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MAJOR ARTICLE

Health Care Workers' Sick Leave due to COVID-19 Vaccination in Context With SARS-CoV-2 Infection and Quarantine—A Multicenter Cross-Sectional Survey

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Background. Reactogenicity of coronavirus disease 2019 (COVID-19) vaccines can result in inability to work. The object of this study was to evaluate health care workers' sick leave after COVID-19 vaccination and to compare it with sick leave due to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection and quarantine leave.

Methods. A multicenter cross-sectional survey was conducted at Regensburg University Medical Center and 10 teaching hospitals in South-East Germany from July 28 to October 15, 2021.

Results. Of 2662 participants, 2309 (91.8%) were fully vaccinated without a history of SARS-CoV-2 infection. Sick leave after first/second vaccination occurred in 239 (10.4%) and 539 (23.3%) participants. In multivariable logistic regression, the adjusted odds ratio for sick leave after first/second vaccination compared with BNT162b2 was 2.26/3.72 for mRNA-1237 (95% CI, 1.28–4.01/1.99–6.96) and 27.82/0.48 for ChAdOx1-S (95% CI, 19.12–40.48/0.24–0.96). The actual median sick leave (interquartile range [IQR]) was 1 (0–2) day after any vaccination. Two hundred fifty-one participants (9.4%) reported a history of SARS-CoV-2 infection (median sick leave [IQR] 14 [10–21] days), 353 (13.3%) were quarantined at least once (median quarantine leave [IQR], 14 [10–14] days). Sick leave due to SARS-CoV-2 infection (4642 days) and quarantine leave (4710 days) accounted for 7.7 times more loss of workforce than actual sick leave after first and second vaccination (1216 days) in all fully vaccinated participants.

Conclusions. Sick leave after COVID-19 vaccination is frequent and is associated with the vaccine applied. COVID-19 vaccination should reduce the much higher proportion of loss of workforce due to SARS-CoV-2 infection and quarantine.

Keywords. COVID-19; quarantine; SARS-CoV-2 infection; sick leave; vaccine reactogenicity.

In December 2020, a vaccination campaign unique in history was started. Health care workers were prioritized to get vaccinated against coronavirus disease 2019 (COVID-19) because of an increased risk of personal infection and transmission to vulnerable patients [1]. Currently, 4 COVID-19 vaccines are approved and broadly used in the European Union (EU): BNT162b2 (Comirnaty from BioNTech/Pfizer), mRNA-1273 (Spikevax from Moderna), ChAdOx1-S (Vaxzevria from AstraZeneca), and Ad26.COV2-S (COVID-19 Vaccine Janssen from Janssen-Cilag) [2]. Recently, NVX-CoV2373 (Nuvaxovid from Novavax) has been authorized across the EU [3].

The reactogenicity profiles of the COVID-19 vaccines are similar, with the vast majority of reported adverse events in the mild local and systemic category [4, 5]. Whereas the vector vaccine ChAdOx1-S caused more adverse reactions after first vaccination, the mRNA vaccines BNT162b2 and mRNA-1273 provoked more adverse reactions after second vaccination [6–8]. When conducting a study on reactogenicity and immunogenicity of the BNT162b2 vaccine in health care workers, we realized that sick leave due to adverse reactions after vaccination was considerable, with 32 (4.3%) and 249 (33.9%) of vaccinees unable to work after first and second vaccination (n = 735) [9].

Received 20 January 2022; editorial decision 7 April 2022; accepted 11 April 2022; published online 14 April 2022

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https://doi.org/10.1093/ofid/ofac203

Next to adverse reactions after vaccination, COVID-19-related absences from work include severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection and quarantine. The isolation period for SARS-CoV-2 infection in Germany was generally 14 days during the study period and has been reduced recently [10, 11]. The regulations for quarantine leave after close contact with a SARS-CoV-2-positive case have changed several times in Germany. During the study, if someone was fully vaccinated or had a history of SARS-CoV-2 infection within the last 6 months, no quarantine was imposed. For SARS-CoV-2-naïve persons with a close contact, quarantine was initially 14 days and got reduced to 10 days in September, with the option to be shortened by a negative polymerase chain reaction (PCR) test or antigen test at 5 or 7 days [12].

