

Attitudes towards COVID-19 vaccination and containment measures in Italy and the role of occupational physicians

CARLO LA VECCHIA¹, GIANFRANCO ALICANDRO^{2,3}, EVA NEGRI⁴, VILMA SCARPINO⁵, MAURIZIO COGGIOLA⁶, GIOVANNA SPATARI⁷

¹Department of Clinical Sciences and Community Health, Università degli Studi di Milano, Milano, Italy

²Department of Pathophysiology and Transplantation, Università degli Studi di Milano, Milano, Italy

³Cystic Fibrosis centre, Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico, Milano, Italy

⁴Department of Medical and Surgical Sciences, Università di Bologna, Bologna, Italy

⁵Istituto Doxa, Milano, Italy

⁶Department of Occupational Medicine, University Hospital Città della Salute e della Scienza di Torino, Torino, Italy

⁷Department of Biomedical and Dentistry Sciences and Morphological and Functional Imaging, Università di Messina, Messina, Italy

KEY WORDS: COVID-19; vaccine; SARS-CoV-2; web survey

ABSTRACT

Background: Vaccine hesitancy is the main barrier to the effective management of COVID-19. This study aims to evaluate attitudes towards vaccination and containment measures in Italy, and the role of occupational physicians in the management of COVID-19. **Methods:** Between 26 and 31 January 2022, we conducted a national online survey including 1000 respondents (631 workers). A series of questions were asked to obtain information on attitudes towards COVID-19 vaccination, containment measures and management of COVID-19. Sampling weights were used to obtain national estimates. **Results:** The majority of respondents (92.6%) received at least two doses of SARS-CoV-2 vaccine (or one dose of Ad26.COV2.S Janssen,), only 4.9% did not get any dose. Most interviewees (79.2%) stated that the decision to be vaccinated was their own choice, while 4.3% were convinced by the general practitioner or the occupational physician. History of SARS-CoV-2 infection was reported by 23.9% of the participants (30.2% among workers); and 40% of the infected workers were contacted/visited by an occupational physician. **Conclusions:** Vaccine uptake was remarkably high in Italy. Occupational physicians played a relevant role in the management of COVID-19.

INTRODUCTION

Italy was one of the countries most severely hit during the first wave of the COVID-19 pandemic (March-May 2020) [1–4]. At the end of 2020, the onset of the vaccination campaign raised great hopes for a rapid ending of the pandemic. Soon

after, however, concern over the emergency authorization and testing of the vaccines and safety issues mounted in the population. Despite some scepticism, around 80% of the Italian population over 12 years received two doses of the vaccines against SARS-CoV-2 by the end of 2021 [5]. Albeit low, the share of the population who refused the vaccine

Received 28.2.2022 - Accepted 14.3.2022

Corresponding author: Gianfranco Alicandro, Department of Pathophysiology and Transplantation, Università degli Studi di Milano, Via Commenda 9, 20122, Milano, Italy. Tel: +390255032456. E-mail: gianfranco.alicandro@unimi.it.

caused a new surge in hospital beds occupation since October 2021, plunging the country into a new emergency and forcing the Government to maintain and, in some cases, reinforce containment measures. Thus, vaccine hesitancy remains among the main barriers to pandemic control.

We therefore conducted a survey to understand the reasons that prompted the Italian population to get vaccinated, and their attitudes towards SARS-CoV-2 vaccination and containment measures. We also evaluated the role of the occupational physician in the endorsement of immunisation and management of COVID-19 in infected workers.

METHODS

The study is based on a national survey commissioned by the Italian Society of Occupational Medicine (Società Italiana di Medicina del Lavoro - SIML) and conducted by Doxa between 26 and 31 January 2022 in Italy.

A sample of 1000 individuals (631 workers) aged 18-74 years, extracted from a panel of 120,000, was interviewed using a Computer-Assisted Web Interview technique. A two-stage sampling design was used: participants were sampled in strata of sex and age groups within municipalities selected according to geographic area and size.

This sample size complies with the WHO recommendation of using 1000 participants when conducting behavioural insights studies related to COVID-19 [6].

