in the survey.

Health personnel who work with or are in contact with children at the headquarters of other departments of the country and the staff of the institution's pre-hospital emergency department were excluded.

To collect the data, a survey was carried out using an anonymous questionnaire, accompanied by an informed consent, through which each participant authorized the researchers to use the data obtained to carry out the study, after informing them of their objectives. Data were obtained by means of a printed questionnaire or by a Google Forms form distributed by a social network (Annex 1).

The following variables were evaluated: age (years), sex (male, female), sector in which the majority of workers work (first level of care, emergency department, moderate care), role at CASMU, years of work in health. We also asked whether participants cared for children under six months of age outside the institution and whether they had risk factors for severe illness (obesity, immunosuppression, pregnancy, and severe chronic disease), whether or not they had received a flu vaccine in 2019 and 2020, and why they had been vaccinated or not. The reason for vaccination or not in each year was inquired by means of an open question.

For the analysis of the role performed, 5 groups were elaborated. Group 1 included doctors of medicine and different specialties (pediatrics, pediatric gastroenterology, nephrology, neuropediatrics, traumatology), the 2 included graduates in nursing, nurses and vaccinators; group 3 staff with administrative tasks and customer service; group 4 cleaning, kitchen, porter and surveillance assistants and group 5 was composed of physiatry technicians, nutritionists, psychologists, dentists and those who did not clarify the role they performed.

Qualitative variables are presented as absolute frequencies and percentage frequencies. Continuous quantitative variables are expressed with measures of mean and median central tendency. Data processing was performed using Microsoft Excel spreadsheets. The χ^2 test was used to compare proportions and a $p < 0.05$ was considered significant.

Ethical aspects: Informed consent was requested from each respondent. Anonymity of individual information was maintained. This study was authorized by the CASMU ethics committee.

Results

The survey was completed by 204 workers. Of these, 149 (73%) received the influenza vaccine in 2019 and 158 (77.5%) in 2020 ($p > 0.05$). Table 1 shows the age, sex, years of work in health, main place of work in the institution, and adherence or not to influenza vaccination in 2019 and 2020.

	AF 204	F % 100%	Flu Vaccination 2019	2020 Flu Vaccination
Age				
< 40 years	84 (41,2%)		65 (77,4%)	67 (79,8%)
≥ 40 years	120 (58,8%)		84 (70,0%)	91 (75,8%)
Sex				
Female	178 (87,2%)		130 (73%)	139 (88%)
Male	26 (12,8%)		19 (72%)	19 (72%)
Years of work in health				
< 10 years	60 (29,4%)		44 (73,3%)	45 (75,0%)
10 - 29 years	118 (57,8%)		87 (73,7%)	93 (78,8%)
≥ 30 years	26 (12,7%)		18 (69,2%)	20 (76,9%)
Place Main Job				
Polyclinics of Montevideo	98 (48%)		62 (63,2%)	70 (71,4%)
Polyclinics of Ciudad de la Costa	18 (8,8%)		11 (61,1%)	10 (55,6%)

Paediatric Inpatient Sector	28 (13,7%)	23 (82,1%)	24 (85,7%)
Pediatric Emergency Department	43 (21%)	39 (90,7%)	40 (93,0%)
Ciudad de la Costa Emergency Service	17 (8,3%)	14 (82,3%)	14 (82,3%)

Table 1: *Adherence to influenza vaccination in 2019 and 2020 according to age, sex, years of work in health and main place of work in the institution. N: 204.*

AF: Absolute Frequency; F %: Percentage Frequency.

In both 2019 and 2020, health personnel in the pediatric emergency department in Montevideo were the most vaccinated, compared to each of the other workplaces. The difference in vaccination between the emergency department in Montevideo and the polyclinics is significant ($p < 0.05$). There was no other significant difference when analyzing each of the other groups.

Table 2 shows the role of the different respondents and their adherence to the influenza vaccination campaign in 2019 and 2020.

Occupation	AF	F %	Flu Vaccination 2019	Flu Vaccination 2020
Group 1 - Medical	86 (42,2%)		82 (95,3%)	82 (95,3%)
Group 2 - Nurses...	70 (34,3%)		48 (68,6%)	53 (75,7%)
Group 3 - Administrative	20 (9,8%)		5 (25,0%)	8 (40,0%)
Group 4 - Cleaning...	19 (9,3%)		8 (42,1%)	8 (42,1%)
Group 5 - Other	9 (4,4%)		6 (66,7%)	7 (77,8%)
	204 (100%)		149 (73%)	158 (77,5%)

Table 2: *Role in the health provider and adherence to the 2019 and 2020 influenza vaccination campaigns. N: 204.*

AF: Absolute Frequency; F %: Percentage Frequency.

