

RESEARCH PAPER



Influenza vaccination in coronavirus times: Primary Care professionals' intention to get vaccinated in Central Catalonia (VAGCOVID). A cross sectional study

Raquel Muñoz-Miralles ^a, Anna Bonet-Esteve ^{b,c}, Anna Rufas-Cebollero ^d, Aina Fuster-Casanovas ^e, Xavier Pelegrin-Cruz ^f, and Josep Vidal-Alaball ^{c,e,g}

^aCentre d'Atenció Primària Plaça Catalunya, SAP Bages-Berguedà-Solsonès, Gerència Territorial Catalunya Central Institut Català de la Salut, Manresa, Spain; ^bUnitat de Farmàcia, Gerència Territorial Catalunya Central Institut Català de la Salut, Sant Fruitós de Bages, Spain; ^cHealth Promotion in Rural Areas Research Group, Gerència Territorial de la Catalunya Central, Institut Català de la Salut, Sant Fruitós de Bages, Spain; ^dCentre d'Atenció Primària Manlleu, SAP Osona, Gerència Territorial Catalunya Central, Institut Català de la Salut, Manlleu, Spain; ^ela Recerca de la Catalunya Central, Fundació Institut Universitari per a la recerca a l'Atenció Primària de Salut Jordi Gol i Gurina Unitat de Suport a , Sant Fruitós de Bages, Spain; ^fDepartament de Matemàtiques, Universitat Autònoma de Barcelona, Barcelona, Spain; ^gFaculty of Medicine, University of Vic - Central University of Catalonia, Vic, Spain

ABSTRACT

Influenza vaccination is the main measure of prevention against epidemic flu. Although recommended, vaccination coverage remains low. The lack of knowledge about the evolution of influenza in the context of the SARS-CoV-2 coronavirus pandemic led to the recommendation of influenza vaccination to people at risk and professionals to avoid a greater burden than the one already posed by SARS-CoV-2. The aim of the study is to determine health professionals' intention to vaccinate against seasonal flu in the 2020-2021 campaign, in the context of the SARS-CoV-2 pandemic, and to analyse the factors that influence it. Cross-sectional study through a structured survey aimed at Primary Care professionals in Central Catalonia. A total of 610 participants responded to the survey, 65.7% of whom intended to get vaccinated against influenza in this campaign, and 11.1% did not know or did not answer. The intention to get vaccinated is associated with the professional category and the number of years of professional practice. The profile of the professionals who intend to get vaccinated against flu includes professionals with a history of vaccination, who participate in on-call duties and perceive that their dependents were at risk of becoming ill. During the SARS-CoV-2 pandemic, although almost two-thirds of the respondents showed a clear intention to get vaccinated against influenza, 11% were doubtful. To improve influenza vaccination uptake among health professionals, strategies need to be devised to target those professionals who are hesitant or reluctant to vaccinate.

ARTICLE HISTORY

Received 25 January 2022
Revised 28 March 2022
Accepted 14 April 2022

KEYWORDS

Human influenza; influenza vaccines; intention; COVID-19; health profession; attitudes; practice; vaccination refusal; vaccination coverage

Introduction

Flu is estimated to affect between 5% and 20% of the general population each year. Approximately 25% of respiratory febrile processes can be caused by influenza.¹

Influenza is a public health problem that directly affects healthcare workers due to the increase in consultations resulting from infection and its complications, leading to an increase in healthcare pressure and hospitalizations.¹⁻³ In addition, professionals who work in healthcare areas are at higher risk of catching influenza than those who work in non-healthcare areas, and the fact that they get influenza can affect the healthcare system due to their possible absences.⁴

Seasonal influenza vaccination (SIV) is an effective primary prevention measure to prevent being infected by influenza and its complications.^{1,5} Its administration is recommended to risk groups (people who will likely present complications if they are infected by influenza) and people who may be vectors of transmission, such as health professionals.^{1,6} Health workers can also infect people in their family environment and can be a key factor in the spread of epidemic outbreaks in health

centers.⁷ Sometimes, influenza can appear asymptotically or mildly, and even if the spread of the virus in these forms is not clearly known, unvaccinated professionals continue to work and can act as a source of infection for the people they care for. Although it is not clear what the vaccination uptake threshold for professionals should be, vaccination of health workers in nursing homes, health centers and hospitalization plants could improve safety and reduce the morbidity and mortality associated with this infection.⁸ In fact, vaccination of professionals has been shown to have some protective effects in elderly patients, with respect to mortality from pneumonia or other causes.⁴

Overall, SIV uptake in health professionals achieved through vaccination campaigns is usually low. This coverage is far from the 75% target proposed by the World Health Organization (WHO) and the European Center for Disease Prevention and Control (ECDC) for the 2020-2021 campaign.^{9,10} Data collected in the European Union during the 2015-2016, 2016-2017, 2017-2018 seasons show that vaccine coverage ranges from 15.6% to 63.2%.¹¹ In the 2019-2020 campaign, coverage in Spain was 39.4%, and 30.2% in Catalonia.¹²