The survey included a series of questions regarding attitudes towards COVID-19 vaccination and the containment measures the Government implemented. Weighted percentages are reported to account for oversampling of certain groups of the Italian population and survey nonresponse.

Differences by sex and age groups were tested using the modified Chi-square test proposed by Rao and Scott that considers the survey design [7].

A weighted logistic regression model, with standard errors clustered at the municipality level, was used to estimate the odds ratio (OR) and the corresponding 95% confidence intervals (CI) of not being vaccinated according to occupational categories. Due to the limited number of participants in some

categories, we grouped the original categories in four groups: 1) Highly qualified non-manual workers (including entrepreneurs, professionals, executives, managers, armed forces, police officers, medical doctors and teachers), 2) routine non-manual workers (office and sales workers), 3) manual workers (manual workers, farmers and agricultural workers), 4) inactive population (unemployed, housewives, retired and students). The regression model was adjusted for sex and age group (18-34, 35-54 and 55-74 years).

RESULTS

Table 1 describes the demographic characteristics of the sample and their weighted distribution. Around 46% of respondents were 35-54 years old, 11.6% had less than a high-school diploma, and almost one-third were office workers.

Table 2 shows self-reported history of COVID-19 overall and by time of infection, and, for those reporting infection, contact tracing and infection management by family and occupational physicians by age and sex: data are reported as weighted percentages (and absolute numbers in brackets). Around 24% of respondents reported having been infected by SARS-CoV-2. About half of these occurred between December 2021 and January 2022, i.e. during the Omicron phase. Symptomatic COVID-19 was reported in 19.5% of the interviewees and was more frequent among younger individuals (33.7% at ages 18-34, 15.4% at ages 35-54, and 14.4% at ages ≥ 55 years). Their contacts were traced in two-thirds of the cases. The prevalence of SARS-CoV-2 infection among workers was 30.2% (189 respondents), and 40% were contacted/visited by their occupational physician (50% among those with a referent occupational physician).

Table 3 gives the weighted percentages of the attitudes towards vaccination by age and sex. Almost one-fourth of the respondents were vaccinated against influenza, while the majority (92.6%) received at least two doses of the SARS-CoV-2 vaccine (or one dose of Ad26.COV2.S, Janssen). Most (91%) of individuals who did not receive any dose were not willing to be vaccinated in the future, with higher frequencies at older ages than at age 18-34 years (63%).

Table 1. Sociodemographic characteristics of the survey sample

| | No. of respondents | Sample % | Weighted % |
|------------------------------|--------------------|----------|------------|
| Total | 1000 | 100 | 100 |
| <i>Sex</i> | | | |
| Men | 506 | 50.6 | 49.5 |
| Women | 494 | 49.4 | 50.5 |
| <i>Age group</i> | | | |
| 18-34 | 291 | 29.1 | 24.2 |
| 35-54 | 463 | 46.3 | 40.5 |
| 55-74 | 246 | 24.6 | 35.3 |
| <i>Education</i> | | | |
| Master/PhD | 43 | 4.3 | 3.9 |
| Master degree | 162 | 16.2 | 6.2 |
| Degree | 154 | 15.4 | 6.9 |
| High-school diploma | 525 | 52.5 | 43.4 |
| Middle-school diploma | 109 | 10.9 | 31.8 |
| Primary school | 5 | 0.5 | 5.8 |
| No education | 2 | 0.2 | 2.0 |
| <i>Occupational category</i> | | | |
| Entrepreneurs | 20 | 2.0 | 2.1 |
| Professionals | 72 | 7.2 | 5.2 |
| Executives | 16 | 1.6 | 1.0 |
| Managers | 20 | 2.0 | 0.7 |
| Full-time office workers | 316 | 31.6 | 25.8 |
| Part-time office workers | 54 | 5.4 | 5.0 |
| Sale workers | 23 | 2.3 | 2.0 |
| Manual workers | 61 | 6.1 | 6.8 |
| Armed forces officers | 25 | 2.5 | 2.2 |
| Other armed forces workers | 7 | 0.7 | 0.9 |
| Other teachers | 8 | 0.8 | 1.4 |
| Medical doctors | 6 | 0.3 | 0.04 |
| Farmers | 3 | 0.3 | 0.06 |
| Housewives | 71 | 7.1 | 8.6 |
| Retired | 44 | 4.4 | 8.0 |
| Unemployed | 78 | 7.8 | 7.7 |
| Students | 108 | 10.8 | 9.1 |
| Other | 68 | 6.8 | 13.4 |

