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Knowledge, attitudes and adherence towards influenza and other vaccinations among healthcare workers at the University Hospital of Palermo, Italy, during the first COVID-19 pandemic season (2020/2021)

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Key words: Influenza vaccination, health care workers, vaccination coverage, communication campaigns, informative strategies

Parole chiave: Vaccinazione antinfluenzale, operatori sanitari, copertura vaccinale, campagne di comunicazione, strategie informative

Abstract

Background. *Increasing adherence to influenza vaccination among healthcare workers is a public health priority, stated that actually remains far below than international recommendations. During the 2020/2021 pandemic season, COVID-19 vaccines were not yet available until the end of December 2020, and influenza vaccines were the only one available to protect against seasonal respiratory diseases. The main objective of the present study was to assess knowledge, attitudes and adherence to influenza and other vaccinations recommended by the National Immunization Plan 2017-2021 for healthcare workers.*

Methods. *Enrollment lasted from October and December 2020 at the vaccination unit of the University Hospital of Palermo. Data were collected through an anonymous and self-administered questionnaire, divided into 5 sections and 31 items.*

Results. *Among 734 healthcare professionals that completed the survey, a significantly higher adherence to influenza vaccination was observed among healthcare workers that were more prone to receive COVID-19 vaccination (OR=4.02; 95% CI: 1.63-9.91). Moreover, higher influenza vaccination rates were observed among healthcare professionals that received influenza vaccination during previous 2019/2020 season*

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(OR=15.3; 95% CI: 5.17-45.1) and that were favorable to the possible impact on increasing adherence of influenza mandatory vaccination (OR=4.88; 95% CI: 2.43-9.80).

Conclusions. *Propensity of healthcare workers to undergo vaccinations recommended in the National Immunization Plan increased during the first pandemic season. At the end of the vaccination season, flu vaccination coverage reached highest rates ever at the University Hospital of Palermo (around 60%), remaining anyway below the recommended minimum value of 75%. During next seasonal flu vaccination campaigns, it becomes essential to promote communication and information strategies to increase flu vaccination among healthcare workers, also focusing on co-administration with the anti-COVID-19 booster/seasonal doses.*

Introduction

Public Health authorities have clearly affirmed the importance of vaccination as the most important effective measure to prevent the spread among general population (1). In accordance with objectives of Italian National Immunization Plan (NIP) 2017-2021 and of the Seasonal Decree (n.14614/2021) for prevention of Influenza and other Vaccine Preventable Diseases (VPDs), seasonal flu vaccination is strongly recommended and offered actively and free of charge to elderly, frail people, pregnant women, children below 6 years of age and healthcare workers (HCWs) (2-4).

During flu season, it has been estimated that approximately 20% of healthcare providers (HCPs*) contract flu virus, often while continuing to carry out their normal work activities, contributing not only to the possible spread of nosocomial epidemics but also to a reduction of the workforce with consequent disruption of medical care (5, 6).

Therefore, vaccination is currently strongly recommended for HCPs and generally to all employees (including social-health workers, administrative personnel) working in contact with patients at healthcare facilities (7, 8).

In addition, other recommended vaccinations for HCWs in the Italian NIP are hepatitis B, measles, mumps, rubella and chicken pox/varicella, diphtheria, tetanus and pertussis and tuberculosis, in a very limited number of highly exposed HCPs (2).

Therefore, there is a need to actively promote and implement strategies that increase influenza vaccination among HCWs, especially among those providing care in hospital departments at higher risk of acquiring/transmitting the infection to frail patients whose consequences could be irreparable, such as emergency rooms, intensive care, oncology, hematology, cardiology, surgery, obstetrics, nursery, pediatrics, nursing homes (9, 10).