Professionals' vaccination acceptance can be influenced by different factors: 1) Personal factors, linked to knowledge, beliefs, perceptions and factors that have to do with motivation; 2) Social/community factors, linked to personal experiences and relationships; 3) Professional factors that support the behavior; and 4) Environmental factors that, despite not being adjustable, influence the individual by offering him/her the opportunity to get vaccinated.⁴ According to Herzog¹³ increased knowledge about vaccines, beliefs aligned with scientific evidence and favorable attitudes toward them are associated with higher vaccination intentions. The social benefit provided by vaccination (protection to patients and the professional environment) is also a justification in favor of SIV in professionals.¹⁴ In contrast, several studies have identified fear of adverse events and doubts about the effectiveness of the vaccine as the main reasons for non-vaccination by healthcare workers.^{14,15} However, a survey carried out in 2012 on 336 healthcare workers in Spain indicated as the main reasons for rejecting SIV the fact that they do not consider themselves at risk, the lack of concern, or the lack of time.¹⁶

The role of professionals is crucial in order to increase the uptake of the population's flu vaccine, both in terms of informing patients and making health recommendations. Vaccine uptake for healthcare professionals, along with their opinion and attitude toward the effectiveness of the vaccine, influences the vaccination rates of their patients.¹⁷

In the context of the current SARS-CoV-2 pandemic, the SIV 2020–2021 campaign was influenced by ignorance of influenza virus behavior and the risk of coinfection of both viruses. For this reason, health authorities promoted an increase in SIV uptake to reduce the incidence and the impact on healthcare pressure that takes place each year.^{9,10}

In these circumstances, it is important to know the intention to receive SIV by health professionals, as intention is a key factor for action^{14,18,19} and, therefore, can help focus actions that improve vaccine uptake. It is also interesting to explore the pandemic-related reasons that may lead them to decide on the SIV.

The aim of the study is to determine health professionals' intention to vaccinate against seasonal flu in the 2020–2021 campaign, in the context of the SARS-CoV-2 pandemic. The specific objectives are: 1) Assess the perception of risk of seasonal flu in the context of the SARS-CoV-2 pandemic; and 2) Determine whether the contextual factors related to the physical and hygienic protection measures disseminated and implemented during the pandemic influence the intention of getting vaccinated against influenza.

Methods

Study design

Cross-sectional study on the acceptance of SIV, the perception of seasonal influenza risk during the SARS-CoV-2 pandemic and the influence of contextual factors related to the hygienic/physical measures implemented during the pandemic, through an online survey to primary care professionals. This survey is based on a previous one conducted by Apiñániz et al. to study the acceptability of an influenza A (H1N1) vaccine.²⁰ The survey that has

already been used in a recent study on the intention to vaccinate among at-risk population in the same area²¹ was considered suitable for this study because compared seasonal influenza and influenza A vaccination and the authors believed that it was suitable for comparing seasonal influenza and coronavirus vaccination.

Scope and period of study

The setting of the study was the Health Region of Central Catalonia, which includes the counties of Anoia, Bages, Berguedà, Moianès and Osona. The research period ranged from 15 days before the start of the influenza vaccination campaign until the month after its completion (5 October 2020–31 January 2021). The population included healthcare professionals in Primary Care Teams from the Catalan Institute of Health in Central Catalonia; approximately 1,500 professionals. The different professional categories included were: Group A1 (family doctors, pediatricians, dentists, pharmacists and senior technicians), Group A2 (nurses, midwives, social workers and management technicians), Group C1 (administrators and specialist technicians), Group C2 (pharmacy assistants, nursing assistants, nurses, administrative assistants, drivers, and maintenance staff) and the GP Group (caretakers or others).

Participants

The inclusion criteria were: 1) Being a Primary Care professional at the Catalan Institute of Health in Catalonia; and therefore 2) Having an indication for influenza vaccination;⁶ and 3) Agreeing to participate in the study voluntarily by answering the self-administered *online* questionnaire, which the professionals received via their corporate e-mail address.

People who did not fulfill inclusion criteria or were not willing to respond were excluded.

Statistical methods

The sample size was calculated with the GRANMO calculator.²² It was calculated that a random sample of 290 individuals would be sufficient to estimate, with 95% confidence and an accuracy of $\pm 5\%$ units, a population percentage that was predicted to be around 30%. The expected percentage of replacements was 10%.

A descriptive statistical analysis was performed with the data derived from the responses. Categorical variables were described using frequencies and percentages. Continuous variables were described with mean and standard deviation. The proportions of categorical variables were compared using Chi Squared test or Fisher's exact test and continuous variables were compared using *T*-Test or Mann–Whitney test.

