Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
Intention to get vaccinations against COVID-19 in French healthcare workers during the first pandemic wave: a cross-sectional survey

A. Gagneux-Brunon, M. Detoc, S. Bruel, B. Tardy, O. Rozaire, P. Frappe, E. Botelho-Nevers

Department of Infectious and Tropical Diseases, University Hospital of Saint-Etienne, Saint-Etienne, France
Centre d'investigation Clinique 1408-INSERM, University Hospital of Saint-Etienne, Saint-Etienne, France
Groupe Immunité des Muqueuses et Agents Pathogènes EA3064, University Jean Monnet, Université de Lyon, Saint-Etienne, France
Institut PRESAGE, Chaire Prevention Vaccination et Contrôle de L’Infection, University Jean Monnet, Université de Lyon, Saint-Etienne, France
Department of General Medicine, Faculté de Médecine Jacques Lisfranc, University Jean Monnet, Université de Lyon, Saint-Etienne, France
Union Régionale des Professionnels de Santé Pharmaciens, Auvergne Rhône Alpes, France

ARTICLE INFO

Article history:
Received 20 October 2020
Accepted 25 November 2020
Available online 28 November 2020

Keywords:
COVID-19
Vaccine
Vaccine hesitancy
Healthcare workers
Flu vaccine

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 26th March to 2nd 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.

© 2020 The Healthcare Infection Society. Published by Elsevier Ltd. All rights reserved.
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 26th March to 2nd 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...
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 | Mutivariate analysis |
|-------|---------------------|---------------------|
|       | P                   | P                   |
| Gender |                     |                     |
| Female | 1116/1515 (73.7)    | 2.21 (1.69–2.9)     | 1.88 (1.38–2.56) | <0.001 | <0.001 |
| Male  | 458/532 (86.1)      | Ref                 |                     |      |       |
| Age   |                     |                     |
| Under 30 years | 323/465 (69.5)     | Ref                 |                     |      |       |
| 30–49 years   | 734/969 (75.7)     | 1.37 (1.07–1.76)    | 1.27 (0.96–1.69)   | 0.005 |       |
| 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)   |       |       |
| Professions |                   |                     |
| Physicians | 397/431 (92.1%)   | Ref                 |                     |      |       |
| 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)    |       |       |
| Chronic medical conditions |       |                     |
| No        | 1212/1571 (77.1)   | Ref                 |                     | 0.780 |       |
| Yes       | 352/460 (76.5)     | 0.96 (0.75–1.23)    |                     |       |       |
| Flu vaccine during the previous season |                   |                     |
| No        | 508/873 (58.2)     | Ref                 |                     |      |       |
| Yes       | 1066/1172 (90.9)   | 7.22 (5.68–9.19)    | 4.69 (3.59–6.11)   | <0.001 |       |
| Fear about COVID-19 |                   |                     |
| No        | 736/1062 (69.3)    | Ref                 |                     |      | <0.001 |
| Yes       | 838/985 (85.1)     | 2.03 (1.58–2.61)    | 1.58 (1.21–2.07)   | 0.001 |       |
| Perceived individual risk |                   |                     |
| No        | 442/726 (60.9)     | Ref                 |                     |      | <0.001 |
| Yes       | 1132/1320 (85.8)   | 2.09 (1.7–2.57)     | 2.48 (1.93–3.2)    | <0.001 |       |
| Vaccine hesitancy |                  |                     |
| No        | 1229/1516 (81.1)   | Ref                 |                     |      | <0.001 |
| Yes       | 345/531 (65)       | 0.35 (0.27–0.44)    | 0.37 (0.29–0.48)   | <0.001 |       |

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

COVID-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 as 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 vaccines 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 of COVID-19 was described as 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
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, co-infections 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 demographic 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.