The present study aimed to further evaluate sick leave due to severe adverse reactions after COVID-19 vaccination in health care workers and to compare it with sick leave due to SARS-CoV-2 infection and quarantine leave.

METHODS

Study Design and Participants

From July 28 to October 15, we conducted a cross-sectional survey among hospital employees at Regensburg University Medical Center and its 10 participating teaching hospitals (Supplementary Table 1).

The survey was carried out by distributing paper tickets that provided electronic access to an online survey (Supplementary Figure 1). This method was previously used to evaluate health care workers' attitudes toward COVID-19 vaccination in our hospital [13]. A ticket contained both a unique QR code and a unique access code for the survey website. The survey could be accessed either with an electronic device via a QR code or by visiting the survey website using the access code, thus ensuring anonymity of the participants and preventing multi-use.

We defined health care workers as all hospital employees including clinical administrative staff and further personnel without patient contact.

Survey Content

We developed an 87-item survey evaluating health care workers' experiences with COVID-19 vaccination, SARS-CoV-2 infection, and quarantine (Supplementary Table 2).

Demographic Characteristics

Demographic characteristics of health care workers included age group, sex, hospital, occupational activity (categorized into nurse/physician/other occupation with direct patient contact and other occupation without direct patient contact), height in centimeters, weight in kilograms, smoking, presence of any chronic disease, and immunosuppression.

COVID-19 Vaccination

Survey participants were asked whether they were fully vaccinated against COVID-19. According to German regulations, full vaccination during the study period was defined as 2 vaccinations with an mRNA vaccine or ChAdOx1-S, a heterologous combination of ChAdOx1-S with an mRNA vaccine, 1 vaccination with Ad26.COV2-S, or 1 vaccination with any approved COVID-19 vaccine 6 months after a laboratory-confirmed SARS-CoV-2 infection. The recommendation to administer only 1 vaccination after a history of SARS-CoV-2 infection was given late March 2021; therefore, there may be both vaccinees with 1 and 2 vaccinations after a history of SARS-CoV-2 in the study population [14]. If not fully vaccinated, participants were asked if they were within the vaccination process, whether they were willing to get vaccinated, and, if not, what was the main reason for refusal.

If fully vaccinated, it was asked if the decision for getting vaccinated was easy to make and if they were willing to get a booster vaccination, which COVID-19 vaccines had been applied, whether the vaccinees had taken antipyretic medication before or after vaccination and which, whether they had experienced adverse reactions after first and second vaccinations categorized as mild (defined as only local on the injection side), moderate (not further classified), and severe (defined as any symptom[s] resulting in sick leave).

Those with severe adverse reactions (ie, resulting in sick leave) were asked to state how many days they would have been unable to go to work independently if the following days were working days or days off (potential sick leave). They were additionally asked how many days they actually were on sick leave (actual sick leave) and whether they had to see a doctor.

SARS-CoV-2 Infection and Quarantine

All survey participants were asked whether they had ever had COVID-19. In German colloquial language, the term "SARS-CoV-2 infection" is not used—COVID-19 generally includes both asymptomatic SARS-CoV-2 infection and symptomatic COVID-19. No classification of asymptomatic or symptomatic course was done. They were further asked whether they ever were in quarantine because of a close contact with a SARS-CoV-2 case and, if yes, how often. In both cases, they stated the potential infectious source (patient/colleague/family/friend/other/unknown) and the number of days they were off work. Participants with a history of SARS-CoV-2 infection reported whether they were hospitalized, suffered from long COVID symptoms, and, if yes, what symptoms they had and whether these symptoms impaired their working life.

Technical Information and Statistics

The survey was programmed in REDCap, a web-based clinical data management system hosted by the University of

Regensburg [15]. Statistical analysis was performed using Stata 16 (StataCorp LLC, College Station, TX, USA).

