



COVID-19-Impfung: Stand und Impfbereitschaft von Beschäftigten im Gesundheits- und Sozialwesen in Deutschland

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Abstrakt

Beschäftigte im Gesundheitswesen sind aufgrund ihrer beruflichen Exposition gegenüber SARS-CoV-2 besonders gefährdet. Daher gehören sie zur Impfgruppe mit der höchsten Priorität. Frühere Studien zeigen jedoch, dass insbesondere das Pflegepersonal mit einer Impfung zurückhaltend ist. Diese Studie zeigt das aktuelle Bild in Bezug auf Impfstatus, Bereitschaft, Impfpräferenz und Gründe für oder gegen eine COVID-19-Impfung bei Gesundheits- und Sozialarbeitern. Zwischen dem 4. März und dem 10. April 2021 wurde eine Online-Umfrage unter Berufsverbänden und Anbietern von Gesundheits- und Sozialdiensten durchgeführt. Datensätze von $n = 3401$ Teilnehmer wurden analysiert. Davon gaben 62 % an, bereits mindestens einmal geimpft worden zu sein. Weitere 22 % wollten sich impfen lassen, 6,6 % zögerten noch und 9 % lehnten eine Impfung ab. Bevorzugt wurden überwiegend mRNA-basierte Impfstoffe. Insgesamt zeigte sich über alle Berufsgruppen und Arbeitsfelder hinweg eine hohe Impfquote und eine große Impfbereitschaft (>80 %). Bei den Pflegekräften waren es insgesamt 83,5 %. Am höchsten war der Anteil in der Altenpflege mit 87,5 %. Entgegen früherer Erhebungen ist die Impfbereitschaft im Verlauf der Impfkampagne in Deutschland in allen Berufsgruppen gestiegen.

Schlüsselwörter: COVID-19-Impfung, Impfbereitschaft, Gesundheitspersonal, Impfpräferenz, Online-Umfrage, Arbeitsmedizin

1. Einleitung

Nachdem die WHO COVID-19 im März 2020 zur Pandemie erklärt hatte, wurde intensiv an Impfstoffen gegen SARS-CoV-2 geforscht [1]. Innerhalb eines Jahres wurden vier Impfstoffe mit zwei unterschiedlichen Wirkmechanismen von der Europäischen Arzneimittelagentur (EMA; Stand: 11. März 2021) zugelassen [2]. Die Verunsicherung in der Bevölkerung war groß, weil die neuen Impfstoffe im Rekordtempo zugelassen wurden. Vor allem in sozialen Netzwerken wurden Befürchtungen und Fehlinformationen verbreitet, dass mRNA den genetischen Code des Menschen verändern, die Fruchtbarkeit verringern oder Krebs verursachen könnte [3]. Darüber hinaus wurde im Verlauf der Impfkampagne eine auffällige Zunahme ei-

ner bestimmten Form der seltenen zerebralen Venenthrombose (CVT) in Verbindung mit Thrombozytopenie und Blutungen nach Impfung mit dem Vaxzervria-Impfstoff beobachtet [4]. In Deutschland veranlasste dies die zuständige Stelle (Paul-Ehrlich-Institut) zum Impfstopp am 15. März 2021 [5]. Nach Überprüfung der CVT-Fälle wurde in Deutschland empfohlen, den Impfstoff auf die über 60-jährige Bevölkerung zu beschränken und Personen unter 60 Jahren, die bereits eine Dosis erhalten haben, einen mRNA-basierten Impfstoff zu geben [6].