Among workers, 89.2% received at least two doses of vaccine (or one dose of Janssen) and 7.5% did not receive any dose. Of these, almost 60% reported no intention to get vaccinated in the future. Almost 80%

of interviewees stated that it was their own decision to be vaccinated, Government regulations convinced 12%, and 4% were convinced by the general practitioner or the occupational physician.

Table 2. Self-reported COVID-19 and management of infection by age group and sex

| | Age group | | | | Sex | | Total (n=1000) |
|--------------------------------------------------------------------------------------------------------|------------------|------------------|------------------|---------|----------------|------------------|-------------------|
| | 18-34 (n=291) | 35-54 (n=463) | 55-74 (n=246) | P value | Men (n=506) | Women (n=494) | |
| <i>Self-reported COVID-19</i> | | | | | | | |
| Never | 59.8 (185) | 81.5 (342) | 81.1 (194) | | 73.0 (359) | 79.2 (362) | 76.1 (721) |
| Asymptomatic | 6.4 (31) | 3.2 (27) | 4.5 (18) | 0.026 | 3.4 (39) | 5.5 (37) | 4.4 (76) |
| Symptomatic, no hospitalisation | 27.7 (74) | 13.6 (90) | 14.4 (33) | | 20.4 (106) | 14.2 (91) | 17.3 (197) |
| Symptomatic, hospitalized | 6.0 (1) | 1.8 (4) | 0 (1) | | 3.2 (2) | 1.2 (4) | 2.2 (6) |
| <i>Year of infection among participants who reported COVID-19^a</i> | | | | | | | |
| 2020 | 36.5 (32) | 31.0 (40) | 56.9 (22) | 0.360 | 35.9 (50) | 46.3 (44) | 40.5 (94) |
| 2021 | 42.4 (40) | 36.4 (64) | 21.1 (14) | 0.333 | 34.3 (68) | 34.9 (50) | 34.6 (118) |
| 2022 | 30.1 (42) | 33.9 (26) | 23.3 (18) | 0.745 | 31.1 (41) | 27.2 (45) | 29.4 (86) |
| <i>Have your contacts been traced?^b</i> | | | | 0.255 | | | 0.545 |
| No | 12.6 (32) | 37.7 (33) | 34.3 (15) | | 25.2 (40) | 28.2 (40) | 26.5 (80) |
| Yes | 79.7 (57) | 56.9 (81) | 58.9 (27) | | 69.9 (89) | 62.7 (76) | 66.7 (165) |
| Does not know | 7.8 (17) | 5.3 (7) | 6.9 (10) | | 4.9 (18) | 9.1 (16) | 6.7 (34) |
| <i>Have you been contacted/visited by the general practitioner/occupational physician?^c</i> | | | | | | | |
| Does not have an occupational physician | 21.6 (7) | 16.3 (14) | 19.6 (7) | | 18.3 (13) | 19.9 (15) | 18.9 (28) |
| Ever been visited/contacted by | 49.6 (15) | 28.4 (30) | 47.6 (14) | 0.738 | 32.3 (34) | 52.4 (25) | 40.6 (59) |
| Never been visited/contacted by | 28.8 (25) | 55.3 (63) | 32.8 (14) | | 49.5 (64) | 27.8 (38) | 40.4 (102) |

Data are reported as weighted percentages (number of respondents).

^a Participants may have been re-infected.

^b Question asked only to participants who reported having had COVID-19.

^c Question asked only to employed participants who reported having had COVID-19.