We completed descriptive statistics to analyze frequencies of demographic characteristics, occupational activity, and individual health factors. For those fully vaccinated without a history of SARS-CoV-2 infection, descriptive statistics were performed to further evaluate vaccination-related variables. Summary statistics were performed to calculate the median body mass index (BMI) and days off work as a result of adverse reactions after COVID-19 vaccination, SARS-CoV-2 infection, and quarantine leave. Univariate logistic regression was performed on variables previously described as potentially influencing reactogenicity of vaccines (ie, age, sex, occupational activity, vaccine type, BMI, underlying diseases, antipyretic medication before vaccination). Multivariable logistic regression was performed on the effect of vaccine type on severe adverse reactions resulting in sick leave after first and second vaccination after controlling for confounding. Data were analyzed from November to December 2021.

RESULTS

Baseline Characteristics

A total of 19 173 tickets were distributed to health care workers in 11 hospitals in Southeast Germany; 2662 responses were generated (response rate, 13.9%). Participants were from all working age groups. Most survey participants were female (72.3%). The majority were nurses (34.4%). Any chronic disease was reported by 22.2%, and immunosuppression by 2.7%. The vast majority were fully vaccinated against COVID-19 (94.5%). Baseline characteristics of survey participants are shown in Table 1.

Table 1. Baseline Characteristics of Survey Participants

Variable	No. (%) (n = 2662)[a]
Age group	
15–29 y	645 (24.2)
30–39 y	571 (21.5)
40–49 y	557 (20.9)
50–59 y	680 (25.5)
60–69 y	205 (7.7)
Missing	4 (0.2)
Sex	
Male	731 (27.5)
Female	1926 (72.4)
Divers	1 (0.0)
Missing	4 (0.2)
Occupational activity	
Nurse	915 (34.4)
Physician	439 (16.5)
Other occupation with patient contact[b]	514 (19.3)
Other occupation without patient contact[c]	790 (29.7)
Missing	4 (0.2)
BMI (n = 2628),[d] median (IQR), kg/m^2	24.5 (21.9–27.8)
Smoking[e]	427 (16.0)
Any chronic disease[e]	591 (22.2)
Immunosuppression[e]	71 (2.7)
History of SARS-CoV-2 infection	251 (9.4)
History of SARS-CoV-2 quarantine	353 (13.3)
COVID-19 vaccination	
Fully vaccinated	2515 (94.5)
Fully vaccinated with no history of SARS-CoV-2 infection	2309 (91.8, n = 2515)
History of SARS-CoV-2 infection and 1 or 2 vaccinations[f]	206 (8.2, n = 2515)
No vaccination because of a history of SARS-CoV-2 infection within the last 6 mo	27 (1.0)
Within the vaccination process	14 (0.5)
Willing to get vaccinated	14 (0.5)
Not willing to get vaccinated	92 (3.5)

Abbreviations: BMI, body mass index; COVID-19, coronavirus disease 2019; IQR, interquartile range; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

[a]Percentages may not total 100 because of rounding.

[b]For example, diabetes consultation, social services, physiotherapy, etc.

[c]For example, administration, technical services, laboratory staff, etc.

[d]One implausible value recoded to missing.

[e]Four missing values.

[f]German regulations recommended in March 2021 that vaccinees with a history of SARS-CoV-2 infection only needed 1 COVID-19 vaccination 6 months after SARS-CoV-2 infection to be regarded as fully vaccinated [14].

COVID-19 Vaccination

A total of 2309 fully vaccinated participants with no history of SARS-CoV-2 infection were included in further analyses (Table 2). Antipyretic medication was taken by about 7% of survey participants before any vaccination. BNT162b2 was the vaccine predominantly applied in first (73.5%) and second (81.5%) vaccination. ChAdOx1-S administration decreased from first (15.3%) to second (5.0%) vaccination; the reduction was probably attributable to a recommendation for heterologous vaccine combinations after ChAdOx1-S prime because of incidents with thrombosis with thrombocytopenia syndrome [16]. The detailed vaccine combinations are listed in the Supplementary Data (Supplementary Table 3). In total, more participants suffered from any type of adverse reaction after second vaccination (61.6%) compared with first vaccination (46.5%). Consequently, sick leave as a result of severe adverse reactions occurred more often after second (23.3%) than after first vaccination (10.4%). Despite a high rate of adverse reactions, most vaccinees would have been willing to get a booster vaccination (90.6%).

