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# Intention to get vaccinations against COVID-19 in French healthcare workers during the first pandemic wave: a cross-sectional survey

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## SUMMARY

**Background:** Healthcare workers (HCWs) are at the frontline of the COVID-19 pandemic and identified as a priority target group for COVID-19 vaccines. We aimed to determine COVID-19 vaccine acceptance rate in HCWs in France.

**Methods:** We conducted an anonymous survey from 26<sup>th</sup> March to 2<sup>nd</sup> July 2020. The primary endpoint was the intention to get vaccinated against COVID-19 if a vaccine was available.

**Results:** Two-thousand and forty-seven HCWs answered the survey; women accounted for 74% of respondents. Among respondents, 1.554 (76.9%, 95% confidence interval 75.1–78.9) would accept a COVID-19 vaccine. Older age, male gender, fear about COVID-19, individual perceived risk and flu vaccination during previous season were associated with hypothetical COVID-19 vaccine acceptance. Nurses and assistant nurses were less prone to accept vaccination against COVID-19 than physicians. Vaccine hesitancy was associated with a decrease in COVID-19 vaccine acceptance. Flu vaccine rate was 57.3% during the previous season, and 54.6% of the respondents had the intention to get a flu vaccine during the next season.

**Conclusions:** Intention to get vaccinated against COVID-19 reached 75% in HCWs with discrepancies between occupational categories. COVID-19 pandemic had no positive effect on flu vaccine acceptance rate.

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## Introduction

Severe acute respiratory syndrome-coronavirus 2 (SARS-CoV-2) is now causing the pandemic of coronavirus disease-19 (COVID-19), and healthcare workers (HCWs) account for a large number of infected people [1]. In this context, HCWs are both potential victims of the disease and spreaders [2]. Protecting HCWs from SARS-CoV-2 infection would be beneficial for themselves, their household contacts and their patients. Protecting HCWs from COVID-19 is crucial in the preservation and protection of healthcare systems. In France, the 'Haute Autorité de Santé' identified HCWs as the primary target population for future COVID-19 vaccines [3]. The World Health Organization (WHO) had also listed HCWs as a priority group for COVID-19 vaccination [4]. However, vaccines should not be limited to HCWs with high exposure to SARS-CoV-2. SARS-CoV-2 infections of HCWs are not only related to care given to COVID-19 patients [5,6], suggesting that patients were not the primary source of HCWs' SARS-CoV-2 infections. The question of mandatory vaccination against COVID-19 for HCWs will be a matter of debate. After clinical development, vaccination against COVID-19 will face the challenge of public acceptance. In 2019, the WHO identified 10 threats for global health: they included vaccine hesitancy and the risk for a pandemic among these threats [7]. The world is now facing both threats. According to the WHO Strategic Advisory Group of Experts on Immunization, vaccine hesitancy refers to delay in acceptance or refusal of vaccines despite availability of vaccination services. Vaccine hesitancy is complex and context specific, varying across time, place and vaccines [8]. Vaccine hesitancy also concerns HCWs: physicians [9,10], nurses and assistant nurses [11]. In 2009, in a context of emergence, vaccine coverage against H1N1 influenza in HCWs remained low [12].

During the 2020–2021 winter season, SARS-CoV-2 and seasonal influenza will probably co-circulate. In France, seasonal flu vaccine is recommended for HCWs. Reducing the risk of co-infections in vulnerable patients is crucial as patients with concomitant flu and COVID-19 may have worse outcomes than patients with COVID-19 only [13]. Our aim was to evaluate the intentions to get vaccinated against COVID-19 and seasonal influenza in French HCWs, and to identify factors associated with the intention to get vaccinated against COVID-19 in HCWs.

## Methods

We conducted both an anonymous online survey (Lime Survey®), and a written questionnaire from 26<sup>th</sup> March to 2<sup>nd</sup> July 2020 among the general population and HCWs. The survey was proposed to individuals via social networks (Facebook, Twitter), shared by e-mail, on the website of the University Hospital of Saint-Etienne (France), and the written questionnaire was distributed to the centre for COVID-19 diagnosis in our establishment.

The questionnaire addressed: (1) demographical characteristics (age, chronic medical conditions), (2) fears about COVID-19, (3) history of previous vaccination against seasonal influenza, (4) intention to get vaccinated if a COVID-19 vaccine was available, (5) vaccine hesitancy. We evaluated participants' self-reported vaccine hesitancy according to the WHO definition using three previously adapted questions: "Have you

ever refused a vaccine for yourself or a child because you considered it as useless or dangerous?" "Have you ever postponed a vaccine recommended by a physician because of doubts about it?" "Have you ever had a vaccine for a child or yourself despite doubts about its efficacy" [14]. If a participant answered 'yes' to one of these proposals, he or she was considered to be 'vaccine hesitant'.