Table 3. Self-reported vaccination status and attitudes towards influenza and SARS-CoV-2 vaccination

| | Age group | | | Sex | | P value | Total (n=1000) |
|---------------------------------------------------------------------------|---------------|---------------|---------------|-------------|---------------|---------|----------------|
| | 18-34 (n=291) | 35-54 (n=463) | 55-74 (n=246) | Men (n=506) | Women (n=494) | | |
| <i>Influenza vaccination</i> | | | | | | | |
| No | 82.9 (236) | 80.3 (381) | 68.1 (156) | 77.8 (380) | 75.4 (393) | 0.780 | 76.6 (773) |
| Yes | 17.1 (55) | 19.7 (82) | 31.9 (90) | 22.2 (126) | 24.6 (101) | | 23.4 (227) |
| <i>SARS-CoV-2 vaccination</i> | | | | | | | |
| No | 2.8 (14) | 7.0 (36) | 3.9 (13) | 6.2 (31) | 3.7 (32) | | 4.9 (63) |
| Yes, one dose | 4.1 (11) | 3.2 (22) | 0.4 (6) | 3.2 (20) | 1.6 (19) | 0.655 | 2.4 (39) |
| Yes, two doses or Janssen | 37.6 (98) | 31.2 (116) | 27.8 (38) | 31.5 (129) | 31.6 (123) | | 31.5 (252) |
| Yes, three doses | 55.4 (168) | 58.6 (289) | 67.9 (189) | 59.1 (326) | 63.1 (320) | | 61.1 (646) |
| <i>Are you going to get vaccinated against SARS-CoV-2?</i> ^a | | | | | | | |
| No | 59.6 (10) | 44.5 (21) | 84.0 (7) | 72.3 (19) | 33.6 (19) | | 57.7 (38) |
| Probably No | 3.2 (2) | 51.5 (10) | 10.1 (3) | 18.4 (6) | 57.4 (9) | 0.049 | 33.1 (15) |
| Probably Yes | 37.2 (2) | 2.3 (4) | 5.9 (2) | 9.3 (5) | 6.4 (3) | | 8.2 (8) |
| Yes | 0 | 1.7 (1) | 0 (1) | 0 (1) | 2.6 (1) | | 1.0 (2) |
| <i>Who advised you to get vaccinated against SARS-CoV-2?</i> ^b | | | | | | | |
| Nobody (my own decision) | 72.8 (220) | 76.6 (325) | 86.7 (199) | 77.9 (380) | 80.5 (364) | 0.797 | 79.2 (744) |
| Relatives, friends, acquaintances | 11.5 (26) | 3.6 (24) | 4.1 (10) | 5.0 (28) | 6.5 (32) | 0.747 | 5.8 (60) |
| Government regulations | 9.4 (34) | 16.7 (65) | 8.7 (25) | 12.6 (61) | 11.5 (63) | 0.878 | 12.0 (124) |
| General practitioner/Occupational physician | 6.2 (5) | 3.3 (23) | 4.1 (8) | 4.2 (18) | 4.5 (18) | 0.943 | 4.3 (36) |
| Social media, TV, newspapers | 6.4 (4) | 0.1 (5) | 0.2 (2) | 3.3 (9) | 0.1 (2) | 0.001 | 1.7 (11) |
| Institutional sources | 0 (1) | 3.5 (11) | 0 (1) | 1.1 (5) | 1.7 (8) | 0.706 | 1.4 (13) |

Data are reported as weighted percentages (number of respondents).

^a Question asked only to participants who did not get any dose of the COVID-19 vaccine.

^b Question asked only to participants who got at least one dose of the COVID-19 vaccine.

^c Due to 0 frequencies in some cells, “Yes” and “Probably yes” were considered together in the statistical test for the difference by age groups.

Table 4 gives the OR of not being vaccinated against SARS-CoV-2 according to selected occupational categories. The prevalence of unvaccinated individuals among manual workers was higher than among highly qualified non-manual workers. Despite the difference between the corresponding prevalences (12.5% vs 8.4%, respectively), the odds ratio estimate is affected by low precision due to the small sample size (OR: 2.37, 95% CI: 0.26-22.0). The prevalence of unvaccinated individuals among routine non-manual workers (6.0%) did not substantially differ from that of highly qualified non-manual workers, the OR being 0.88, 95% CI: 0.19-4.18.

The main reported reasons for not being vaccinated were: concern about possible side effects (77%), doubts over a too rapid vaccine development

and consequent inadequate testing (66.5%), doubts over their efficacy (51.7%). A sizeable fraction of the sample did not believe COVID-19 to be dangerous (28.4%), but the prevalence of subjects not worrying about being infected was low (4.1%). Practically non-existent was the fear of needles (0.3%).