There is a significant difference between the vaccination of medical personnel compared to each of the other groups ($p < 0.05$).

In addition to working in healthcare, 43 (21%) of the 204 respondents had other indications for influenza vaccination. The number of participants with these characteristics is shown in table 3. None of the respondents reported having more than one risk factor associated with severe disease.

Condition	AF	Vaccinated in 2019		Vaccinated in 2020	
		AF	RF	AF	RF
Pregnancy*	7	7 (1,0)		7 (1,0)	
Obesity	23	13 (0,56)		19 (0,82)	
Chronic disease	11	7 (0,63)		6 (0,54)	
Immunosuppression	2	1 (0,50)		1 (0,50)	
Total	43	28 (0,65)		33 (0,77)	

Table 3: *Risk factors for severe disease in health personnel and adherence to influenza vaccination campaign. N = 43.*

AF: Absolute Frequency; RF: Relative Frequency.

**Between 2019 and 2020, 7 pregnant women completed the survey; It is not possible to determine in which year they filed this condition using the form used. Only 3 of them mention pregnancy as a reason for flu vaccination, two in 2019 and one in 2020.*

Fourteen (6.8%) of the 204 participants lived with or cared for children under 6 months of age, 10 of whom were vaccinated in both 2019 and 2020.

The first reason mentioned by respondents, which led to their adherence to the influenza vaccination campaign, is shown in table 4.

First reason mentioned for Flu vaccination	2019 AF	2020 AF
Prevention	76	79
Be a health worker	56	55
Scientific certainty of your need/conviction	2	2
Medical indication	2	1
Chronic Illness	3	3
Pregnancy	2	1
Presence of risk factor	1	1
They came to my workplace to vaccinate	0	2
They clarified my doubts	0	1
Institutional requirement	0	1
Pandemic	0	4
Personal reasons	0	2
No data	7	6
Total respondents who received Flu Vaccine	149	158

Table 4: *First reason referred how cause of vaccination and frequency. Year 2019 and 2020.*

AF: Absolute Frequency.

The reasons given for not receiving the flu vaccine are shown in table 5.

First reason mentioned for non-vaccination	2019 AF	2020 AF
They never get sick	10	9
Doesn't believe in vaccines	1	1
Fear of getting sick from the vaccine	3	2
Belief of lack of effectiveness	2	2
Lack of confidence in this vaccine	1	1
Disagreement with this vaccine	1	2
Lack of knowledge about the vaccine	2	0
It is not mandatory	2	2
He didn't think it was necessary	4	2
They didn't tell him	1	1
Allergy	1	1
Absence of risk factors	2	2
Disinterest	3	1
Forgetfulness or lack of time	2	2
Personal reasons or own decision	6	3
No Reason	2	1
Other causes	1	2
No data	11	11
Difficulty in accessing a vaccine due to the pandemic	0	1
Total respondents who did not receive Flu Vaccine	55	46

Table 5: *First reason reported by those who did not receive a flu vaccine. Cause and frequency. Year 2019 and 2020.*

AF: Absolute Frequency.

Seventeen participants were not vaccinated in 2019 and were vaccinated in 2020. The most mentioned reason for vaccination in 2020 by them was the pandemic (5), followed by prevention (3), "they went to my workplace to vaccinate" (3), personal reasons (2). In one case, the reason mentioned was "they clarified doubts for me", institutional requirement (1) and being a health worker (1). They did not answer the reason in 2 cases.

Discussion

The annual vaccination of the population with influenza vaccine, especially of at-risk groups, continues to be a matter of global concern. Among these risk groups are health personnel. The CDC (Centers for Disease Control and Prevention) and the WHO (World Health Organization) recommend annual influenza immunization for all health personnel [8,9]. The goal is to reduce the risk of infection, prevent transmission to patients, create "herd immunity" that protects both the vaccinated and patients who cannot receive the vaccine or are unlikely to respond with a sufficient antibody response, maintain a critical social workforce during disease outbreaks, and set an example on the importance of vaccination for all people [10]. Despite efforts to increase adherence among health workers, coverage varies globally [11] but has typically been low. During the winter of 2010/11, average vaccination rates in 11 European countries were less than 30% [12]. A decrease in coverage was seen in the post-pandemic H1N1 season; in Germany it decreased from 30.5% in 2008/09 to 25.8% in 2010/11 [13]. The decline was also constant in Italy [14], France, Hungary, Portugal and Spain [12]. In contrast, the United States has seen an increase in the percentage of healthcare workers reporting having received influenza vaccination, from less than 50% in the 2009/2010 season, with a progressive annual increase to 80% in the 2019/2020 season [15].