Finally, the variables with the greatest impact on the intention to vaccinate were evaluated using a stepwise logistic regression model, based on Bayesian Information Criterion. Only variables with significant association with intention to vaccinate were considered and only the yes or no option of response variable was analyzed; the non-response (NA/DK)

was not considered. The statistical programme R for Windows (version 3.6.3) was used for statistical analysis. The results were considered significant, with $p < .05$.

Ethics approval

The study protocol was approved by the University Institute for Primary Care Research (IDIAP), Jordi Gol Health Care Ethics Committee (Code 20/177-PCV).

Results

The online survey was sent to 1,747 primary care professionals, 610 of whom (34.9%) responded to the entire survey. 83.6% of respondents were women and the average age was 50, with an age range of 20–60 years old. 70.8% were married/living with a partner, and 46.2% had one or more dependents. 24.1% of participants belonged to the professional category A1, and 38.5% to A2. 20.3% had a temporary contract, and 42.8% were interim workers. 25.9% had a professional experience of more than 21 years, and 22.1% of less than 5 years. 44.6% of participants participated in the on-call rotation. Professional category ($p < .001$), employment situation ($p < .001$), years of professional practice ($p = .03$) and the fact of participating in on-call rotation ($p < .01$) were significantly associated with the intention to get vaccinated. All this data is detailed in Table 1.

Risk perception

46.6% of professionals believed that they were not at risk from influenza and 28.9% did not answer or did not know (see Table 2). 43.5% of professionals with dependents believed that caretakers had a high risk of catching influenza. Within the 150 professionals (24.6% of the total) who believed that they were at risk from influenza, 83 (55.3%) cared for a dependant. Within these, 66 (79.5%) believed that the dependent had a high risk of influenza, 15 (18%) did not, and 2 (2.4%) did not know or did not answer. Furthermore, 61.1% of participants had been vaccinated against influenza last year, and 73.4% had done so on another occasion. Table 2 shows the intention to vaccinate against flu according to perception of risk of influenza, history of vaccination and number of risk factors excluding age.

Intention to vaccinate

65.7% of participants reported the intention to get vaccinated against influenza in this campaign, and 11.1% did not know or did not answer, as you can see in Table 1. When asked if they intended to get vaccinated during the pandemic situation caused by SARS-CoV-2, as you can see in Table 3, 60% answered that they would do so regardless of the situation, 6.7% would do so because of it, and 12.6% did not know or did not answer.

Regarding the intention to vaccinate and the relationship with the recommended protection measures during the pandemic, 52.8% would get vaccinated, despite thinking that the

mask already protects them, and 13.9% would not do so, despite knowing that the mask does not protect them totally. Regarding handwashing and physical distancing, 52.1% and 51.1% of respondents, respectively, stated that they would get vaccinated, despite applying these measures; and 15.2% and 15.4%, respectively, had no intention of getting vaccinated, despite knowing that these measures do not protect them totally. In the questions related to the three contextual variables, the “No Answer/Do not know” was chosen by 14% of the participants.

The intention to get vaccinated was also related to the perception of the risk of suffering from influenza ($p < .001$). There were professionals who intended to get vaccinated against influenza who did not perceive their own risk of suffering from it as high (55.6%), or who did not know whether they were at risk (63.1%).

Having dependents was not associated with the intention to get vaccinated ($p = .053$). The perception of the risk of suffering from influenza by the people in charge ($p < .001$) and the fact of having some additional risk factor ($p = .003$ (age excluded) and $p < .001$ (age included)) were associated with the intention to get vaccinated. Having or having had a partner is also associated with a higher intention to vaccinate ($p = .014$). Table 3 shows intention to vaccinate against flu in the context of the SARS-CoV-2 pandemic.

The history of influenza vaccination has shown significant differences with the intention to get vaccinated, both vaccination in the previous year ($p < .001$) and in another campaign ($p < .001$).

The three response variables with higher impact in vaccination intention were the subject’s perception of whether their dependents would catch influenza (OR 3.33 (1.16; 10.26)) and whether (or not) they had been vaccinated the previous year or in other campaigns with an OR of 32.52 (12.72; 93.32) and 6.59 (2.39; 19.00), respectively. Table 4 shows the logistic regression model for the intention to vaccinate against flu in the context of the SARS-CoV-2 pandemic.

Discussion

The results obtained in the present study on health professionals’ intention to get vaccinated against influenza show that, in the context of the SARS-Cov-2 pandemic, higher than usual vaccine uptake could be achieved¹² but without reaching the 75% proposed by the WHO and ECDC.^{9,10}

The moderate response rate (almost 35%), like other studies^{15,16,23} with an online survey to health professionals, should be noted. It indicates the high interest that the influenza vaccination aroused in the context of the SARS-CoV-2 pandemic.