The majority (70-80%) of the participants agreed with all the containment measures (Table 5), although only 62.9% agreed with an extensive lockdown for unvaccinated people. Agreement was generally lower among younger individuals.

DISCUSSION

Prevalence of self-reported COVID-19 was 24%, compared to 18% officially registered by the end of

Table 4. Odds of not being vaccinated against SARS-CoV-2 according to occupational categories

| Occupational category | Weighted percentage (No. of unvaccinated workers/ No. of workers in the category) | OR (95% CI) ^a |
|-------------------------------------|--------------------------------------------------------------------------------------|--------------------------|
| Highly qualified non-manual workers | 8.4 (12/174) | 1 |
| Routine non-manual workers | 6.0 (25/393) | 0.88 (0.19-4.18) |
| Manual workers | 12.5 (7/64) | 2.37 (0.26-22.01) |
| Inactive population | 2.3 (16/301) | 0.44 (0.05-3.52) |

OR: Odds ratio

^aOR estimated using a weighted logistic regression model adjusted for sex and age group (18-34, 35-54 and 55-74 years) with standard errors clustered at the municipality level.

Table 5. Attitude towards containment measures by age group and sex

| | Age group | | | P value | Sex | | P value | Total (n=1000) |
|-------------------------------------------------------------------------|------------------|------------------|------------------|---------|----------------|------------------|---------|-------------------|
| | 18-34 (n=291) | 35-54 (n=463) | 55-74 (n=246) | | Men (n=506) | Women (n=494) | | |
| <i>Mandatory green pass in restaurants, shops, public offices, etc.</i> | | | | | | | | |
| Strongly agree | 33.2 (149) | 49.3 (242) | 69.9 (152) | 0.002 | 52.4 (279) | 53.0 (264) | 0.341 | 52.7 (543) |
| Agree | 32.5 (80) | 34.1 (111) | 19.4 (50) | | 25.5 (114) | 31.6 (127) | | 28.5 (241) |
| Disagree/Strongly disagree | 34.3 (62) | 16.6 (110) | 10.7 (44) | | 22.2 (113) | 15.4 (103) | | 18.8 (216) |
| <i>Mandatory super green pass in the workplace</i> | | | | | | | | |
| Strongly agree | 29.9 (136) | 57.8 (229) | 67.5 (146) | 0.004 | 49.2 (259) | 59.7 (252) | 0.127 | 54.5 (511) |
| Agree | 40.0 (82) | 21.7 (107) | 18.5 (54) | | 31.3 (120) | 18.8 (123) | | 25.0 (243) |
| Disagree/Strongly disagree | 30.1 (73) | 20.5 (127) | 13.9 (46) | | 19.5 (127) | 21.5 (119) | | 20.5 (246) |

Table 5 (Continued)