In 2019-2020, during the first waves of COVID-19 pandemic, there was a significant reduction in cases of flu-like syndrome worldwide; this may have been affected by the preventive measures and strategies to limit COVID-19 spread that inevitably impacted on influenza and other respiratory viruses' circulation (11-14). To counteract the COVID-19 pandemic, the Italian Public Health Authorities developed and applied several strategies to implement preparedness, communication and vaccination offer (not only against SARS-CoV-2) for the Italian

(*) The term "Healthcare Providers" (HCPs) includes the healthcare operators (such as MDs, nurses, therapists) who directly perform actions toward diagnosis, practice treatments (surgery, medications, pharmacotherapy, rehabilitation), and health prevention/promotion, while the term "Healthcare Workers" (HCWs) indicates all those who are employed in every kind of healthcare facility and may have any direct contact with people for health assistance. Obviously, HCPs are included in the larger family of HCWs.

General Population (15, 16).

The main objective of the present study was to investigate, during the first 2020/2021 pandemic season, knowledge, attitudes and adherence of HCWs belonging to the Palermo University Hospital (UH) towards influenza and other vaccinations recommended in the NIP and intention to get vaccinated with COVID-19 vaccination, in the months before the beginning of the anti-SARS-CoV-2 universal vaccination campaign (in January 2021).

Materials and Methods

A cross-sectional study was conducted through the administration of a self-administered questionnaire to investigate immunization knowledge, attitudes, and adherence towards immunization among HCWs working at the Palermo UH.

The study was conducted and data were collected at the vaccination Unit of the Palermo UH, which is one of the largest UH in Sicily with a total of 604 hospital beds, 542 of which are ordinary inpatient hospital beds and 62 Day Hospitals beds, 2,100 employees (including HCPs and administrative staff), 1,120 medical residents and over 1,500 trainees of healthcare university courses.

In addition, the Palermo UH is the only Hospital in Western Sicily to have an outpatient vaccination unit for the vaccination of HCWs, employees, hospitalized patients and the general population at high-risk (for severe comorbidities and allergic diseases).

The reliability and validity of the questionnaire were evaluated in a preliminary pilot study conducted among 30 HCWs. A post hoc analysis of Cronbach's alpha was performed on the most relevant questions, which ranged from 0.75 to 0.82.

Questionnaire and sample

The questionnaire, structured in 5 sections and consisting of 31 items, including the following sections:

- Section 1: socio-demographic data (age, gender, pathology, family member with comorbidities, job, area of activity, operating unit);
- Section 2: occupational features;
- Section 3: propensity to accept anti-COVID-19 vaccination;
- Section 4: attitude and adherence to influenza vaccination during 2020/2021 and previous seasons;
- Section 5: attitude and adherence to vaccinations recommended in the NIP 2017-2021.

The questionnaire, together with the informed consent and with the informative on the study, were previously validated and approved by the Ethical Committee Palermo 1 during the session number 9 in September 2020. The questionnaire was delivered and filled out anonymously by HCWs attending, during influenza vaccination season 2020/2021 from the 1st of October to the 18th of December 2020, the Vaccination Unit of the Palermo UH. The survey was proposed to HCWs that voluntary accessed the vaccination unit to get vaccinated against flu or other vaccines recommended for HCWs.

Two different modes of administration were used: paper or an online Google® form, which was accessible through a QR code printed on the posters affixed in the vaccination center that also allowed participants to fill out the questionnaire through personal mobile devices.

Data collection, registration, and analysis

The data on vaccination coverage were collected at the end of the season by consulting the online platform of the Vaccination Unit of the Palermo UH. Absolute and relative frequencies were calculated for categorical (qualitative) variables.

The association between 2020/2021 seasonal influenza vaccination adherence and other qualitative variables was explored

using Fisher test or Chi-square test. To ensure a more conservative approach all variables with a p-value ≤ 0.20 at univariable analysis were included a multivariable backward stepwise logistic regression model. Crude and adjusted odds ratios (crude ORs and adj-ORs) with corresponding 95% confidence intervals (CIs) were calculated. The significance level chosen was set at p-value < 0.05 (two tailed). All data were analyzed using the statistical software package Stata/MP 12.1 (StataCorp LP, College Station, TX USA).