In this study, we included among health care workers, specifically those who are in their work in contact with children. In Uruguay, Quián., *et al*. at the Pediatric Hospital of the Pereira Rossell Hospital Center, recorded an adherence to influenza vaccination of 24% of the personnel surveyed in 2006, 31% in 2007 and 55.3% in 2008 [16]. In the present study, the percentage is higher (73%). CASMU health personnel who work with children were vaccinated in 2019, increasing coverage slightly in 2020 (77%) with the arrival of SARS Cov2. This percentage is higher than we expected to find. In the year 2020, with the emergence and rapid global spread of SARS CoV2 coronavirus infection, the number of people vaccinated with the influenza vaccine globally and nationally increased. Coinciding with that, the percentage of vaccinated in this health provider increased to 77.5%.

One of the limitations of the present research is that a convenience sample and a self-administered questionnaire were used. This limits the generalizability of the results (possible bias of those who join the campaign agreeing to fill it out).

However, compared to a study conducted in Italy with a methodology similar to the present one (anonymous self-administered questionnaire), the proportion of health workers who reported having received the influenza vaccine in the 2013/2014 season was much lower (26.4%) [17] than that obtained in this study. Since this is an anonymous survey, it is not possible to corroborate in the Immunization Information System whether those who claim to have been vaccinated actually did so, constituting another bias of the present study.

The analysis considering the occupation carried out by the respondents shows that, in both 2019 and 2020, the percentage of vaccinated doctors was more than 95%, a value that is very satisfactory. This percentage was higher to that of other health workers, which has already been seen in other international studies [14,17]. This is probably because doctors, who frequently see patients with influenza, know the morbidity and mortality that this infection determines, as well as the efficacy and safety of the vaccine.

The percentage of vaccinators, nurses and nurses vaccinated was 68.6% in 2019 and 75.7% in 2020, higher than in a study of licensed nurses in Hong Kong, in which 49% of participants reported receiving influenza vaccine in the winter of 2019-2020 [18].

Adherence to influenza vaccination among non-clinical workers (groups 3 and 4) was even lower (33% in 2019 and 41% in 2020). These results are similar to a study conducted in the USA, where influenza coverage of clinical health personnel (doctors, graduates, and nurses) is high compared to non-clinical health personnel (administrative and cleaning assistants) [19]. The development of strategies to increase vaccination in this group of workers with such low adherence to influenza vaccination is a necessary challenge to be faced.

With regard to adherence according to the workplace, the staff of the emergency sector, including Montevideo and Ciudad de la Costa, and those of pediatric hospitalization are better vaccinated than those of the polyclinics. Perhaps seeing on a daily basis how severe these infections can be in young children contributes to this difference.

In addition to the occupational risk factor of working in the health sector, of the 204 respondents, 43 also had risk factors for severe disease. The fact that health personnel with chronic diseases such as obesity, diabetes, immunosuppression of different causes, do not take into account the risk of acquiring influenza is difficult to understand. All pregnant women received the flu vaccine in both 2019 and 2020.

The flu vaccine can be given as early as 6 months of age, with young infants being a group in which this infection can be severe. An effective way to prevent their infection is by vaccinating caregivers. Of the 14 survey participants who live with or care for children under 6 months of age outside of their work at CASMU, 4 were not vaccinated, leaving infants without this protection.

With respect to the reasons for adherence or not to influenza vaccination campaigns, this study has the strength of having asked open questions, which removes the bias of induction or selection of options that are not always those that the participant would have chosen, as occurs in the cases of closed questions.

In relation to the reasons why they adhered to vaccination, the most answered was "prevention" (50%), with some of the participants clarifying their intention to prevent infection not only in themselves, but also contagion to their patients, the community and those people who cannot be vaccinated. The second determinant of vaccine acceptance in 2019 and 2020 was being "health personnel" (35%). None of the other reasons mentioned exceeds 2.5% of the responses. In addition, the pandemic was mentioned by 8 interviewees as a reason for vaccination in 2020.