Sick Leave After COVID-19 Vaccination

In univariate logistic regression, older age groups age 50 years and above took significantly less sick leave after any COVID-19 vaccination compared with those age <30 years (Table 3). The odds of sick leave after first and second vaccination were significantly higher in females compared with males (after first vaccination: odds ratio [OR], 1.69; 95% CI, 1.21–2.35; after second

Table 2. Characteristics of COVID-19 Vaccination in Fully Vaccinated Participants Without a History of SARS-CoV-2 Infection

Variable	No. (%) (n = 2309)[a]
Antipyretic medication before first vaccination	162 (7.0)[b]
Antipyretic medication before second vaccination	173 (7.5)[c]
Willingness to get COVID-19 booster vaccination	2093 (90.6)
First vaccine	
BNT162b2	1696 (73.5)
mRNA-1273	251 (10.9)
ChAdOx1-S	354 (15.3)
Ad26.COV2-S	6 (0.3)
Missing	2 (0.1)
Second vaccine[d]	
BNT162b2	1881 (81.5)
mRNA-1273	303 (13.1)
ChAdOx1-S	116 (5.0)
No second vaccination because of Ad26.COV2-S	6 (0.3)
Missing	3 (0.1)
Adverse reactions after first vaccination	
No	1232 (53.4)
Mild (only local on injection side)	444 (19.2)
Moderate	391 (16.9)
Severe (resulting in sick leave)	239 (10.4)
Missing	3 (0.1)
Adverse reactions after second vaccination	
No	880 (38.1)
Mild (only local on injection side)	287 (12.4)
Moderate	596 (25.8)
Severe (resulting in sick leave)	539 (23.3)
Missing	7 (0.3)

Abbreviations: COVID-19, coronavirus disease 2019; IQR, interquartile range; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

[a]Percentages may not total 100 because of rounding.

[b]Three missing values.

[c]Seven missing values.

[d]One implausible value recoded to missing.

vaccination: OR, 1.50; 95% CI, 1.20–1.89). Compared with nurses, there was significantly less sick leave in physicians after both vaccinations (OR, 0.58/0.59, respectively; 95% CI, 0.36–0.95 after first and 0.43–0.80 after second vaccination). There was strong evidence for an association between sick leave and vaccine type after first and second vaccination. There was no evidence of an association between sick leave after first or second vaccination and BMI, any chronic disease, immunosuppression, or antipyretic medication before second vaccination.

Sick Leave After COVID-19 Vaccination According to Vaccine

In multivariable logistic regression analyses, severe adverse reactions resulting in sick leave after first and second COVID-19 vaccination were described in reference to BNT162b2 (Table 4). After adjusting for confounders, the odds ratio of sick leave after first/second vaccination was 2.26/3.72 for mRNA-1273 (95% CI, 1.28–4.01/1.99–6.96), 27.82/0.48 for ChAdOx1-S (95% CI, 19.12–40.48/0.24–0.96), and 28.84 for Ad26.COV2-S (95% CI, 5.50–151.19) vaccinees.

Loss of Workforce due to COVID-19 Vaccination, SARS-CoV-2 Infection, and SARS-CoV-2 Quarantine Leave

Two hundred fifty-one survey participants (9.4%) reported a history of SARS-CoV-2 infection, and 353 (13.3%) reported having been in SARS-CoV-2 quarantine, with quarantine also occurring more than once. The most important suspected source of SARS-CoV-2 infection was patients (47.8%). The risk contacts for SARS-CoV-2 quarantine were predominantly exposure to SARS-CoV-2-positive family members (36.1%) and colleagues (23.1%). Long COVID symptoms were reported by 112 (44.6%) convalesced individuals, and 63 (25.1%) reported that these symptoms impaired their working life. These and further details on SARS-CoV-2 infection and quarantine in study participants are provided in Supplementary Table 4.

In fully vaccinated participants without a history of SARS-CoV-2 infection, the median number of days of potential sick leave after first (n = 239) and second (n = 538) vaccination (interquartile range [IQR]) was 2 (1–3). The median number of actual sick days (IQR) was 1 (0–2) day. Similar results were shown for fully vaccinated participants with a history of SARS-CoV-2 infection (different sequences of infection and vaccination possible in the study population). The median number of sick days after SARS-CoV-2 infection and quarantine leave (IQR) was 14 (10–21 [infection], 10–14 [quarantine]) days. When comparing total days off work due to SARS-CoV-2 infection (4642 days) and quarantine (4710 days), loss of workforce was 7.7 times higher than through actual sick leave (1216 days) in all fully vaccinated study participants (Table 5).