Beschäftigte im Gesundheitswesen (HCWs) stehen im Kampf gegen die Pandemie an vorderster Front. Gerade zu Beginn der Pandemie infizierten sich viele medizinische Fachkräfte mit SARS-CoV-2. Im Jahr 2020 wurden der Weltgesundheitsorganisation (WHO) etwa 14 % der COVID-19-Fälle unter Gesundheitspersonal gemeldet. In einigen Ländern betrug der Anteil sogar 35 % [7]. Trotz erheblicher Unterschiede zwischen den Ländern und begrenzten Daten wurde die mittlere Sterblichkeitsrate unter HCW auf 0,05 Fälle pro 100.000 Einwohner des Landes geschätzt. Mit 0,35 Fällen pro 100.000 Einwohner weist Italien die höchste Sterblichkeitsrate unter HCWs in Europa auf [8]. Laut dem Nationalen Institut für Unfallversicherung in Italien (Stand: 30. September 2020) betrafen 70 % aller gemeldeten Fälle von COVID-19 den Sektor „Gesundheit und Sozialhilfe“. Die am stärksten betroffenen Berufsgruppen waren Gesundheitstechniker (39 %), gefolgt von Sozialarbeitern (20 %) und Ärzten (10 %). Für diese Berufe wurden entsprechend hohe Sterblichkeitsraten dokumentiert [9]. Eine kürzlich durchgeführte Metaanalyse zeigte, dass die Prävalenz von Krankenhauseinweisungen und Mortalität bei Gesundheitspersonal 15 % bzw. 1,5 % betrug. Das Tragen von persönlicher Schutzausrüstung (PSA) und die Schulung in der Verwendung von PSA erwiesen sich als schützend, während das Fehlen von N95/FFP2-Masken, wiederverwendete PSA und unzureichende Handhygiene Risikofaktoren für eine SARS-Cov-2-Infektion waren [10]. Als Reaktion auf diese verheerende Situation fordert die WHO einen besseren Schutz von HCWs weltweit und stellt sicher, dass alle gefährdeten HCWs geimpft werden und vorrangigen Zugang zu neu zugelassenen und verfügbaren Impfstoffen haben [7].

Die Bekämpfung einer Pandemie hängt von mehreren Faktoren ab. Neben Eindämmungsmaßnahmen, Contact Tracing und der Wirksamkeit der eingesetzten Impfstoffe ist auch die Impfbereitschaft in der Bevölkerung und insbesondere in Risikoberufen entscheidend. Ende 2020 und Anfang 2021 wurden medizinische Fachkräfte aus verschiedenen Bereichen in Deutschland zu ihrer Impfbereitschaft befragt. Die Impfbereitschaft war anfänglich eher gering (zwischen 57 % und 64 %), stieg aber im Verlauf der Impfkampagne auf 76 % an [11 , 12 , 13 , 14]. Die Akzeptanz war bei den Ärzten deutlich höher als bei den Pflegekräften (81 % vs. 71 %). Zu beiden Erhebungszeitpunkten war die Impfbereitschaft bei Männern insgesamt höher als bei Frauen (73 % bzw. 81 % vs. 54 % bzw. 73 %) [12]. Vor allem Pflegekräfte – überwiegend Frauen – gaben an, große Bedenken hinsichtlich Nebenwirkungen und Spätfolgen zu haben [13 , 15 , 16]. Eine Scoping-Überprüfung der Impfbereitschaft unter Gesundheitspersonal zeigt, dass durchschnittlich 22,5 % eine Impfung gegen COVID-19 ablehnen oder zögern. Bedenken hinsichtlich der Sicherheit, Wirksamkeit und Nebenwirkungen der Coronavirus-Impfstoffe waren die häufigsten Gründe für das Zögern oder Verweigern einer Impfung [17]. Darüber hinaus wurden Personen, die angaben, in der Vergangenheit gegen Influenza geimpft worden zu sein, mit größerer Wahrscheinlichkeit gegen COVID-19 geimpft [17 , 18 , 19].