We ran ordinal regression models to examine demographic and attitudinal factors predictive of respondents' willingness to get vaccinated against COVID-19. To identify suitable candidate variables for regression models, we first conducted univariate analysis using a chi-squared test. Candidates that were significant at  $P < 0.2$  in univariate analyses were then included in a multivariable regression model. Data were analysed using SPSS version 24.0.

The protocol complied with the data privacy laws of the National Commission for Informatics and Civil Liberties and was approved by the institutional review board with the number IRBN422020/CHUSTE.

## Results

Two-thousand and forty-seven HCWs answered the questionnaire (1421 online and 626 on site). Demographic characteristics of HCWs are displayed in Table I. One-thousand five-hundred and fifteen (74%) respondents were women. Four-hundred and sixty HCWs (22.5%) reported a chronic medical condition. Vaccine hesitancy was observed in 531 HCWs (25.9%, 95% confidence interval (CI) 24–27.8%). Nine hundred and eighty-five (48.1%, 95% CI 45.9–50.3%) respondents had fears about COVID-19; 1320 (64.5%, 95% CI 62.4–66.5%) respondents considered themselves at risk for COVID-19. One-thousand one-hundred and seventy-two respondents (57.3%) declared that they got seasonal influenza vaccine during the previous flu season. Reported seasonal influenza vaccine rates were 360/431 (83.5%) in physicians, 438/501 (87.4%) in pharmacists, 132/371 (35.6%) in nurses, 49/218 (22.5%) in assistant nurses, 11/37 (29.7%) in midwives, 17/24 (70.8%) in physiotherapists, and 165/465 (35.5%) in other HCWs (administrative staff, laboratory staff, research staff). One-thousand one-hundred and sixteen HCWs (54.6%) declared that they would get the seasonal influenza vaccine in the context of the COVID-19 pandemic. Among the 873 HCWs who did not report having had flu vaccine during the previous season, 159 (18.2%) intended to get the flu vaccine for the next season. Among the 1172 HCWs vaccinated against flu during the previous season, 215 (18.3%) declared that they had no intention of being vaccinated during the next flu season.

### *Intention to get vaccinated against COVID-19*

One-thousand five-hundred and seventy-four (76.9%, 95% CI 75.1–78.9%) respondents declared that they would intend to get vaccinated against COVID-19 if a vaccine was currently available. Rates of intention were 397/431 (92.1%) in physicians, 445/501 (88.8%) in pharmacists, 240/371 (64.7%) in nurses, 131/218 (60.1%) in assistant nurses, 26/37 (70.3%) in midwives, 23/24 (95.8%) in physiotherapists and 312/465 (67.1%) in other HCWs. Factors associated with COVID-19 vaccine acceptance in HCWs are displayed in Table II. Male HCWs

**Table 1**  
Demographic characteristics of the responders to the survey

	N = 2047 (%)
Gender	
Male	532 (26)
Female	1515 (74)
Age	
Under 30 years	465 (22.7)
30–49 years	969 (47.3)
50–64 years	549 (26.8)
Over 65 years	64 (3.1)
Professions	
Physicians	431 (21.06)
Pharmacists	501 (24.5)
Nurses	371 (18.1)
Assistant nurses	218 (10.65)
Midwives	37 (1.8)
Physiotherapist	24 (1.2)
Others (administrative staff, laboratory staff, research staff)	465 (22.7)
Do you suffer from a chronic disease? Yes	460 (22.5)
Did you get flu vaccine during the previous flu season? Yes	1172 (57.3)
Have you fears about COVID-19? Yes	985 (48.1)
Do you feel at risk of getting infected by the new coronavirus? Yes	1320 (64.5)
Vaccine hesitancy	
Have you ever refused a vaccine for yourself or a child because you considered it as useless or dangerous?	190 (9.3)
Have you ever postponed a vaccine recommended by a physician?	210 (10.3)
Have you ever had a vaccine for a child or yourself despite doubts about its efficacy?	357 (17.4)
Global vaccine hesitancy	531 (25.9)
If a vaccine against the new coronavirus was available, would you get vaccinated? Yes	1574 (76.9)

were more inclined to get vaccinated against COVID-19 ( $P < 0.001$ ). Nurses and assistant nurses were less inclined to get vaccinated against COVID-19 than physicians ( $P < 0.001$ ). Fear about COVID-19 and self-perceived risk of infection were associated with COVID-19 vaccine acceptance in HCWs. The main predictor of COVID-19 vaccine acceptance was flu vaccine uptake during the previous season with an adjusted odds ratio (aOR) of 4.69 (95% CI 3.59–6.11). Vaccine hesitancy was a barrier to COVID-19 vaccine acceptance in HCWs with an aOR of 0.37 (95% CI 0.29–0.48).