Results

During the 2020/2021 influenza vaccination campaign, 734 HCWs completed the survey at the vaccination unit of the Palermo UH and were enrolled in the study. The overall response rate (on total number of HCWs and students' trainees of the Palermo UH) was 15.5%, while the RR of HCWs attending the Vaccination Unit during the 2020/2021 campaign was 59.1%. Most of the questionnaires were collected in digital form (n = 721), while only a small minority (n = 13) were collected in paper form. As reported in Table 1, 79.2% of those recruited were under 50 years of age, while the gender distribution showed a slight prevalence of female subjects (57.4%). Most of the HCWs enrolled in the study were physicians (25.8%), nurses, midwives, etc. (17.8%), trainees or postgraduate medical students (20.7%). Among those enrolled, 79.8% did not suffer from any comorbidity, and among those with chronic conditions, 6.3% suffered from cardiovascular disease, 1.9% were diabetic, 2.1% had thyroid disease, 2.1% suffered from severe allergic diseases (asthma, atopic dermatitis, etc.), 1.6% had respiratory diseases, 0.3% suffered from a hematologic or solid neoplasm, 2.7% were obese, and 3.3% reported other unspecified comorbidities (Table 2).

Among the enrolled HCWs, 62% had at least one family member with at least one comorbidity (Table 2).

The study also assessed attitudes toward vaccines recommended for HCWs in the NIP and willingness toward Covid-19 vaccination that would become available right after the study conclusion at the end of December 2020 (Table 3). Influenza vaccination coverage among HCWs participating in the study was 61.4 percent during the 2019/2020 season and 14.8 percent during the previous 2009/2010 A/H1N1 influenza pandemic

Table 1 - Socio-demographic data of the sample (n=734)

Age	n	(%)
≤49	581	(79.2)
≥50	153	(20.8)
Gender		
Male	313	(42.6)
Female	421	(57.4)
HCWs classification		
Medical residents/students/trainees	152	(20.7)
Health professionals (nurses, midwives, etc…)	131	(17.8)
Medical Doctors	189	(25.8)
Administrative/logistic services	189	(25.8)
Other	73	(9.9)

Table 2 - Comorbidity data of the sample (n=734)

	No.	%
Comorbidity		
None	586	(79.8)
Allergy	15	(2)
Diabetes	14	(1.9)
Thyroid disease	15	(2)
Cardiovascular diseases	46	(6.3)
Obesity	20	(2.7)
Respiratory disease	12	(1.6)
Solid/hematological malignancies	2	(0.3)
Other comorbidities	24	(3.3)
Comorbidity among family member		
Yes	455	(62)
No	279	(38)

Table 3 - Knowledge, attitudes and adherence towards influenza and other vaccinations recommended among HCWs in the NIP 2017-2021 (n=734)

Vaccination against influenza in the 2019-2020 season	n	%
Yes	451	(61.4)
No	283	(38.5)
Vaccination against influenza in the 2009-2010 AH1N1 pandemic season		
Yes	109	(14.8)
No/Don't remember	625	(85.2)
Adherence to influenza vaccination during 2020/2021		
Yes	682	(92.9)
No	52	(7.1)
Opinion about influenza mandatory vaccination among HCWs		
Favorable	590	(80.4)
Not favorable	144	(19.6)
Immunization against HBV (full vaccination cycle or contracting the disease)		
Yes	589	(80.2)
No/Don't remember	145	(20.8)
Immunization against measles, mumps, rubella and varicella – MMRV (full vaccination cycle or contracting the diseases)		
Yes	664	(90.5)
No/Don't remember	70	(9.5)
Intention to get vaccinated with Covid-19 vaccination		
Yes	665	(90.6)
No	69	(9.4)
HCWs at higher risk of contracting COVID-19 than general population		
Not at all/Little	172	(23.4)
Somewhat/Very much	562	(76.6)
Increasing vaccine confidenze among HCWs due to COVID-19 pandemic		
Yes	398	(54.2)
No	336	(45.8)

season. During the current influenza season (2020/2021), 92.9% received influenza vaccination at the Palermo UH vaccination unit. Furthermore, 80.4% of the respondents believed that influenza vaccination should be mandatory for HCWs.