Concern about getting sick or being a source of infection for relatives or patients seems to be a factor that would motivate flu vaccination and has already been described in other studies.^{15,16,23} The data obtained do not distinguish between dependents (i.e., children or elderly), and people at risk of health complications; something which would provide more information to assess the perception of risk of people they care for and their intention to get vaccinated. In the context of the SARS-CoV-2 pandemic, there are professionals who state that they would get vaccinated

Table 1. Intention of influenza vaccination and sociodemographic characteristics of participants.

VARIABLE	Yes, I'll get vaccinated	No. I will not be vaccinated	I don't know if I will be vaccinated/I don't know	Total	p-value
INTENTION TO GET VACCINATED AGAINST INFLUENZA	401 (65.7%)	141 (23.1%)	68 (11.1%)	610 (100%)	
Gender					.081*
Male	59 (59.6%)	25 (25.3%)	15 (15.2%)	99 (16.2%)	
Female	342 (67.1%)	116 (22.7%)	52 (10.2%)	510 (83.6%)	
Other	0 (0%)	0 (0%)	1 (100%)	1 (.2%)	
Age					0.0900 **
Mean (SD)	46 (10.6)	44 (11.1)	46 (11.5)	50 (10.8)	
Median [Min-Max]				50 [20-60]	
Ethnicity					.550*
Native	386 (65.5%)	138 (23.4%)	65 (11.0%)	589 (96.6%)	
Foreigner	15 (71.4%)	3 (14.3%)	3 (14.3%)	21 (3.4%)	
Professional category					>.001*
Group A1 (family doctors, pediatricians, dentists, pharmacists, senior technicians)	114 (77.6%)	21 (14.3%)	12 (8.16%)	147 (24.1%)	
Group A2 (nurses, midwives, social workers, management technicians)	175 (74.5%)	40 (17.0%)	20 (8.51%)	235 (38.5%)	
Group C1 (administrators, specialist technicians)	46 (63.0%)	19 (26.0%)	8 (11.0%)	73 (12.0%)	
Group C2 (pharmacy assistants, nursing assistants, nurses, administrative assistants, drivers, maintenance staff)	64 (42.1%)	61 (40.1%)	27 (17.8%)	152 (24.9%)	
GP Group (caretaker or other professionals)	2 (66.7%)	0 (.0%)	1 (33.3%)	3 (.5%)	
Civil status					.014*
Single	57 (53.3%)	34 (31.8%)	16 (15.0%)	107 (17.5%)	
Married/living together	296 (68.5%)	97 (22.5%)	39 (9.03%)	432 (70.8%)	
Separated/divorced	43 (68.3%)	9 (14.3%)	11 (17.5%)	63 (17.5%)	
Widowed	5 (62.5%)	1 (12.5%)	2 (25.0%)	8 (1.3%)	
Employment situation					<.001*
Temporary or substitute	58 (46.8%)	51 (41.1%)	15 (12.1%)	124 (20.3%)	
Permanent	152 (71.0%)	37 (17.3%)	25 (11.7%)	214 (35.1%)	
Interim	182 (69.7%)	53 (20.3%)	26 (9.96%)	261 (42.8%)	
Resident	9 (81.8%)	0 (.0%)	2 (18.2%)	11 (1.8%)	
Years of professional practice					0.030*
<5	72 (53.3%)	45 (33.3%)	18 (13.3%)	135 (22.1%)	
5-10	58 (71.6%)	18 (22.2%)	5 (6.17%)	81 (13.3%)	
11-15	54 (65.9%)	21 (25.6%)	7 (8.54%)	82 (13.4%)	
16-20	59 (68.6%)	16 (18.6%)	11 (12.8%)	86 (14.1%)	
>21	158 (69.9%)	41 (18.1%)	27 (12.0%)	226 (37.1%)	
On-call rotation					0.002*
Yes	199 (73.2%)	49 (18.0%)	24 (8.82%)	272 (44.6%)	
No	202 (59.8%)	92 (27.2%)	44 (13.0%)	338 (55.4%)	
Dependent people					0.053*
1 or more	195 (70.7%)	57 (20.7%)	24 (8.70%)	276 (45.2%)	
None	206 (61.7%)	84 (25.1%)	44 (13.2%)	334 (54.8%)	

*Chi-squared test was used to calculate the p-value.

**T-test was used to calculate the p-value.

against influenza, but who still report not being at risk of suffering from the disease. This attitude in some health professionals has been reported in previous studies.^{15,24}

According to other studies,^{14,23,25} the history of influenza vaccination in the previous year or on other occasions is a strong predictor of vaccination. This information is interesting because, for professionals who are vaccinated regularly, health authorities only need to send a reminder of the recommendation.²⁴ For professionals who never get vaccinated, evaluable strategies and interventions should be designed to convince them, considering not only knowledge, but also beliefs and attitudes.^{13,16,23} The WHO has initiated a different approach to improve vaccination uptake in health personnel, drawing on knowledge of behavior change theories and health programme planning models, and offering tools adapted to different contexts.^{4,26} Godoy et al. described that physicians' influenza vaccination uptake and their opinions can be good predictors of vaccination in their patients.¹⁷ Therefore, the promotion of

vaccination aimed at changing opinions and attitudes could have a beneficial effect on the uptake of both professionals and the population they serve.