## Discussion

In this study assessing intention to get vaccinated against COVID-19, we observed that almost three-quarters of the HCW respondents would accept a vaccine against COVID-19 although 25.9% of the respondents could be qualified as ‘vaccine hesitant’. The rate of COVID-19 vaccine acceptors in HCWs is not far from the results in the French general population [15–17]. HCWs are probably more likely to agree to get vaccinated against COVID-19 than non-HCWs [18]. The relative high rate of COVID-19 vaccine acceptance in HCWs observed in our study might be quite artificial as physicians and pharmacists represented a great proportion of the respondents. Intention to get vaccinated against COVID-19 differed significantly between the professions, with physicians and pharmacists most inclined to get vaccinated. A difference in COVID-19 vaccine acceptance rates between physicians and nurses was previously observed in Israel [18]. Differences in vaccine acceptance rates between

occupational categories were previously observed for seasonal flu vaccine; nurses are less often vaccine acceptors than physicians [18]. This observation could become a concern in healthcare settings as nurses and assistant nurses had more and longer contacts with patients than physicians or pharmacists [19]. Nurses and assistant nurses were the most affected occupational categories among the HCWs infected by SARS-CoV-2 in France [20]. Although the association between occupation and intention to get vaccinated against COVID-19 was independent of age, gender, vaccine hesitancy, and self-perceived risk for COVID-19 infection in this work, the pre-eminence of women in nurses and assistant nurses occupational categories may contribute to the observed discrepancies. We previously observed that women were less prone to get vaccinated against COVID-19 [17], as was also observed in Israel [18]. In our sample, men accounted for only 12.4% of the nurses and assistant nurses, 76.7% of them would accept a COVID-19 vaccine (data not shown).

We also observed that intentions to get vaccinated against COVID-19 exceed seasonal flu vaccine rates in the previous season and intentions to get seasonal flu vaccine. Being vaccinated against seasonal flu was significantly associated with COVID-19 vaccine acceptance independently of vaccine hesitancy. Previous influenza vaccination behaviour was also found to be a predictor of COVID-19 acceptance in 806 nurses in a study conducted in Hong Kong in March–April 2020 [21]. Discrepancies between the intentions to get vaccinated against COVID-19 and intention to get flu vaccine were previously observed in a study in a United States general population; in this study, 67% of the general population would accept COVID-

**Table II**  
Factors associated with COVID-19 vaccine acceptance expressed with odds ratio, in multivariable analysis

	N (%)	Univariate analysis	P	Multivariable analysis	P
<b>Gender</b>					
Female	1116/1515 (73.7)	Ref	<0.001	Ref	<0.001
Male	458/532 (86.1)	2.21 (1.69–2.9)		1.88 (1.38–2.56)	
<b>Age</b>					
Under 30 years	323/465 (69.5)	Ref	<0.001	Ref	0.005
30–49 years	734/969 (75.7)	1.37 (1.07–1.76)		1.27 (0.96–1.69)	
50–64 years	460/549 (83.8)	2.27 (1.68–3.07)		1.29 (1.08–1.53)	
Over 65 years	57/64 (89.1)	3.45 (1.53–7.77)		1.27 (0.93–1.74)	
<b>Professions</b>					
Physicians	397/431 (92.1%)	Ref	<0.001	Ref	0.005
Pharmacists	445/501 (88.8)	0.68 (0.43–1.06)		0.63 (0.37–1.05)	
Nurses	240/371 (64.7)	0.16 (0.10–0.24)		0.57 (0.45–0.73)	
Assistant nurses	131/218 (60.1)	0.13 (0.08–0.20)		0.66 (0.54–0.81)	
Midwives	26/37 (70.3)	0.20 (0.09–0.44)		0.81 (0.64–1.02)	
Physiotherapists	23/24 (95.8)	1.97 (0.26–15.03)		1.19 (0.77–1.82)	
Others	312/465 (67.1)	0.17 (0.12–0.26)		0.9 (0.85–0.95)	
<b>Chronic medical conditions</b>					
No	1212/1571 (77.1)	Ref	0.780		
Yes	352/460 (76.5)	0.96 (0.75–1.23)			
<b>Flu vaccine during the previous season</b>					
No	508/873 (58.2)	Ref	<0.001	Ref	<0.001
Yes	1066/1172 (90.9)	7.22 (5.68–9.19)		4.69 (3.59–6.11)	
<b>Fear about COVID-19</b>					
No	736/1062 (69.3)	Ref	<0.001	Ref	0.001
Yes	838/985 (85.1)	2.03 (1.58–2.61)		1.58 (1.21–2.07)	
<b>Perceived individual risk</b>					
No	442/726 (60.9)	Ref	<0.001	Ref	<0.001
Yes	1132/1320 (85.8)	2.09 (1.7–2.57)		2.48 (1.93–3.2)	
<b>Vaccine hesitancy</b>					
No	1229/1516 (81.1)	Ref	<0.001	Ref	<0.001
Yes	345/531 (65)	0.35 (0.27–0.44)		0.37 (0.29–0.48)	

Only variables with a *P*-value < 0.2 in univariate analysis were integrated in the model. Ref, reference.