Als die Umfrage durchgeführt wurde, waren gerade die ersten Fälle von seltenen Nebenwirkungen nach der Impfung mit Vaxzervria bekannt geworden. Die daraus resultierende Aussetzung der Impfungen und die darauf folgenden überarbeiteten Empfehlungen könnten sich auch auf die Impfbereitschaft von Beschäftigten in Pflege- und Sozialberufen ausgewirkt ha-

ben. Andere Aspekte wie die innovative Technologie, die in den mRNA-basierten Impfstoffen verwendet wird, das schnelle Zulassungsverfahren der EMA und die relativ kurzen Beobachtungszeiten nach der Impfung aus den Phase-III-Studien könnten dazu führen, dass Einzelpersonen die Impfung zögern oder ablehnen, insbesondere im Zusammenhang mit der Sicherheit der verwendeten Impfstoffe.

Ziel dieser Befragung war es, ein aktuelles Bild der Impfquoten und der Impfbereitschaft von Beschäftigten im Gesundheits- und Sozialwesen nach demografischen Faktoren, Berufsgruppe, Tätigkeitsbereich, Wohnort (nach Bundesland), Influenza-Impfstatus und zu erhaltenen Kontakt zu COVID-19-Patienten. Darüber hinaus wurden Gründe für und gegen die COVID-19-Impfung, wahrgenommene Impfbereitschaft am Arbeitsplatz, Einstellungen zur Impfpflicht und Informationsbeschaffung über COVID-19-Impfstoffe ermittelt, um während der Impfkampagne in Deutschland besser auf Bedürfnisse, Präferenzen und Bedenken eingehen zu können. Die Befragung wurde auf weitere Berufsgruppen mit hoher Impfpriorität ausgeweitet (z. B. Personal in sozialen Berufen).

2. Materialien und Methoden

2.1. Probe

Zwischen dem 4. März und dem 10. April 2021 wurde eine anonyme Online-Befragung von Beschäftigten im Gesundheits- und Sozialwesen durchgeführt. Angehörige dieser Berufe gelten primär als prioritäre Gruppe für die Impfung gegen COVID-19. Der Link zur Umfrage wurde auf der Website der Deutschen Gesetzlichen Unfallversicherung für die Gesundheits- und Wohlfahrtspflege (BGW) veröffentlicht. Auch über den monatlichen Newsletter der BGW wurde eine Teilnahmeaufforderung verschickt. Darüber hinaus wurde der Umfragelink an verschiedene Berufsverbände und Anbieter von Gesundheits- und Sozialdiensten weitergeleitet. Insgesamt haben 3429 Personen an der Online-Umfrage teilgenommen. Befragte, die keine vollständigen soziodemografischen Angaben machten oder im Ruhestand waren ($n=28$) wurden von den nachfolgenden Analysen ausgeschlossen. Damit standen uns 3401 Datensätze zur Verfügung. Eine Rücklaufquote konnte nicht berechnet werden, da im Vorfeld keine klar definierte Anzahl potenzieller Befragter ermittelt werden konnte.