In this sense, in 2020, the reasons for vaccination (which were not there in 2019) also appear as "they clarified my doubts" and "they came to my workplace to vaccinate", reinforcing the concept that there are interventions, some simpler than others that increase adherence to vaccination.

As for the reasons why the population did not get vaccinated in 2019 or 2020, the most frequent mentioned by just under 20% was "I never get sick". This was also the most frequent reason for non-vaccination in a study conducted by Ibarra., *et al*. in a public provider caring for adult patients in Montevideo (Uruguay) [20] and in the study conducted at the CHPR by Quian., *et al*. [16]. This suggests the perception of low risk of infection among some health workers in our country.

Although there are few cases, there is still a lack of knowledge and confidence in this vaccine (one of the participants does not believe in vaccines), doubts about its effectiveness and fear of getting sick from getting vaccinated. These motifs are also similar to those described by Ibarra., *et al*. in their research. These misconceptions and doubts regarding this vaccine are the main factors leading to non-adherence to vaccination internationally [21]. Discussing and eliminating these misconceptions, such as those related to vaccine safety, could increase adherence to annual immunization.

Two respondents mentioned not getting vaccinated because they do not have risk factors, ignoring that working in health already involves a risk. It seems necessary to remind staff about the health risk of their work and their active role in the prevention of contagion. "I

wasn't told" is also listed as the cause of non-vaccination, so this could probably have been reversed with a timely medical recommendation.

There are numerous studies that attempt to determine the best strategies to increase influenza vaccination coverage among health personnel, with varying results. These strategies include: training and dissemination of educational materials, promotional activities, improvements in access to the vaccine (vaccination in the workplace, vaccination at extended hours, on weekends, mobile vaccination clinics), incentives or rewards for vaccination, reminders to get vaccinated, visible vaccination of key personnel, monitoring of vaccination by the authorities, signing of a refusal form if they do not join, requirement to wear a mask if they decide not to adhere to vaccination, and requirement as a condition of working in the service [11,22-24].

Rashid., *et al.* concluded that combined strategies appeared to be more effective than isolated approaches [22]. Siemieniuk R., *et al*. conclude that all interventions increase adherence to influenza vaccination in healthcare workers to varying degrees, but that the only measure that achieves sustained vaccination rates greater than 95% in healthcare workers is that vaccination is a policy and a necessary condition of the service to work there [23]. Weber DJ., *et al*. also conclude that the only proven method to reliably achieve a coverage level greater than 95% is to require influenza vaccination as a condition of employment [24].

Although in the present research, adherence to influenza vaccination in health personnel working with children in this health provider was good, the application of different interventions or strategies could improve it. The various measures described to improve vaccine uptake among healthcare workers need to be carefully evaluated, although not all of them seem to be applicable to our reality.

Conclusion

In CASMU, the percentage of health workers in contact with children who adhered to influenza vaccination in 2019 and 2020 is greater than 70%. There was no significant increase secondary to the pandemic. Coverage in polyclinics and for non-medical health personnel, and in particular health personnel with risk factors for severe disease, should be improved. This research provides information that will be used for the planning of strategies to increase influenza vaccination coverage among health personnel, trying to overcome the identified barriers.

Thanks

To each of the members of the Health Team who collaborated with this research.

Annex 1

Attitudes and practices of health personnel working with children in CASMU regarding influenza vaccination. Years 2019 and 2020

Please complete the following anonymous survey. The aim of the data obtained is to learn more about the attitudes and practices of health workers regarding this vaccine in different health realities.

1

Age		
	< 20 years	
	21-30	
	31- 39	
	40-49	
	50-59	
	≥ 60	

2

Sex		
Female		
Male		

3- Sector in which you work mainly at CASMU

Internment	
SUP	
Solymar Emergency	
Mdeo Polyclinic	
Solymar Polyclinic	

If you work in a polyclinic, in which mostly.....

4- Position or task that he/she performs mostly in CASMU

Administrative	
Aux. of Nursing	
Bachelor of Nursing	
Doctor	
Aux Cleaning/Porter/Security/Elevator Operator	
Physiotherapist	
Nutritionist	
Kitchen Assistant	
Messenger	
Other, which	

5- Years of work in healthcare

Less than 10 years	
10 - 19 years old	
20 - 29 years old	
30 - 39 years	
≥ 40 years	

Bibliography

1. Centers for Disease Control and Prevention. "People at higher risk for complications from the flu". Atlanta, GA: CDC (2022).