Some studies have reported that age, gender, years worked and being a pediatrician are factors that would influence vaccination uptake.^{16,27} In the present study, gender and age were not found to be significant. However, professional category, years of experience and participating in the on-call rotation would be predisposing factors to acceptance of influenza vaccination by health professionals, as also shown in other studies.^{16,24} Being over 60 or suffering from a health problem that predisposes you to be at risk of complications from influenza are factors that can influence vaccination, as Picazo points out.¹⁵

Compared to a similar study conducted in patients in the same region, health professionals' intention to get vaccinated is higher than the intention of patients with risk factors²¹ although there are a significant number of people who do not have a clear decision in both population groups. Similarly, the

Table 2. Intention to vaccinate according to perception of risk of influenza, history of vaccination and number of risk factors.

VARIABLE	Yes, I'll get vaccinated	No, I will not be vaccinated	I don't know if I will be vaccinated/I don't know	Total	p-value
Risk of dependents who are at risk of catching the influenza					<.001*
Yes	101 (84.2%)	13 (10.8%)	6 (5.0%)	120 (19.7%)	
No	78 (64.5%)	31 (25.6%)	12 (9.92%)	121 (19.8%)	
NA/DK	16 (45.7%)	13 (37.1%)	6 (17.1%)	35 (5.7%)	
Own risk of suffering from flu					<.001*
Yes	132 (88.0%)	7 (4.67%)	11 (7.33%)	150 (24.6%)	
No	158 (55.6%)	97 (34.2%)	29 (10.2%)	284 (46.6%)	
NA/DK	111 (63.1%)	37 (21.0%)	28 (15.9%)	176 (28.9%)	
Vaccination in the previous year					<.001*
Yes	349 (93.6%)	9 (2.41%)	15 (4.02%)	373 (61.1%)	
No	52 (22.3%)	131 (56.2%)	50 (21.5%)	233 (38.2%)	
NA/DK	0 (.0%)	1 (25.0%)	3 (75.0%)	4 (.7%)	
Vaccination on other occasions					<.001*
Yes	364 (81.2%)	41 (9.15%)	43 (9.60%)	448 (73.4%)	
No	35 (22.6%)	96 (61.9%)	24 (15.5%)	155 (25.4%)	
NA/DK	2 (28.6%)	4 (57.1%)	1 (14.3%)	7 (1.1%)	
Risk Factor number (age included)					<.001**
0	289 (62.55%)	124 (26.84%)	49 (10.61%)	462 (75.73%)	
1	95 (74.80%)	15 (11.81%)	17 (13.39%)	127 (20.82%)	
2	15 (83.33%)	1 (5.56%)	2 (11.11%)	18 (2.95%)	
3	2 (66.67%)	1 (33.33%)	0 (0%)	0.5 (100%)	
Risk Factor number (age excluded)				n = 562	.003**
0	289 (62.55%)	124 (26.84%)	49 (10.61%)	462 (82.20%)	
1	71 (77.17%)	11 (11.96%)	10 (10.87%)	16.37 (100%)	
2	5 (71.43%)	1 (14.29%)	1 (14.29%)	7 (1.25%)	
3	0 (0%)	1 (100%)	0 (0%)	1 (.18%)	

*Chi-squared test was used to calculate the *p*-value.**Mann Whitney test was used to calculate the *p*-value.**Table 3.** Intention to vaccinate in the context of the SARS-CoV-2 pandemic.