Funding sources
None

References
[1] Nguyen LH, Drew DA, Graham MS, Joshi AD, Guo C-G, Ma W, et al. Risk of COVID-19 among front-line health-care workers and the general community: a prospective cohort study. Lancet Public Health 2020;5:e475–83.
[2] Schwierzeck V, König JC, Kühn J, Mellmann A, Correa-Martínez CL, Omran H, et al. First reported nosocomial outbreak of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in a pediatric dialysis unit. Clin Infect Dis 2020.
[3] Stratégie de vaccination contre le COVID 19 – Anticipation des scénarios possibles de vaccination et recommandations préliminaires sur les populations cibles. Haute Autorité de Santé n.d. Available at: https://www.has-sante.fr/jcms/c_3197106/fr/strategie-de-vaccination-contre-le-covid-19-anticipation-des-scenarios-possibles-de-vaccination-et-recommandations-preliminaires-sur-les-populations-cibles [last accessed August 2020].
[4] NITAG Resource Center. WHO SAGE values framework for the allocation and prioritization of COVID-19 vaccination. n.d. Available at: https://www.nitag-resource.org/media-center/who-sage-values-framework-allocation-and-prioritization-covid-19-vaccination [last accessed October 2020].
[5] Hunter E, Price DA, Murphy E, van der Loeff IS, Baker KF, Lendrem D, et al. First experience of COVID-19 screening of health-care workers in England. Lancet 2020;395:e77–8.
[6] Gagneux-Brunon A, Pelissier C, Gagnaire J, Pillet S, Pozzetto B, Botelho-Nevers E, et al. SARS-CoV-2 infection: advocacy for training and social distancing in healthcare settings. J Hosp Infect 2020;106:610–2.
[7] Ten health issues WHO will tackle this year n.d. Available at: https://www.who.int/news-room/feature-stories/ten-threats-to-global-health-in-2019 [last accessed April 2020].
[8] SAGE group vaccine hesitancy – Recherche Google n.d. Available at: https://www.google.com/search?client=safari&rls=en&q=SAGE+group+vaccine+hesitancy&ie=UTF-8&oe=UTF-8 [last accessed October 2018].
[9] Killian M, Detoc M, Berthelot P, Charles R, Gagneux-Brunon A, Lucht F, et al. Vaccine hesitancy among general practitioners: evaluation and comparison of their immunisation practice for themselves, their patients and their children. Eur J Clin Microbiol Infect Dis 2016;35:1837–43.
[10] Agrinier N, Le Maréchal M, Fressard L, Verger P, Pulcini C. Discrepancies between general practitioners’ vaccination recommendations for their patients and practices for their children. Clin Microbiol Infect 2017;23:311–7.
[11] Wilson R, Zaytseva A, Boquiera A, Nakri A, Fressard L, Chamboredon P, et al. Vaccine hesitancy and self-vaccination behaviors among nurses in southeastern France. Vaccine 2020;38:1144–51.
[12] Blasi F, Alberti S, Mantero M, Centanni S. Compliance with anti-H1N1 vaccine among healthcare workers and general population. Clin Microbiol Infect 2012;18:37–41.
[13] Iacobucci G. Covid-19: Risk of death more than doubled in people who also had flu, English data show. BMJ 2020;370:m3720.
[14] Reyes D, Fressard L, Cortaredona S, Bocquiera A, Gautier A, Perretti-Watel P, et al. Vaccine hesitancy in the French population in 2016, and its association with vaccine uptake and perceived vaccine risk–benefit balance. Eurosurveillance 2018;23(17):00816.
[15] Peretti-Watel P, Seror V, Cortaredona S, Launay O, Raude J, Verger P, et al. A future vaccination campaign against COVID-19 at risk of vaccine hesitancy and politicisation. The Lancet Infect Dis 2020;20:769–70.
[16] Neumann-Böhme S, Varghese NE, Sabat I, Barros PP, Brouwer W, van Exel J, et al. Once we have it, will we use it? A European survey on willingness to be vaccinated against COVID-19. Eur J Health Econ 2020;21:977–82.
[17] Detoc M, Bruel S, Frappe P, Tardy B, Botelho-Nevers E, Gagneux-Brunon A. Intention to participate in a COVID-19 vaccine clinical trial and to get vaccinated against COVID-19 in France during the pandemic. Vaccine 2020;38:7002–6.
[18] Dror AA, Eisenbach N, Talber S, Morozov NG, Mizrachi M, Zigron A, et al. Vaccine hesitancy: the next challenge in the fight against COVID-19. Eur J Epidemiol 2020;35:775–9.
[19] Jiang L, Ng HL, Ho HJ, Leo YS, Prem K, Cook AR, et al. Contacts of COVID-19 cases: a population-based assessment. Singapore. Epidemiol Infect 2017;145:3085–95.
[20] Recensement national des cas de COVID-19 chez les professionnels en établissements de santé n.d. Available at: https://www.santepubliquefrance.fr/etudes-et-enquetes/recensement-national-des-cas-de-covid-19-chez-les-professionnels-en-établissements-de-santé [last accessed May 2020].
[21] Wang K, Wong ELY, Ho KF, Cheung AWL, Chan EYY, Yeoh EK, et al. Intention of nurses to accept coronavirus disease 2019 vaccination and change of intention to accept seasonal influenza vaccination during the coronavirus disease 2019 pandemic: A cross-sectional survey. Vaccine 2020;38:7049–56.
[22] Malik AA, McFadden SM, Elharake J, Omer SB. Determinants of COVID-19 vaccine acceptance in the US. E Clinical Medicine 2020;26:100495.
[23] Lorenc T, Marshall D, Wright K, Sutcliffe K, Sowden A. Seasonal influenza vaccination of healthcare workers: systematic
review of qualitative evidence. BMC Health Serv Res 2017;17:732.

[24] Dubé E, Laberge C, Guay M, Bramadat P, Roy R, Bettinger JA. Vaccine hesitancy. Hum Vaccin Immunother 2013;9:1763–73.

[25] Torreele E. The rush to create a covid-19 vaccine may do more harm than good. BMJ 2020;370:m3209.

[26] Costantino C, Casuccio A, Caracci F, Bono S, Calamusa G, Ventura G, et al. Impact of communicative and informative strategies on influenza vaccination adherence and absenteeism from work of health care professionals working at the University Hospital of Palermo, Italy: A quasi-experimental field trial on twelve influenza seasons. Vaccines 2019;8:5.

[27] Groenewold MR. Increases in health-related workplace absenteeism among workers in essential critical infrastructure occupations during the COVID-19 pandemic – United States, March–April 2020. MMWR Morb Mortal Wkly Rep 2020;69:853–8.

[28] Maltezou HC, Theodoridou K, Poland G. Influenza immunization and COVID-19. Vaccine 2020;38:6078–9.

[29] DREES études et statistiques — Rapports, n.d. Available at: http://www.data.drees.sante.gouv.fr/ReportFolders/reportFolders.aspx?IF_ActivePath=P,490,497,514 [last accessed October 2020].