| | Age group | | | P value | Sex | | P value | Total (n=1000) |
|--------------------------------------------------------|---------------|---------------|---------------|---------|-------------|---------------|---------|----------------|
| | 18-34 (n=291) | 35-54 (n=463) | 55-74 (n=246) | | Men (n=506) | Women (n=494) | | |
| <i>Mandatory vaccination at ages 50 and over</i> | | | | | | | | |
| Strongly agree | 29.4 (153) | 60.7 (243) | 74.2 (159) | <0.0001 | 54.9 (283) | 60.9 (272) | 0.391 | 57.9 (555) |
| Agree | 30.8 (77) | 18.7 (108) | 15.4 (44) | | 19.5 (106) | 21.5 (123) | | 20.5 (229) |
| Disagree/Strongly disagree | 39.7 (61) | 20.6 (112) | 10.4 (43) | | 25.7 (117) | 17.6 (99) | | 21.6 (216) |
| <i>Mandatory face mask in open spaces</i> | | | | | | | | |
| Strongly agree | 34.9 (155) | 50.4 (234) | 66.9 (149) | 0.063 | 49.8 (277) | 55.1 (261) | 0.556 | 52.5 (538) |
| Agree | 27.3 (76) | 27.1 (102) | 12.6 (47) | | 21.2 (106) | 22.8 (119) | | 22 (225) |
| Disagree/Strongly disagree | 37.9 (60) | 22.5 (127) | 20.5 (50) | | 29 (123) | 22.1 (114) | | 25.5 (237) |
| <i>Lockdown for unvaccinated people</i> | | | | | | | | |
| Strongly agree | 19.6 (80) | 30.8 (139) | 46.1 (90) | 0.097 | 29.6 (146) | 37.3 (163) | 0.307 | 33.5 (309) |
| Agree | 29.7 (92) | 28.2 (147) | 30.7 (80) | | 28.4 (146) | 30.4 (173) | | 29.4 (319) |
| Disagree/Strongly disagree | 50.7 (119) | 41 (177) | 23.2 (76) | | 41.9 (214) | 32.3 (158) | | 37.1 (372) |
| <i>Chargeable medical care for unvaccinated people</i> | | | | | | | | |
| Strongly agree | 23.0 (131) | 51.7 (220) | 73.2 (140) | <0.0001 | 47.3 (234) | 57.2 (257) | 0.470 | 52.3 (491) |
| Agree | 25.5 (82) | 22.9 (100) | 11.9 (45) | | 21.3 (123) | 18.0 (104) | | 19.6 (227) |
| Disagree/Strongly disagree | 51.5 (78) | 25.4 (143) | 14.9 (61) | | 31.3 (149) | 24.8 (133) | | 28.0 (282) |
| <i>Mandatory vaccination for specific occupations</i> | | | | | | | | |
| Strongly agree | 27.1 (115) | 56.6 (210) | 57.5 (102) | 0.014 | 50.2 (216) | 49.3 (211) | 0.300 | 49.7 (427) |
| Agree | 37.4 (75) | 17.2 (86) | 16.4 (61) | | 25.1 (105) | 18.7 (117) | | 21.8 (222) |
| Disagree/Strongly disagree | 35.5 (101) | 26.2 (167) | 26.1 (83) | | 24.7 (185) | 32.0 (166) | | 28.4 (351) |
| <i>Mandatory vaccination in all workplaces</i> | | | | | | | | |
| Strongly agree | 35.5 (150) | 53.9 (255) | 84.6 (180) | <0.0001 | 53.3 (293) | 67.1 (292) | 0.131 | 60.3 (585) |
| Agree | 32.6 (81) | 28.6 (109) | 4.7 (28) | | 27.1 (114) | 15.3 (104) | | 21.2 (218) |
| Disagree/Strongly disagree | 31.9 (60) | 17.5 (99) | 10.7 (38) | | 19.6 (99) | 17.6 (98) | | 18.6 (197) |

Data are reported as weighted percentages (number of respondents).

January 2022, thus confirming a considerable underestimation of COVID-19 in Italy [8]. This survey indicates that most respondents got vaccinated against SARS-CoV-2 mainly by their own choice, and most of them agree with the containment measures to fight the spread of SARS-CoV-2 infection. At the time of our survey (January 26-31, 2022), the prevalence of unvaccinated people was around 5%, and almost 60%

of them did not intend to get vaccinated any time soon. The role of the general practitioner and occupational physician in the endorsement of vaccination was limited, being around 4%, without any age- or sex-related difference. Almost 40% of SARS-CoV-2 infected workers were contacted or visited by an occupational physician (50% among those who had an occupational physician).

In a previous survey we conducted in Italy between 16 and 28 September 2020 [9], when COVID-19 vaccines were not yet available, 54% of the interviewees would have accepted to receive a potential vaccine against SARS-CoV-2. Despite the initial scepticism, only 4.9% of the Italian population remained unvaccinated when vaccines became available. At the beginning of 2022, Italy was among the European countries with the highest vaccine uptake [10]. In addition, the prevalence of influenza vaccine was almost double in winter 2021-22 as compared to pre-Covid-19 calendar years [9].

The containment measures for unvaccinated people (i.e. mandatory green pass to access public spaces and workplaces) put in place by the Government have likely contributed to the high vaccine uptake in our country. However, 80% of the interviewees stated that they got vaccinated by their own choice.