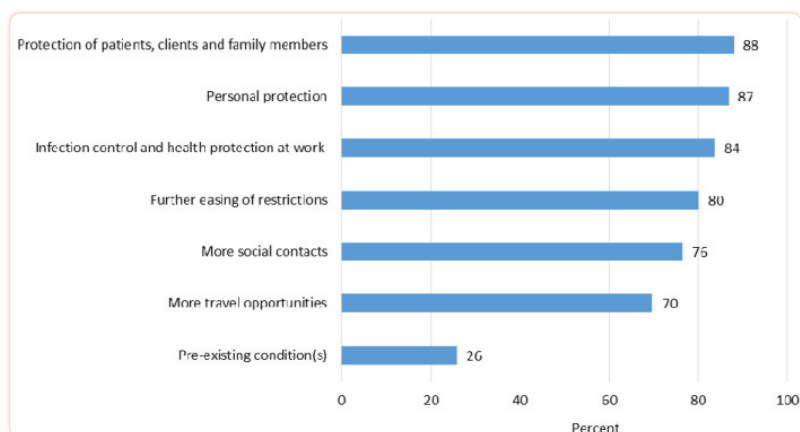
2.2. Fragebogen

Ein standardisierter Fragebogen mit 18 Fragen wurde selbst entwickelt und an 12 Personen vorgetestet, um die Verständlichkeit, Anwendbarkeit und Angemessenheit der Fragen sowie den Zeitaufwand zum Ausfüllen des Fragebogens zu beurteilen. Die im Fragebogen untersuchten Aspekte orientierten sich an Fragen aus der Praxis und zuvor durchgeführten Studien zur COVID-19-Impfstoffbereitschaft [[13](#) , [15](#) , [19](#)]. Der Fragebogen war in folgende Unterabschnitte gegliedert:

First, participants were asked about vaccination status, willingness to be vaccinated, and preference of vaccines licensed in the EU at the time of the survey. They were asked to indicate whether they had already been vaccinated at least once and, if so, which vaccines they were administered. Apart from the question concerning vaccination status, all questions were optional. Individuals who were not yet vaccinated were asked about their willingness to be vaccinated

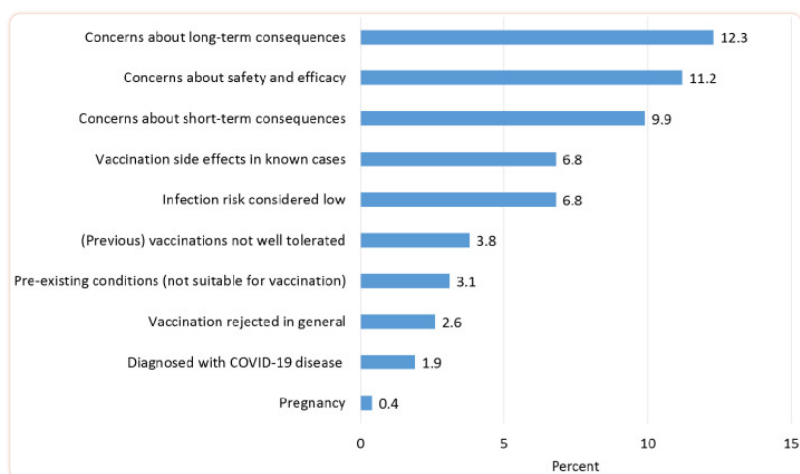
(“yes, immediately”, “rather yes, but wait and see”, “undecided”, “rather no”, “no in any case”). Finally, participants were asked, if given a choice, which vaccine they would choose (“mRNA-based,” “vector-based”, “doesn’t matter, as long as I get vaccinated,” or “with none of the mentioned vaccines”).

In the second part, we asked about motivational reasons (7 statements) and reasons for refusal or hesitation (10 statements) to receive COVID-19 vaccination (see also [Figure 1](#) and [Figure 2](#)). The questions could be answered on a 5-point Likert scale from 1 = “strongly agree” to 5 = “strongly disagree”.



[Figure 1](#)

Reasons for COVID-19 vaccination (strongly agree/agree; percentage relative to the total sample).



[Figure 2](#)

Reasons for hesitating or refusing COVID-19 vaccination (strongly agree/agree; percentage relative to the total sample).

In the third part, participants were asked to rate vaccination willingness at their facility (“high”, “moderate”, “low”, “don’t know”). If they rated vaccination readiness as moderate or low, we asked them to indicate what they thought might promote employee vaccination readiness. Six answer options were given, which could be selected in case of agreement: (1) “providing detailed information on the effectiveness and safety of the new COVID-19 vaccines”, (2) “transparent reporting on possible side effects and long-term consequences”, (3) “prolonged observation time of the vaccination process to better evaluate side effects and long-term consequences”, (4) “evidence of fewer COVID-19 cases in previously vaccinated individuals”, (5) “financial incentive”, or (6) “none of the above”. Other specific reasons and suggested measures could be entered as free text. These were grouped together in superordinate categories and evaluated based on the frequency with which they were mentioned.