Analyzing immunization rates against other VPDs recommended for HCWs in the NIP, 80.2% of respondents declared that tey were immunized (including subjects vaccinated with full vaccination course and those who naturally contracted the disease) against hepatitis B, 90.5% against measles, mumps, rubella and varicella at the time of questionnaire administration, 90.6% were willing to receive vaccination against COVID-19 when vaccines would be licensed (n=734).

Multivariable analysis (Table 4) showed that factors significantly associated with adherence to influenza vaccination during the 2020/2021 season were adherence to influenza vaccination during the 2019/2020 season (OR=15.26; CI 95%: 5.17-45.09), being in favor of mandatory influenza vaccination for HCWs (OR = 4.88; CI 95%: 2.43-9.80), and intention to get vaccinated against COVID-19 (OR = 4.02; CI 95%: 1.63-9.91).

Table 4 - Univariable and Multivariable analysis of adherence to influenza vaccination during 2020/2021 season with sociodemographic and vaccination variables collected in the study.

Adherence to influenza vaccination during 2020/2021 season				
	crude OR (95% CIs)	*p*-Value	adj-OR (95% CIs)	*p*-Value
Gender				
- Female	Reference	0.73		
- Male	1.10 (0.62-1.96)			
Age classes				
- ≥ 50	Reference	**0.18**	Reference	0.08
- ≤ 49	1.75 (0.77-3.96)		2.65(0.88-7.99)	
HCWs				
- Other	Reference	**<0.01**	Reference	0.18
-HCPs	3.47 (1.36-8.87)		2.07(0.72-5.93)	
Comorbidity				
- No	Reference	0.22		
- Yes	1.67 (0.74-3.79)			
Comorbidity among family members				
- No	Reference	0.27		
-Yes	0.71 (0.38-1.30)			
Willingness to receive COVID-19 vaccination				
- No	Reference	**<0.001**	Reference	**<0.001**
- Yes	7.28 (3.86-13.7)		4.02 (1.63-9.91)	
Increasing vaccine confidence among HCWs due to COVID-19 pandemic				
- No	Reference	**<0.001**	Reference	0.24
- Yes	2.61 (1.43-4.74)		1.55 (0.74-3.21)	
HCWs at higher risk of contracting COVID-19 than general population				
-Not at all/Little	Reference	**<0.001**	Reference	0.74
-Somewhat/Very much	2.18 (1.21-3.92)		1.14 (0.54-2.39)	
HBV immunization				
- No	Reference	**<0.05**	Reference	0.22
- Yes	2.10 (1.14-3.87)		1.62 (0.75-3.49)	
MMRV immunization				
- No	Reference	**0.14**	Reference	0.76
- Yes	1.82 (08.2-4.03)		0.84 (0.28-2.51)	
Influenza vaccination 2019-2020				
- No	Reference	**<0.001**	Reference	**<0.001**
- Yes	22.8 (8.13-64.1)		15.3(5.17-45.1)	
Vaccination against influenza in the 2009-2010 AH1N1 pandemic season				
- No	Reference	0.49		
- Yes	1.36 (0.57-3.27)			
Mandatory influenza vaccination				
- Not favorable	Reference	**<0.001**	Reference	**<0.001**
- Favorable	11.9 (6.41-22.3)		4.88 (2.43-9.80)	

Discussion

This cross-sectional study was designed to investigate, during the first 2020/2021 pandemic season, knowledge, attitudes and adherence of HCWs belonging to the Palermo UH towards influenza and other vaccinations recommended in the NIP and intention to get COVID-19 vaccination, in the months before the beginning of the anti-SARS-CoV-2 universal vaccination campaign (in January 2021).

According to the WHO's strategy, the multilevel approach might be the most effective intervention to increase vaccination coverage rates and discourage "vaccine hesitancy" (17). For this reason, several studies have been conducted on HCWs based on multilevel strategies such as communication, health education and promotion, but especially facilitation of access to vaccination (18-23). The main limitation of these studies has been the short-term evaluation, considering that the confidence in vaccination needs a long time to prove the effectiveness of the impact among the general population and, consequently, also among the HCWs.