VARIABLE	Yes, I'll get vaccinated	No, I will not be vaccinated	I don't know if I will be vaccinated/I don't know	Total	p-value
Pandemic situation and intention to vaccinate					<.001*
Yes, regardless of the pandemic	363 (99.2%)	0 (.0%)	3 (.82%)	366 (60.0%)	
Yes, because of the pandemic	33 (80.5%)	1 (2.44%)	7 (17.1%)	41 (6.7%)	
No, in spite of the pandemic	0 (.0%)	23 (95.8%)	1 (4.17%)	24 (3.9%)	
No, regardless of the pandemic	0 (.0%)	101 (99.0%)	1 (.98%)	102 (16.7%)	
NA/DK	5 (6.49%)	16 (20.8%)	56 (72.7%)	77 (12.6%)	
Use of mask and intention to vaccinate					<.001*
Even if the mask protects me, I will get vaccinated	317 (98.4%)	1 (.31)	4 (1.24%)	322 (52.8%)	
The mask does not protect me, so I will get vaccinated	77 (89.5%)	1 (1.16%)	8 (9.30%)	86 (14.1%)	
The mask does not protect me, but I will not get vaccinated	1 (1.18%)	83 (97.6%)	1 (1.18%)	85 (13.9%)	
The mask protects me, so I will not get vaccinated	0	23 (85.2%)	4 (14.8%)	27 (4.4%)	
NA/DK	6 (6.67%)	33 (36.7%)	51 (56.7%)	90 (14.8%)	
Hand washing and vaccination intention					<.001*
Even if hand washing protects me, I will get vaccinated	312 (98.1%)	1 (.31%)	5 (1.57%)	318 (52.1%)	
Hand washing does not protect me, so I will get vaccinated	83 (90.2%)	1 (1.09%)	8 (8.7%)	92 (15.1%)	
Hand washing does not protect me, but I will not get vaccinated	0 (.0%)	91 (97.8%)	2 (2.15%)	93 (15.2%)	
Hand washing protects me, so I will not get vaccinated	1 (4.55%)	19 (86.4%)	2 (9.09%)	22 (3.6%)	
NA/DK	5 (5.88%)	29 (34.1%)	51 (60.0%)	85 (13.9%)	
Physical distance and vaccination intention					<.001**
Physical distancing protects me, but I will get vaccinated	307 (98.4%)	1 (.32%)	4 (1.28%)	312 (51.1%)	
Physical distancing does not protect me, so I will get vaccinated	82 (89.1%)	1 (1.09%)	9 (9.78%)	92 (15.1%)	
Physical distancing does not protect me, but I will not get vaccinated	3 (3.19%)	89 (94.7%)	2 (2.13%)	94 (15.4%)	
Physical distancing protects me, so I will not get vaccinated	1 (4.35%)	21 (91.3%)	1 (4.35%)	23 (3.8%)	
NA/DK	8 (8.99%)	29 (32.6%)	52 (58.4%)	89 (14.6%)	

*NA: no answer; DK: did not know was removed to fit a logistic regression.

**Chi-squared test was used to calculate the *p*-value.

Table 4. Logistic regression model for vaccination intention considering the SARS-CoV-2 pandemic as a response variable.

	Odds Ratio	IC 95%	P-value
Intercept	0.11	(.03; .28)	<.001
Risk of dependents who sicken from influenza			
Yes	3.33	(1.16; 10.26)	.028
NA/DK	0.61	(.16; 2.39)	.482
Vaccination in the previous year			
Yes	32.52	(12.72; 93.32)	<.001
Vaccination on other occasions			
Yes	6.59	(2.39; 19.00)	<.001

Reference categories: Risk of dependents who are at risk of catching the influenza—No; The Vaccination in the previous year—No; The vaccination on other occasions—No.

*Responses NA/DK were removed to fit a logistic regression.

only variables associated with the intention to vaccinate that coincide in both professionals and users are the history of vaccination (both in the previous year and on other occasions) and the perception of risk of influenza in the dependents. The other variables analyzed in the two population groups do not coincide in relation to the intention to get vaccinated. The variables with the greatest impact on the vaccination intention were, in both studies, the history of vaccination, both in the previous year and in other seasons. In health workers, the perception of risk of influenza in their dependents also had a great impact in predicting influenza vaccination, in comparison with the study of patients, where we found that the perception of their own risk of influenza was one of the most predictive variables.²¹

This study may have certain limitations: the survey was entirely voluntary and online, and this can lead to a selection bias, as it may have been answered by the professionals most interested and motivated in SIV. Nevertheless, the high percentage of participation in a survey of this nature could minimize the bias. Another possible limitation of the study is the high female participation that could lead to a potential selection bias. However, the institution where the survey was conducted is 78,70% female and this explains the participation rate. In this context, future research should be aimed at analyzing whether gender influences vaccination uptake. Although the survey used was adapted from a previous one, some questions—especially those related to the intention to vaccinate according to the contextual factors of the SARS-CoV-2 pandemic—with very similar answer options could generate hesitations when choosing the answers.

One of the concerns with public health measures is that individuals who undertake these measures may engage in a higher risk behavior, believing that they are protected, thereby removing the benefits of the measures. The results of this study refute this theory of risk compensation;^{28,29} participants more in favor of the protective measures were also the ones with better intention to get vaccinated.

Knowing the intention to get vaccinated against flu can help to establish strategies to improve vaccine uptake, both for professionals and, consequently, for patients in future vaccination campaigns. In addition, the intention to vaccinate should be compared with the vaccination uptake data obtained for the different risk groups with indications for vaccination.

As Collange² suggests, future lines of research, qualitative or quantitative, should be aimed at analyzing in more detail the already known factors that influence health professionals' reluctance to receive the vaccine against influenza.