Acceptance of vaccine results from a complex decision-making process based on several determinants, including contextual factors (e.g. communication, politics, culture, barriers to accessibility), individual and group influences (e.g. beliefs and attitudes towards public health interventions, trust in the governments and pharmaceutical industries, awareness of the risk/benefit) and specific characteristics of the vaccine (e.g. side effects, mode of administration, vaccination schedule) [11,12]. According to the model proposed by the WHO Strategic Advisory Group of Experts (SAGE) on Immunization Working Group on Vaccine Hesitancy, the propensity to be vaccinated is a function of confidence (i.e. trust in vaccine effectiveness and safety), complacency (i.e. risk perception of the disease) and convenience (i.e. accessibility). The following sentence our survey identified confidence as a critical issue in vaccine hesitancy, with the majority of unvaccinated people expressing doubts about their effectiveness and safety. Therefore, efforts are required to enhance vaccine acceptance in the Italian population, not only for COVID-19 vaccines but also for other vaccines, when they represent a safe and effective option to prevent the avoidable consequences of an infectious disease. Much of the responsibility falls on national governments, which have the power and the duty to make vaccines accessible and acceptable [13].

A survey [14] conducted during the first two weeks of January 2021, involving occupational physicians working in Italy and participating in Facebook groups and forums on occupational medicine, documented high awareness of COVID-19-related risks and high acceptance of COVID-19 vaccines, with the majority of occupational physicians endorsing vaccination mandates for high-risk workers such as healthcare workers. However, our data claim for greater involvement of the occupational physician in reducing vaccine hesitancy and managing COVID-19 in workplaces.

Concerning the Government containment measures, almost three-quarters of Italians were in favour of them, despite their strong nature compared to most other countries [15]. For instance, the US Supreme Court ruled against testing and vaccine mandates in business with 100 or more employees, leaving mandatory vaccination only for healthcare workers [16]. At the same time, the UK Government stepped back on compulsory vaccination even for the National Health Service (NHS) employees [17].

Charging for medical care for unvaccinated people needing hospital and even ICU admission is not compatible with the Italian Constitution, nor would it be consistent with the universalistic nature of the Italian Health System. In spite of this more than 70% of people interviewed would agree with such a measure, with an age- but not a sex-related trend, ranging from 48.5% in the group aged 18-34 to 85.1% in people over 55.

This study has some limitations. Response rate was 28.3%, a value which is in line with other online surveys based on questionnaires sent by e-mail [18]. The survey sample is not fully representative of the Italian population aged 18-74 years. A comparison with Italian demographic data [19] showed a substantial oversampling of the age groups 18-34 (29.1% *vs* 24.2%) and 35-54 (46.3% *vs* 39.7%) and of highly educated individuals. This is largely expected since we collected data using a computer assisted web interview and young people and highly educated individuals more frequently participate into this kind of studies. However, by using the sampling weights, we have partly or largely accounted for this potential bias. In addition, the relatively small sample size did not allow to assess

differences between occupational categories, and to closely scrutinise healthcare workers, more exposed than others to the risk of infection and psychosocial consequences of the pandemic.

Despite these limitations, this study provides detailed and updated information on the attitudes towards COVID-19 vaccination and containment measures in Italy, including reasons for not getting vaccinated.

In conclusion, at the beginning of 2022, vaccine uptake in Italy was high, either in the general or working population. A central role of the occupational physician in the management of workers with COVID-19 is perceived as part of his duties, being desirable in order to achieve better control of the disease in occupational settings.

FUNDING: The study was supported by the Italian Society of Occupational Medicine.

DECLARATION OF INTEREST: The authors declare no conflict of interest.