According to the Robert Koch Institute, a public health institute in Germany, there are no plans for mandatory vaccination against COVID-19 [20]. We therefore asked whether the participants considered this approach to be reasonable. The response categories ranged from “yes in any case” to “no in no case”.

Personal details included gender, age, field of work, professional group, and federal state (place of residence). Respondents were also asked whether they had cared for or treated COVID-19 patients/clients in the past four weeks (response categories: “never”, “rarely”, “often”, “always”) and whether they had been vaccinated against seasonal influenza in the past five years (response categories: “every year”, “once or irregularly”, “none”).

The respondents were informed that data would be collected and analyzed anonymously and that data would only be processed with their consent. Answering the questions was voluntary and participation could be terminated at any time. Respondents were informed that the findings would be published in aggregated form. Tivian XI GmbH EFS online survey software was used for this questionnaire (Tivian XI GmbH, Köln, Germany) (<https://www.unipark.com/umfragesoftware/>, accessed on 21 June 2021).

2.3. Ethical Consideration

In accordance with the Professional Code for Physicians in Hamburg (Art. 15, 1., Status of 10 March 2014) and the Chamber Legislation for Medical Professions in the Federal State of Hamburg (HmbKGGH) it is only necessary to obtain advice on questions of professional ethics and professional conduct from an Ethics Committee if data that can be traced to a particular individual is being used in a research project. All data in this trial were collected, analyzed, and disclosed anonymously, following the terms of the German Federal Data Protection Act (BDSG) and HmbDSG.

2.4. Statistics

The data underwent descriptive analysis and frequencies were presented separately based on vaccination status and/or willingness. Group differences were examined using a chi-squared test; the significance level was set at $p < 0.05$. To explore the potential factors for vaccination hesitancy or refusal, we used a stepwise backward logistic regression analysis. All variables that had a p -value of <0.25 in the bivariate analysis were included and then the least significant variables were removed stepwise. However, gender and age were included in the analysis re-

ardless of significance level. The dependent variable was dichotomized as follows: “vaccinated or willing to be vaccinated” and “hesitant, undecided, and refusing”. SPSS version 27 was used to evaluate the data.

3. Results

3.1. Description of the Study Population

The vast majority of the respondents were women (70%) and 86% were over the age of 35. Of the respondents, 30% worked in geriatric care, 10% in nursing, 13% in disabled care, 11.3% in social work, and 35% in various other sectors (e.g., pharmacies, dentistry, therapeutic care, childcare, or hairdressing). The majority of the respondents worked in nursing (27%) and administration (29%). Medical staff accounted for a comparatively small proportion of 4.4%. At 86%, the majority of the respondents came from the former West German states ([Table 1](#)).

Table 1

Description of the study population.

	Frequency	Percent ¹
	<i>n</i>	%
Gender		
Female	2371	70.4
Male/Diverse	997	29.6
Age (years)		
<35	479	14.2
35–55	1791	52.9
>55	1114	32.9
Professional group		
Nursing staff	908	27.1
Medical staff	148	4.4
Therapeutic staff	353	10.5
Administrative staff	967	28.9
Educational/support staff	541	16.2
Body-related service staff	72	2.2
Other professions	359	10.7
Field of work		
Geriatric care	1018	30.1
Nursing	352	10.4
Work with disabled people	453	13.4
Social work	381	11.3
Other areas	1173	34.7
Federal states		
Western states	2897	85.9
Eastern states	476	14.1

Note: ¹ Valid percentages. Missing values: gender ($n = 33$, 1%), age ($n = 17$, 0.5%), professional group ($n = 53$, 1.6%), working field ($n = 24$, 0.7%), federal states ($n = 28$, 0.8%).

3.2. Vaccination Status, Vaccination Willingness, and Vaccine Preference

On the time of the survey, 62% of the participants had received at least one dose of a vaccine. BioNTech/Pfizer (54%) and AstraZeneca (41%) were the most frequently administered vaccines. A further 22% wanted to be vaccinated as soon as possible, 7% were hesitating or undeci-

ded, and 9% were inclined to refuse or had completely ruled out having a COVID-19 vaccination.