DISCUSSION

This cross-sectional survey study describes the loss of workforce in health care workers due to severe adverse reactions after COVID-19 vaccination resulting in sick leave and puts it in context with loss of workforce due to SARS-CoV-2 infection and SARS-CoV-2 quarantine.

Vaccine reactogenicity is dependent on different factors, and symptoms are often perceived differently [17]. We used a simplified classification of adverse reactions—no, mild, moderate, and severe resulting in sick leave—to assess the extent of sick leave after COVID-19 vaccination. Our results are in line with general vaccine reactogenicity data. More frequent and severe local and systemic reactions to vaccines are reported by females [18]. Less reactogenicity is reported with rising age, possibly due to higher tolerance to pain and illness symptoms and a waning innate immune defense [17]. Education level is described as significantly associated with duration of symptoms after a second COVID-19 vaccination [19].

The present analysis of sick leave dependent on vaccine confirms safety data on the 3 most used vaccines—BNT162b2, mRNA-1273, and ChAdOx1-S [4, 6–8]. We found that

Table 3. Univariate Logistic Regression on Severe Adverse Reaction Resulting in Sick Leave After First and Second COVID-19 Vaccination in Fully Vaccinated Participants Without a History of SARS-CoV-2 Infection

	Sick Leave After First Vaccination[a]		Sick Leave After Second Vaccination[a]	
	Total (%) (n = 239)	Crude OR (95% CI)	Total (%) (n = 539)	Crude OR (95% CI)
Age group				
15–29 y (reference)	72 (30.1)	1	155 (28.8)	1
30–39 y	53 (22.2)	0.77 (0.53–1.13)	119 (22.1)	0.78 (0.59–1.03)
40–49 y	50 (20.9)	0.72 (0.49–1.06)	129 (23.9)	0.86 (0.66–1.13)
50–59 y	55 (23.0)	**0.64 (0.44–0.93)**	112 (20.8)	**0.55 (0.42–0.73)**
60–69 y	9 (3.8)	**0.33 (0.16–0.67)**	24 (4.5)	**0.36 (0.23–0.57)**
Sex				
Male (reference)	47 (19.7)	1	120 (22.3)	1
Female	191 (79.9)	**1.69 (1.21–2.35)**	419 (77.7)	**1.50 (1.20–1.89)**
Divers	1 (0.4)	…	0	…
Occupational activity				
Nurse (reference)	71 (29.7)	1	193 (35.8)	1
Physician	23 (9.6)	**0.58 (0.36–0.95)**	68 (12.6)	**0.59 (0.43–0.80)**
Other occupation with direct patient contact	54 (22.6)	1.27 (0.87–1.85)	110 (20.4)	0.90 (0.69–1.18)
Other occupation without direct patient contact	91 (38.1)	1.37 (0.99–1.91)	168 (31.2)	0.87 (0.68–1.10)
Vaccine				
BNT162b2 (reference)	51 (21.3)	1	408 (75.7)	1
mRNA-1273	18 (7.5)	**2.49 (1.43–4.34)**	120 (22.3)	**2.37 (1.83–3.06)**
ChAdOx1-S	167 (69.9)	**28.94 (20.43–41.00)**	11 (2.0)	**0.38 (0.20–0.71)**
Ad26.COV2-S	3 (1.3)	**32.24 (6.35–163.60)**	…	…
BMI (n = 237/535)	…	1.00 (0.97–1.02)	…	0.98 (0.96–1.00)
Any chronic disease	58 (24.3)	1.13 (0.83–1.55)	135 (25.0)	1.22 (0.98–1.53)
Immunosuppression	7 (2.9)	1.19 (0.54–2.66)	13 (2.4)	0.94 (0.50–1.76)
Antipyretic medication before first vaccination	55 (23.0)	**5.48 (3.83–7.84)**	…	…
Antipyretic medication before second vaccination	…	…	43 (8.0)	1.09 (0.76–1.56)

Significant ORs (95% CI) are presented in bold.