To sum up, vaccination intention can be a good predictor of vaccination uptake by health professionals. The generalization of the protection measures introduced due to the SARS-CoV-2 pandemic does not reduce the intention to get vaccinated among health professionals. However, there are still a significant number of professionals who are hesitant or reluctant to get vaccinated; an issue that highlights the need to establish actions aimed especially at them, addressing not only knowledge but also attitudes and beliefs about vaccination.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

The authors reported there is no funding associated with the work featured in this article.

ORCID

Raquel Muñoz-Miralles  <http://orcid.org/0000-0001-8204-4418>

Anna Bonet-Esteve  <http://orcid.org/0000-0002-2672-327X>

Anna Rufas-Cebollero  <http://orcid.org/0000-0002-9757-8102>

Aina Fuster-Casanovas  <http://orcid.org/0000-0001-9128-9580>

Xavier Pelegrin-Cruz  <http://orcid.org/0000-0001-9353-2652>

Josep Vidal-Alaball  <http://orcid.org/0000-0002-3527-4242>

References

- Public Health Agency of Catalonia; Department of Health; Government of Catalonia. Vaccination programme. Technical guide for the 2019 seasonal flu vaccination campaign. 2021-2022 campaign. Barcelona; 2021. [accessed 2022 Jun 9]. https://salutpublica.gencat.cat/web/.content/minisite/aspcat/promocio_salut/vacunacions/06vacunacio-antigripal/informacio-de-temporada/Recomanacions-vacunacio-antigripal-2021-2022.pdf.
- National Centre for Epidemiology; Carlos III Institute of Health. Guide for assessing the severity of influenza epidemics and pandemics in Spain; 2019 Mar. [accessed 2021 Apr 6]. https://www.isciii.es/QueHacemos/Servicios/VigilanciaSaludPublicaRENAVE/EnfermedadesTransmisibles/Documents/GRIPE/GUIAS/Guia_Evaluacion_Gravedad_Epidemias_Gripe_28Marzo2019.pdf.
- Commission of The European Communities. Proposal for a council recommendation on seasonal influenza vaccination. Brussels; 2009 July 13. <https://op.europa.eu/en/publication-detail/-/publication/99fd9b9-ce99-4064-9711-44385d555c1b/language-en>.
- Tailoring Immunisation Programmes for Seasonal Influenza (TYPE FLU). A guide for increasing health care workers' uptake of seasonal influenza vaccination. https://www.euro.who.int/__data/assets/pdf_file/0007/281860/Tailoring-Immunization-Programmes-Seasonal-Influenza-TIP-FLU.pdf.
- World Health Organisation. [Internet]. https://www.who.int/health-topics/influenza-seasonal#tab=tab_1.
- Public Health Agency of Catalonia; Department of Health. Government of Catalonia. [Internet]. Influenza vaccination. https://salutpublica.gencat.cat/ca/ambits/promocio_salut/vacunacions/Vacunacio-antigripal/.