Those who were not vaccinated at the time of the study preferred mRNA-based vaccines (55%); few preferred vector-based vaccines (2%). Meanwhile, 23% had no preference (they just wanted to be vaccinated) and a further 21% did not want to be inoculated with any of the vaccines available at the time of the survey. The suspension of Vaxzervria (AstraZeneca) vaccinations on 15 March 2021 did not have a significant impact on the participants' vaccination willingness, but it did affect their choice of vaccine. Prior to the suspension, 48% of respondents wanted to receive an mRNA vaccine. Afterwards, the figure stood at 57%. While 4% preferred viral vector vaccines beforehand, only 1.2% did afterwards (no Table).

The proportion of vaccinated and accepting individuals among women and men (including "diverse") was roughly the same (84% and 85%, respectively). Of the under-35 group, 25% were hesitant or refused a COVID-19 vaccination, contrasting with the 35 to 55 age group (16%) and the over-55 group (11%). The highest percentage of vaccinated individuals was seen among nursing staff at 75%. A further 9% wanted to be vaccinated as soon as possible and 7% were hesitant or undecided. Just 10% of the nursing staff did not want to be inoculated. Vaccination willingness was very high overall among all other professions, even though groups such as educational staff and body-related service staff had the lowest vaccination rates at the time of the survey ([Table 2](#)).

Table 2

Vaccination status and willingness of unvaccinated individuals for COVID-19 vaccination.

		Vaccination Status and Willingness				
		Vaccinated	Accepting	Hesitating/Undecided	Refusi	
		<i>n</i> = 2108	<i>n</i> = 761	<i>n</i> = 224	<i>n</i> = 30	
Gender	Female	<i>n</i>	1490	505	169	207
		%	62.8	21.3	7.1	8.7
	Male/Diverse	<i>n</i>	601	247	53	96
		%	60.3	24.8	5.3	9.6
Age (years)	<35	<i>n</i>	262	99	51	67
		%	54.7	20.7	10.6	14.0
	35–55	<i>n</i>	1124	379	113	175
		%	62.8	21.2	6.3	9.8
	>55	<i>n</i>	713	280	59	62
		%	64.0	25.1	5.3	5.6
Professional group	Nursing staff	<i>n</i>	680	78	60	90
		%	74.9	8.6	6.6	9.9
	Medical staff	<i>n</i>	98	27	6	17
		%	66.2	18.2	4.1	11.5
	Therapeutic staff	<i>n</i>	225	64	24	40
		%	63.7	18.1	6.8	11.3
	Administrative staff	<i>n</i>	617	230	51	69
		%	63.8	23.8	5.3	7.1
	Educational/support staff	<i>n</i>	283	185	45	28
		%	52.3	34.2	8.3	5.2
	Body-related service staff	<i>n</i>	9	52	8	3
		%	12.5	72.2	11.1	4.2
	Other professions	<i>n</i>	172	108	28	51
		%	47.9	30.1	7.8	14.2
	Geriatric care	<i>n</i>	823	68	55	72

Note: Line percentages are indicated; * Fisher’s exact test.

An examination based on fields of work showed that geriatric caregivers had the highest vaccination rate at 81%, with a further 7% wanting to be inoculated as soon as possible. In disabled care and social work, 60% and 40%, respectively, had been vaccinated at the time of the study. However, taken together with the number who accepted inoculation, these groups had a similarly high vaccination willingness to workers in geriatric care and nursing. There were also regional differences in vaccination willingness. While 86% in the western federal states were already vaccinated or were willing to be inoculated straight away, the figure was 78% in the eastern states. Persons who either regularly or occasionally received vaccinations against the seasonal flu were significantly more likely to state that they would also be inoculated against COVID-19. However, of the group that had not received flu vaccinations in the past five years, 55% had been vaccinated against COVID-19 and a further 22% wanted to be inoculated ([Table 2](#)).