From the studies conducted at the Palermo UH, it emerges that vaccination promotion campaigns during the flu season were a strong driver in achieving optimal vaccination coverage and above the regional average (24-26). On the other hand, it seems clear that there are always some categories less likely to get vaccinated, this refusal is due to fear of contracting flu because of the vaccination itself; not considering oneself at risk; believing that one's immune system can handle trivial diseases; laziness; false beliefs and other distorted informations (27-30).

Influenza vaccination has a particular relevance for public health, as the overlap of seasonal influenza and the enduring COVID-19 pandemic could have overloaded health services, generating co-infections between the two viruses with serious consequences especially amog the elderly and the immunosuppressed individuals, during 2020/2021 and the following cold seasons (31).

In the 2020/2021 seasonal influenza vaccination campaign, COVID-19 pandemic had a positive effect on the propensity to get vaccinated against seasonal flu. In Italy, in fact, in the 2020/2021 epidemic season a 6.9% increase in influenza vaccination coverage was observed compared to the previous season, thus reaching 23.7% in the general population (a historical record in Italy, since 1999/2000) and 65.3% among the elderly (primary target) with an increase of 11.5% in comparison with the previous season.

It should be noted that in the following 2021/2022 season, a decrease in flu vaccination coverage to 20.5% and 58.1% in the general population and in the over 65 population, respectively, was observed (11). This decline could be partially explained by both the simultaneous administration of first booster dose of anti-COVID-19 vaccination with seasonal flu from September 2021 and a partial delay in the release of the Ministerial decision (October 2021) enabling the possible co-administration of the two vaccines (32). In the light of what happened in the 2021/2022, for the 2022/2023 season, the Ministry of Health strongly recommended seasonal flu dose with second booster dose to all target populations (33).

Targeted multidisciplinary interventions are needed to increase influenza vaccination coverage rates. The role of general practitioners (GPs) remains crucial in increasing influenza vaccine awareness and acceptance through effective counseling (34).

The results demonstrate that there is a good attitude to flu vaccination among HCWs, which has increased significantly since 2009/10, the year of the H1N1 pandemic.

However, the attitude towards vaccination among the HCPs has increased over the

years; even though, coverage rates remain very low compared to those recommended by national and international health authorities, but are in line with the data described by other European surveys (35-39). Compared to the 2009/10 season, vaccination rate increased significantly during the following season at the Palermo UH, reaching 37.2% during the 2018/2019 season and around 60% in 2020/2021 (24).

Although vaccination against seasonal flu is strongly recommended by the NIP 2017-2021 for HCWs, it remains not mandatory for them. This recommendation is of particular importance considering that HCWs not only have a significantly higher incidence of Influenza-Like Illnesses than the general population, but also show a significantly earlier peak incidence than the general population: therefore flu can be considered an occupational exposure risk (40, 41).

For what concerns the spread of respiratory infections in healthcare structures, 80.4% of study respondent reported that influenza should be mandatory for HCWs, as the disease can be spread by asymptomatic vectors. This attitude is confirmed by a strong rationale which considers the increase of vaccination coverage within nosocomial wards as directly linked with the proportional decrease of influenza transmission. (42).

In accordance with the recommendations of the Italian Ministry of Health, the majority (97.3%) of the sample showed that they are fully aware of the problems associated with influenza and, consequently, recommend influenza vaccination, not only for HCWs, but also for subjects at high-risk for comorbidities (33).

Limitations

There are some limitations of the present study that need to be highlighted. Firstly, a possible lack of representativeness due to the limited number of participants should be considered, although they were well distributed among the several categories of HCWs. Secondly, the survey was proposed to HCWs that voluntary accessed the vaccination unit to get vaccinated against flu or other vaccines recommended for HCWs, and this may introduce a selection bias; in addition, the very few questionnaires collected and completed in paper form within the Vaccination Unit may have suffered from a social desirability bias.