7. Sánchez-Payá J, Hernández-García I, Barrenengoa J, Rolando H, Camargo R, Cartagena-Llopis L, Villanueva Ruiz C, González Hernández M. Determinantes de la vacunación antigripal en personal sanitario, temporada 2009-2010. *Gac Sanit.* 2011;25(1):29–34. doi:10.1016/j.gaceta.2010.09.018.
8. Clansbury LE, Brown CS, Nguyen-Van-Tam JS. Influenza in long-term care facilities. *Influenza Other Respir Viruses.* 2017;11(5):356–66. doi:10.1111/irv.12464.
9. Public Health Agency of Catalonia; Department of Health; Government of Catalonia. Influenza vaccination. https://salutpublica.gencat.cat/web/.content/minisite/aspcat/promocio_salut/vacunacions/06vacunacio-antigripal/info_vacunacio_grip_de_professionals_sanitaris/grip_professionals_07.pdf.
10. Ministry of Health, Consumption and Social Welfare; Government of Spain. [Internet]. https://www.sanidad.gob.es/profesionales/saludPublica/prevPromocion/vacunaciones/programasDeVacunacion/docs/Recomendaciones_vacunacion_gripe.pdf.
11. European Centre for Disease Prevention and Control. Seasonal influenza vaccination and antiviral use in EU/EEA Member States - Overview of vaccine recommendations for 2017–2018 and vaccination coverage rates for 2015–2016 and 2016–2017 influenza seasons. Stockholm: ECDC; 2018. <https://www.ecdc.europa.eu/sites/default/files/documents/seasonal-influenza-antiviral-use-2018.pdf>.
12. Ministry of Health, Consumption and Social Welfare. [Internet] Vaccination coverage. Statistical data. 2020 Sept 3. <https://www.sanidad.gob.es/profesionales/saludPublica/prevPromocion/vacunaciones/calendario-y-coberturas/coberturas/docs/Tabla13.pdf>.
13. Herzog R, Álvarez-Pasquin MJ, Díaz C, Del Barrio JL, Estrada JM, Gil Á. Are healthcare workers' intentions to vaccinate related to their knowledge, beliefs and attitudes? a systematic review. *BMC Public Health.* 2013;13(1):154. doi:10.1186/1471-2458-13-154.
14. Schmid P, Rauber D, Betsch C, Lidolt G, Denker ML. Barriers of influenza vaccination intention and behaviour - a systematic review of influenza vaccine hesitancy 2005-2016. *PLoS One.* 2017;12:2005–16.
15. Picazo J, González Romo F, Salleras Sanmartí J, Bayas Rodríguez J, Álvarez Pasquín M. Survey on adult vaccination in Spain. *Influenza and pneumococcus. Vaccines.* 2012;13(3):100–11. doi:10.1016/S1576-9887(12)70048-1.
16. Torner N, Godoy P, Soldevila N, Toledo D, Rius C, Domínguez A. Study of attitudes on influenza vaccination among primary care health professionals in Catalonia. *Prim Care.* 2016;48:192–99. doi:10.1016/j.aprim.2014.09.014.
17. Godoy, Godoy P, Castilla J, Mayoral JM, Martín V, Astray J, Torner N, Toledo D, Soldevila N, González-Candelas F, et al. Influenza vaccination of primary healthcare physicians may be associated with vaccination of their patients: a vaccination coverage study. *BMC Fam Pract.* 2015;16(1):44. doi:10.1186/s12875-015-0259-0.
18. Myers L, Goodwin R. Determinants of adults' intention to vaccinate against pandemic swine flu. *BMC Public Health.* 2011;11(1):15. doi:10.1186/1471-2458-11-15.
19. Goldman R, McGregor S, Shashidar M, Katsuta T, Griffiths M, Hall J, et al. Willingness to vaccinate children against influenza after the COVID-19 pandemic. *J Pediatr Pre-Proof J.* doi:10.1016/j.jpeds.2020.08.005.
20. Apiñániz A, López-Picado A, Miranda-Serrano E, Latorre A, Cobos R, Parraza-Díez N, Amezcua P, Martínez-Cengotitabengoa M, Aizpuru F. Population-Based cross sectional study about vaccine acceptability and perception of the severity of A/H1N1 influenza: opinion of the general population and health professionals. *Gac Sanit.* 2010;24(4):314–20. doi:10.1016/j.gaceta.2010.03.009.
21. Bonet-Esteve A, Muñoz-Miralles R, González-Claramunt C, Rufas AM, Cruz XP, Vidal-Alaball J. Influenza vaccination during the coronavirus pandemic: intention to vaccinate among the at-risk population in the Central Catalonia Health Region (VAGCOVID). *BMC Fam Pract.* 2021;22(1):84. doi:10.1186/s12875-021-01434-8.
22. Local Institute for Medical Research. Sample size and power calculator. Version 7; 2012 Apr 12. [accessed 2020 Apr 20]. <https://www.imim.cat/ofertadeserveis/software-public/granmol/>.
23. Martínez-Baz, Díaz-González J, Guevara M, Toledo D, Zabala A, Domínguez A, Castilla J. Attitudes, perceptions and factors associated with influenza vaccination in primary care professionals in Navarre, 2011-2012. *An Sist Sanit Navar.* 2013;36(2):263–73.
24. Picazo J, Alonso LM, Aristegui J, Bayas JM, Sanz J, Del Amo P, Cobos JL, Rodríguez-Salazar J, Sánchez-Pastor M, de la Cámara R, et al. [Consensus document on vaccination against influenza in health care workers]. *Rev Esp Quimioter.* 2012;25(3):226–39.
25. Shahar I, Mendelson G, Ben Natan M. Intention to receive the seasonal influenza vaccine among nurses working in a long-term care facility. *Int J Nurs Pract.* 2017 ;23(2):e12512. Advance online publication. doi:10.1111/ijn.12512.
26. Tailoring Immunisation Programmes for Seasonal Influenza (TYPE FLU). Understanding healthcare workers' uptake of seasonal influenza vaccination in Montenegro: a case study for policy-makers and programme managers; 2015. https://www.euro.who.int/__data/assets/pdf_file/0007/281860/Tailoring-Immunitation-Programmes-Seasonal-Influenza-TIP-FLU.pdf.
27. Montserrat-Capdevila J, Godoy P, Marsal JR, Barbé-Illa. Factors associated with receiving influenza vaccination by primary care professionals. *Gaceta Sanitaria.* 2015;29(5):383–86. doi:10.1016/j.gaceta.2015.02.004.
28. Trogen B, Caplan A. Risk compensation and COVID-19 vaccines. *Ann Intern Med.* 2021;174(6):858–59. doi:10.7326/M20-8251.
29. Wadud Z, Rahman SM, Enam A. Face mask mandates and risk compensation: an analysis of mobility data during the COVID-19 pandemic in Bangladesh. *BMJ Global Health.* 2022;7(1):e006803. doi:10.1136/bmjgh-2021-006803.