19 vaccine whereas only 52% were vaccinated against seasonal flu [22]. The difference in acceptance rates between COVID-19 vaccines and seasonal flu vaccine exists in the different subgroups except people of black ethnicity [22]. The difference in vaccine acceptance rates between seasonal flu and COVID-19 vaccines is questionable. Seasonal flu vaccine is well known and largely used and, at the time of this study, no COVID-19 vaccine was licensed. The contrasts between attitudes towards COVID-19 and flu vaccines may be in part due to differences in self-perceived risk to get infected by SARS-CoV-2, or by seasonal flu. HCWs perceived themselves as at low risk of contracting influenza [23]. In our study, self-perceived risk of infection with SARS-CoV-2 was significantly associated with COVID-19 vaccine acceptance. The perceived susceptibility to and seriousness of a vaccine preventable diseases may contribute to vaccine acceptance [24]. In the context of COVID-19, we previously observed this association in a sample of HCWs and non-HCWs [17]. HCWs involved in the care of COVID-19 patients and considering themselves at risk of disease were more likely to accept COVID-19 vaccine than HCWs not caring COVID-19 workers [16]. In our survey, we did not collect any information about the HCWs contacts with COVID-19 patients. In the USA, people who had the intention to get vaccinated

against COVID-19 also perceived themselves at higher risk than people who would not accept the COVID-19 vaccine [22]. Moreover, concerns about vaccine effectiveness may contribute to the low seasonal flu vaccine acceptance rate in HCWs [23]. At the time of the study no data about COVID-19 vaccine effectiveness were available. HCWs probably expect a highly effective COVID-19 vaccine. However, first generation COVID-19 vaccines may prove to have limited effectiveness, which could contribute to an erosion of trust in vaccines against COVID-19 [25]. Suspicion about safety, efficacy and effectiveness about COVID-19 was described as the main barrier to COVID-19 vaccine acceptance in nurses [21], while the main barrier to flu vaccine seems to be the doubts about necessity [21].

Our results also addressed a concern with flu vaccine in HCWs at the time of the COVID-19 pandemic. We did not observe any increase after the first wave of the COVID-19 pandemic in the intention to get flu vaccine in HCWs, as previously observed among Chinese nurses [21]; the flu vaccine acceptance rate in 2020 was estimated at 44.7%. Low flu vaccine coverage in HCWs is a concern in healthcare settings. The increase in flu vaccine adherence may be associated with a decrease in HCWs absenteeism [26]. In addition, the COVID-19

pandemic is associated with an increase in work absenteeism in healthcare support occupations [27]. During this public health crisis, reducing HCWs absenteeism is crucial. Furthermore, coinfections with SARS-CoV-2 and influenza might have worse outcomes than SARS-CoV-2 only infections [13]. Both infections can present with similar symptoms and reducing the incidence of flu in HCWs may decrease the numbers of suspected cases of COVID-19 [28]. Both vaccinations should be promoted, with common tools addressing common and different concerns about each vaccine and dedicated to HCWs, particularly nurses and assistant nurses.

Our work suffers from limitations. First, our sample is not completely representative of the French HCWs, and the great amount of physicians and pharmacists may overestimate the proportion of HCWs with intentions to get vaccinated. There were 700,000 nurses, 226,219 physicians, and 73,818 pharmacists in France in 2018 [29]. Secondly, most of the answers were collected at the beginning of the COVID-19 pandemic, and temporal changes may occur about the perception of the disease and may affect the intention to get vaccinated against COVID-19. In the same vein, we did not collect demographical characteristics as region of residence. Vaccine acceptance might be greater in regions highly affected by the COVID-19 pandemic, as previously observed in Lombardy [16].

In conclusion, during the first wave of COVID-19 pandemic, a majority of the French HCWs would agree to get vaccinated against COVID-19. The COVID-19 pandemic has had no impact on flu vaccine acceptance among these HCWs. However, discrepancies between the occupational categories are observed, and should be more in-depth analyzed to build effective promotion tools for both COVID-19 and flu vaccines in HCWs.

#### Conflict of interest statement

None declared.

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None

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