Conclusions

In accordance with these findings, future promotion and training campaigns among HCWs should be adapted to overcome emerging barriers to the flu vaccination process among them. This cannot be achieved without the development of appropriate strategies supported by adequate training in vaccinology both during undergraduate and postgraduate courses and for all HCWs involved in mass vaccination.

Moreover, education and promotion programs, in addition to specific counselling in the workplace, should aim at eradicating certain misconceptions that also exist among HCWs, often due to the media bombardment of fake news on the subject of vaccinations, which may limit their adherence to flu vaccinations.

If, despite the implementation of these interventions, adherence to influenza vaccination among HCWs remains lower than recommended, legislators should consider introducing mandatory vaccination for all HCWs working in wards devoted to high-risk frail patients.

Finally, evidence suggests that it would be advisable to offer influenza vaccination for HCWs earlier than for the general population to prevent, in addition to the outbreak of influenza in the HCWs themselves, a possible transmission of influenza to patients.

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Institutional Review Board Statement: The study was conducted in agreement with the Declaration of Helsinki, and approved by the Palermo Ethical Committee 1 of the University Hospital of Palermo in the session no. 9 of September 2020.
Informed Consent Statement: Informed consent was obtained from all subjects involved in the study
Data Availability Statement: Data available on reasonable request due to privacy restrictions
Conflicts of Interest: The Authors declare no conflict of interest

Riassunto

Conoscenze, atteggiamenti e adesione alla vaccinazione antinfluenzale e alle altre vaccinazioni tra gli operatori sanitari del Policlinico Universitario di Palermo, Italia, durante la prima stagione pandemica COVID-19 (2020/2021)

Premessa. Aumentare l'adesione alla vaccinazione antinfluenzale tra gli operatori sanitari è una priorità per la salute pubblica, che in realtà rimane molto al di sotto delle raccomandazioni internazionali. Durante la stagione pandemica 2020/2021, i vaccini COVID-19 non erano ancora disponibili fino alla fine di dicembre 2020 e i vaccini antinfluenzali erano gli unici disponibili per proteggere dalle malattie respiratorie stagionali. L'obiettivo principale del presente studio è stato quello di valutare le conoscenze, gli atteggiamenti e l'adesione all'influenza e alle altre vaccinazioni raccomandate dal Piano Nazionale di Immunizzazione 2017-2021 per gli operatori sanitari.

Metodi. L'arruolamento è durato da ottobre a dicembre 2020 presso l'ambulatorio vaccinale dell'Ospedale Universitario di Palermo. I dati sono stati raccolti attraverso un questionario anonimo e autosomministrato, suddiviso in 5 sezioni e 31 item.

Risultati. Tra i 734 operatori sanitari che hanno completato l'indagine, è stata osservata un'adesione significativamente più elevata alla vaccinazione antinfluenzale tra gli operatori sanitari più inclini a ricevere la vaccinazione COVID-19 (OR=4,02; 95% CI: 1,63-9,91). Inoltre, sono stati osservati tassi di vaccinazione antinfluenzale più elevati tra gli operatori sanitari che hanno ricevuto la vaccinazione antinfluenzale durante la precedente stagione 2019/2020 (OR=15,3; 95% CI: 5,17-45,1) e che erano favorevoli al possibile impatto sull'aumento dell'adesione alla vaccinazione obbligatoria antinfluenzale (OR=4,88; 95% CI: 2,43-9,80).

Conclusioni. La propensione degli operatori sanitari a sottoporsi alle vaccinazioni raccomandate dal PNI è aumentata durante la prima stagione pandemica. Al termine della stagione vaccinale, la copertura vaccinale antinfluenzale ha raggiunto i tassi più alti di sempre presso l'Ospedale Universitario di Palermo (circa il 60%), rimanendo comunque al di sotto del valore minimo raccomandato del 75%. Durante le prossime campagne stagionali di vaccinazione antinfluenzale, diventa essenziale promuovere strategie di comunicazione e informazione per aumentare la vaccinazione antinfluenzale tra gli operatori sanitari, concentrandosi anche sulla co-somministrazione con il richiamo/dosi stagionali anti-COVID-19.

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