Abbreviations: BMI, body mass index; COVID-19, coronavirus disease 2019; OR, odds ratio; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

[a]Percentages may not total 100 because of rounding.

BNT162b2 was the least associated with sick leave after first vaccination. Although ChAdOx1-S showed the most favorable results after second vaccination, this fact may be of no benefit in the future as German authorities recommend a heterologous vaccination scheme after priming with ChAdOx1-S [16].

There are few studies focusing on the phenomenon of sick leave after COVID-19 vaccination. A US survey found that 27.8% of participants required transient time off from work after mRNA-1273 vaccination and 12.3% after BNT162b2 vaccination [20, 21]. Another study in health care workers reported sick leave after prime/boost vaccination in 7.6%/22.7% of BNT162b2 vaccinees and 11.5%/56.8% of mRNA-1273 vaccinees [22]. Sick leave after heterologous vaccination with ChAdOx1-S/BNT162b2 was described as 66.3% after first and 31.7% after second vaccination [23]. The loss of workforce because of severe adverse reactions after COVID-19 vaccination prompted the US Centers for Disease Control and Prevention to recommend staggering delivery of vaccine to health care workers and planning time away from work if systemic symptoms occurred after COVID-19 vaccination [24]. We also decided to include potential and actual sick leave after vaccination to be able to account for planned days off.

Vaccine safety outcomes are difficult to compare among studies [25]. Sick leave after vaccination may be an additional variable to be included in future vaccine safety studies to enable a quantitative comparison of vaccine reactogenicity in the working population.

We excluded vaccinees with a history of SARS-CoV-2 infection from the logistic regression analysis as reactogenicity of COVID-19 vaccines in those with preexisting immunity is different, with often more systemic adverse reactions [26, 27].

Absences caused by SARS-CoV-2 infection and quarantine are long, with a median of 14 days in our survey. A study describing medical leave associated with COVID-19 among emergency medical system responders and firefighters in New York City found a mean medical leave duration of 25.3 days for reverse transcription PCR–confirmed SARS-CoV-2 infection [28]. The median duration of COVID-19 sick leave in a national Swedish cohort study was 35 days [29]. Spanish data reported a 116% increase in sick leave in March 2020, mainly due to infectious and respiratory diseases, with the

Table 4. Multivariable Logistic Regression of Severe Adverse Reactions Resulting in Sick Leave After First and Second COVID-19 Vaccination by Vaccine Type in Fully Vaccinated Participants Without a History of SARS-CoV-2 Infection

	Adjusted OR	95% CI	*P*-value
Severe adverse reaction leave after first vaccination[a]			
BNT162b2 (reference)	1		
mRNA-1273	2.26	1.28–4.01	.005
ChAdOx1-S	27.82	19.12–40.48	<.001
Ad26.COV2-S	28.84	5.50–151.19	<.001
Severe adverse reaction after second vaccination[b]			
BNT162b2 (reference)	1		
mRNA-1273	3.72	1.99–6.96	<.001
ChAdOx1-S	0.48	0.24–0.96	.038

Abbreviations: BMI, body mass index; COVID-19, coronavirus disease 2019; OR, odds ratio; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

[a]Adjusted for age, sex, BMI, occupational activity, any chronic disease, immunosuppression, antipyretic medication before first vaccination.

[b]Adjusted for age, sex, BMI, occupational activity, any chronic disease, immunosuppression, antipyretic medication before second vaccination, vaccine received in first vaccination.

Table 5. Comparison of Length of Sick Leave After COVID-19 Vaccination, SARS-CoV-2 Infection, and SARS-CoV-2 Quarantine

	Median (IQR) No.	Summary
Sick leave in vaccinees *without* a history of SARS-CoV-2 infection		
Potential sick leave in days[a]		
After first vaccination	2 (1–3) n = 239	639
After second vaccination	2 (1–3) n = 538[c]	1292
Actual sick leave in days[b]		
After first vaccination	1 (0–2) n = 239	333
After second vaccination	1 (0–2) n = 538[c]	770
Sick leave in vaccinees *with* a history of SARS-CoV-2 infection[d]		
Potential sick leave in days[a]		
After first vaccination	2 (2–4) n = 41	138
After second vaccination	2 (1.5–4) n = 24	65
Actual sick leave in days[b]		
After first vaccination	1 (1–2) n = 41	82
After second vaccination	1 (0–2) n = 24	31
Sick leave because of SARS-CoV-2 infection	14 (10–21)[c] n = 250	4642
Sick leave because of SARS-CoV-2 quarantine	14 (10–14)[c] n = 352	4710