2. Mandell G., *et al*. "Infectious Diseases: Principles and Practice". 7th edition. Barcelona: Elsevier (2011): 2272-2296.

3. Mena G., *et al*. "Influenza vaccination coverage in health workers: a call for optimization in data recording and analysis". *Revista Española de Salud Pública* 94 (2020): e1-e4.

4. Kimberlin D., *et al*. "Red book: Infectious diseases in pediatrics". 31st edition. Madrid: Médica Panamericana (2019): 430-444.

5. Uruguay. Ministry of Public Health. Directorate-General for Health. Epidemiology Division. Immunization Unit. The National Immunization Program ensures universal and free access to vaccines to prevent 18 infectious diseases. Montevideo: MSP (2022).

6. Uruguay. Ministry of Public Health. Directorate-General for Health. Epidemiology Division. Immunization Unit. Adaptation of the regular vaccination plan to the national health emergency due to Covid-19. Recovery plan for vaccination schemes October 2020. Montevideo: MSP (2020).

7. Spanish Association of Pediatrics. Vaccine Advisory Committee. AEP Online Immunization Handbook. Madrid: AEP (2023).

8. Centers for Disease Control and Prevention. Advisory Committee on Immunization Practices. Immunization of health-care personnel: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Recommendations and Reports* 60.RR-7 (2011): 1-45.

9. World Health Organization. WHO recommendations for routine immunization: summary tables (2021).

10. Talbot T., *et al*. "Revised SHEA position paper: influenza vaccination of healthcare personnel". *Infection Control and Hospital Epidemiology* 31.10 (2010): 987-995.

11. To K., *et al*. "Increasing the coverage of influenza vaccination in healthcare workers: review of challenges and solutions". *Journal of Hospital Infection* 94.2 (2016): 133-142.

12. Mereckiene J., *et al*. "Overview of recommendations and vaccination coverage for three seasons: pre-pandemic (2008/09), pandemic (2009/10) and post-pandemic (2010/11)". *Eurosurveillance* 19.16 (2014): 20780.

13. Böhmer M., *et al*. "Barriers to pandemic influenza vaccination and uptake of seasonal influenza vaccine in the post-pandemic season in Germany". *BMC Public Health* 12 (2012): 938.

14. Alicino C., *et al*. "Influenza vaccination among healthcare workers in Italy". *Human Vaccines and Immunotherapeutics* 11.1 (2015): 95-100.

15. Centers for Disease Control and Prevention. Influenza vaccination coverage among health care personnel: United States, 2018–19 influenza season (2021).

16. Quian J., *et al*. "Influenza vaccination in health personnel at the Pediatric Hospital of the Pereira Rossell Hospital Center: evolution of coverage from 2006 to 2008". *Revista Médica del Uruguay* 26.2 (2010): 65-73.

17. Durando P., *et al*. "Determinants of adherence to seasonal influenza vaccination among healthcare workers from an Italian region: results from a cross-sectional study". *BMJ Open* 6.5 (2016): e010779.

18. Kwok K., *et al*. "Editor's Choice: Influenza vaccine uptake, COVID-19 vaccination intention and vaccine hesitancy among nurses: A survey". *International Journal of Nursing Studies* 114 (2021): 103854.

19. Centers for Disease Control and Prevention. "Seasonal influenza vaccination resources for health Professionals".

20. Ibarra A., *et al*. "Influenza vaccination in health personnel: coverage, attitudes and barriers against vaccination in two departments of a general hospital". *Archivos de Medicina Interna* 36.2 (2014): 49-53.

21. Hollmeyer H., *et al*. "Influenza vaccination of health care workers in hospitals--a review of studies on attitudes and predictors". *Vaccine* 27.30 (2009): 3935-3944.

22. Rashid H., *et al*. "Assessing interventions to improve influenza vaccine uptake among health care workers". *Health Affairs (Millwood)* 35.2 (2016): 284-292.

23. Siemieniuk R., *et al*. "Interventions to increase healthcare worker influenza vaccination: a meta-analysis". *Open Forum Infectious Diseases* 1.1 (2014): s458-s459.

24. Weber D., *et al*. "How to improve influenza vaccine coverage of healthcare personnel". *Israel Journal of Health Policy Research* 5 (2016): 61.

Volume 13 Issue 3 March 2024