REFERENCES

- Islam N, Shkolnikov VM, Acosta RJ, et al. Excess deaths associated with covid-19 pandemic in 2020: Age and sex disaggregated time series analysis in 29 high income countries. *BMJ*. 2021;373. doi:10.1136/bmj.n1137
- Alicandro G, La Vecchia C, Remuzzi G, Gerli A, Centanni S. Excess mortality in Italy in 2020 by sex and age groups accounting for demographic changes and temporal trends in mortality. *Panminerva Med*. Published online 2021. doi:10.23736/s0031-0808.21.04397-4
- Alicandro G, Remuzzi G, Centanni S, Gerli A, La Vecchia C. Excess total mortality in 2021 in Italy was about one third of that observed in 2020. *Med del Lav*. 2021;112(6):414-421. doi:10.23749/mdl.v112i6.12601
- Achilleos S, Quattrocchi A, Gabel J, et al. Excess all-cause mortality and COVID-19-related mortality: a temporal analysis in 22 countries, from January until August 2020. *Int J Epidemiol*. 2022;51(1):35-53. doi:10.1093/ije/dyab123
- Ministero della Salute. Report vaccini anti-Covid19. Covid-19-open-data vaccini. <https://github.com/italia/covid19-opendata-vaccini/tree/master/dati>
- World Health Organization. Survey tool and guidance. Rapid, simple, flexible behavioural insights on COVID-19. Accessed March 10, 2022. https://www.euro.who.int/__data/assets/pdf_file/0007/436705/COVID-19-survey-tool-and-guidance.pdf
- Rao JNK, Scott AJ. The analysis of categorical data from complex sample surveys: Chi-squared tests for goodness of fit and independence in two-way tables. *J Am Stat Assoc*. 1981;76(374):221-230. doi:10.1080/01621459.1981.10477633
- Negri E, Scarpino V, La Vecchia C. Prevalence of COVID-19-like symptoms in Italy and Lombardy, March-April 2020, and their implications on cancer prevention, diagnosis and management. *Eur J Cancer Prev*. 2021;30(2):123-125. doi:10.1097/CEJ.0000000000000604
- La Vecchia C, Negri E, Alicandro G, Scarpino V. Attitudes towards influenza vaccine and a potential COVID-19 vaccine in Italy and differences across occupational groups, September 2020. *Med Lav*. 2020;111(6):445-448. doi:10.23749/mdl.v111i6.10813
- European Centre for Disease Prevention and Control. Covid-19 Vaccine Tracker. Published 2022. Accessed February 18, 2022. <https://qap.ecdc.europa.eu/public/extensions/COVID-19/vaccine-tracker.html#uptake-tab>
- MacDonald NE, Eskola J, Liang X, et al. Vaccine hesitancy: Definition, scope and determinants. *Vaccine*. 2015;33(34):4161-4164. doi:10.1016/j.vaccine.2015.04.036
- Wang VH-C, Silver D, Pagán JA. Generational differences in beliefs about COVID-19 vaccines. *Prev Med (Baltim)*. Published online February 2022:107005. doi:10.1016/J.YPMED.2022.107005
- Attwell K, Hannah A, Leask J. COVID-19: talk of “vaccine hesitancy” lets governments off the hook. *Nature*. 2022;602(7898):574-577. doi:10.1038/D41586-022-00495-8
- Riccò M, Ferraro P, Peruzzi S, Balzarini F, Ranzieri S. Mandate or not mandate: Knowledge, attitudes, and practices of Italian occupational physicians towards SARS-CoV-2 immunization at the beginning of vaccination campaign. *Vaccines*. 2021;9(8). doi:10.3390/vaccines9080889
- European Centre for Disease Prevention and Control. Data on country response measures to COVID-19. Accessed February 25, 2022. <https://www.ecdc.europa.eu/en/publications-data/download-data-response-measures-covid-19>
- Gostin LO, Parmet WE, Rosenbaum S. The US Supreme Court's Rulings on Large Business and Health Care Worker Vaccine Mandates. *Jama*. 2022;327(8). doi:10.1001/jama.2022.0852
- Iacobucci G. Covid-19: Government abandons mandatory vaccination of NHS staff. *Bmj*. 2022;376:o269. doi:10.1136/bmj.o269
- Nulty DD. The adequacy of response rates to online and paper surveys: What can be done? *Assess Eval High Educ*. 2008;33(3):301-314. doi:10.1080/02602930701293231
- Istituto Nazionale di Statistica. Demografia in cifre. Popolazione Residente 2021. Accessed March 10, 2022. <https://demo.istat.it/popres/index.php?anno=2021&lingua=ita>