Abbreviations: COVID-19, coronavirus disease 2019; IQR, interquartile range; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

[a]Survey participants were asked how many days they would have been unable to go to work because of COVID-19 vaccination–associated adverse reactions if the vaccination day was followed by days off (weekend, holidays, etc.).

[b]Survey participants were asked how many days they actually were on sick leave.

[c]One implausible value recoded to missing.

[d]SARS-CoV-2 infection may have occurred before, during, or after the vaccination process.

highest increase (457%) observed among health-related workers [30]. There are hardly any quantitative data on other COVID-19-related absences. An international cross-sectional study among surgeons found that during the first 10 weeks of the pandemic, the proportion of surgeons absent because of isolation, shielding, and family care was higher than the proportion sick with COVID-19 [31]. COVID-19 vaccination may help to directly reduce loss of workforce due to SARS-CoV-2 infection and quarantine in health care settings and elsewhere. Among the 251 survey participants who reported a history of SARS-CoV-2 infection, nearly half of them suffered from long COVID symptoms, and about one-quarter described their working life as impaired by those symptoms, a long-term burden possibly largely preventable by COVID-19 vaccination.

Limitations

The study is subject to limitations. First, the response rate was low (13.9%), which makes the results prone to selection bias. In our survey, we linked severe adverse reactions and sick leave. Therefore, the option to report sick leave was not possible for vaccinees with mild or moderate adverse reactions. As there is sick pay in Germany, this link might have resulted in misinterpretation of vaccine reactogenicity. We also did not assess half-days for sick leave that may have occurred in vaccinees who got their vaccination early in the morning and fell sick sometime later but were able to return to work the following day. This is possibly the reason why some vaccinees who reported sick leave after vaccination indicated 0 days off. Because of different vaccine reactogenicity in seropositive and seronegative vaccinees and 2 vaccination strategies for people with a laboratory-confirmed SARS-CoV-2 infection, we decided to focus the logistic regression analysis on vaccine reactogenicity in participants without a history of SARS-CoV-2 infection. Yet, we cannot rule out that unwittingly seropositive vaccinees were included in our analysis. For the majority of participants with a history of SARS-CoV-2 infection who were fully vaccinated, we did not know whether the infection occurred before, during, or after the vaccination. Finally, there are other causes of pandemic-induced loss of workforce not addressed in the study, for example, the necessity to care for quarantined or SARS-CoV-2-positive children and relatives or compulsory quarantine after entry from a country with a high SARS-CoV-2 incidence.

Supplementary Data

Supplementary materials are available at Open Forum Infectious Diseases online. Consisting of data provided by the authors to benefit the reader, the posted materials are not copyedited and are the sole responsibility of the authors, so questions or comments should be addressed to the corresponding author.

Acknowledgments

We would like to thank Marion Schweiger for graphical support in designing the tickets and Edith Faltermeier for logistic support in delivering the tickets.

Financial support. This research received no external funding.

Potential conflicts of interest. B.S.: advisory boards (GSK and SANOFI), lecture fees from Falk Foundation. F.H.: travel grants from

Gilead Sciences, lecture fees from MSD Sharp & Dohme. A.M.: travel grants from Gilead Sciences. All other authors report no potential conflicts.

All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

Author contributions. S.B., G.H., F.H., and B.S. conceived and designed the study. L.H., S.P., H.H., W.S., M.W., S.S., K.K., C.P., N.K., D.D., and N.Z. collected the data. S.B. and K.M. performed the analysis. S.B., F.H., A.M., B.M.J.L., and B.S. wrote the paper.

Ethics approval and participant consent. The study was performed in accordance with the ethical standards of the Helsinki Declaration. It was approved by the ethics committee of the University of Regensburg (Ref. number: 21-2479-101). No consent was obtained as the data were collected and analyzed anonymously.

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