A total of 185 individuals stated that they had been in contact with COVID-19 patients or clients either often or occasionally in the past four weeks. Of these, 68% had already been vaccinated, a further 8.6% wanted to be vaccinated, 6.5% were hesitant, and 17% refused to be inoculated ([Table 2](#)).

Compared with participants older than 55 years, the odds ratios (OR) for hesitating/rejecting COVID-19 vaccine were 1.9 (95% CI: 1.40–2.59) in participants younger than 35 years and 1.3 (95% CI: 1.04–1.69) in participants aged 35–55 years ([Table 3](#)). Administrative (OR 0.6, 95% CI: 0.47–0.96) and educational/support staff (OR 0.5, 95% CI: 0.34–0.78) hesitated less often than participants in other occupational groups. Participants in geriatric care (OR 0.4, 95% CI: 0.30–0.58), nursing (OR 0.5, 95% CI: 0.34–0.80), and disabled care (OR 0.6, 95% CI: 0.45–0.90) showed a lower likelihood of hesitation or refusal compared to workers in other fields. Participants from the new federal states were more hesitant than those from the old federal states (OR 1.9, 95% CI: 1.51–2.58). For individuals who had not received the seasonal influenza vaccination in the past 5 years, results showed an increased OR of 5.7 (3.84–7.80) for being hesitant. Surprisingly, individuals who reported frequent contact with COVID-19 patients or clients in particular showed a higher likelihood of not being vaccinated against COVID-19 (OR 1.9, 95% CI: 1.32–2.97).

Table 3

Factors associated with hesitancy or refusal to be vaccinated against COVID-19.

			Vaccinated/ Accepting (n = 2869)	Hesitating/Refusing (n = 532)	OR	95% CI	p- V:
Gender	Female	<i>n</i>	1995	376	0.9	0.77- 1.22	
		%	84.1	15.9			
	Male/Diverse	<i>n</i>	848	149	1	-	
		%	85.1	14.9			
Age (years)	<35	<i>n</i>	361	118	1.9	1.40- 2.59	
		%	75.4	24.6			
	35-55	<i>n</i>	1503	288	1.3	1.04- 1.69	
		%	83.9	16.1			
	>55	<i>n</i>	993	121	1	-	
		%	89.1	10.9			
Professional group	Nursing staff	<i>n</i>	758	150	1.1	0.73- 1.63	
		%	83.5	16.5			
	Medical staff	<i>n</i>	125	23	0.8	0.48- 1.49	
		%	84.5	15.5			
	Therapeutic staff	<i>n</i>	289	64	0.7	0.49- 1.1	
		%	81.9	18.1			
	Administrative staff	<i>n</i>	847	120	0.6	0.47- 0.96	
		%	87.6	12.4			
	Educational/support staff	<i>n</i>	468	73	0.5	0.34- 0.78	
		%	86.5	13.5			
	Body-related service staff	<i>n</i>	61	11	0.5	0.25- 1.07	
		%					

3.3. Reasons for COVID-19 Vaccination

Most individuals chose to be vaccinated to protect their patients, clients, family members, and themselves ([Figure 1](#)). Making a positive contribution to infection control and health protection at work was also frequently cited as a reason. Respondents also often agreed with the following reasons: rapid easing of restrictions and more social contacts and travel opportunities. A further 26% of the respondents wanted to be vaccinated due to pre-existing health conditions. Helping to tackle the pandemic and setting a good example were also frequently cited as reasons in the free-text responses.

3.4. Reasons for Hesitating or Refusing COVID-19 Vaccination

Participants who wanted to wait before being vaccinated, were undecided, or were inclined to refuse vaccination often stated that they had concerns about short- and long-term consequences or the safety and efficacy of the vaccines. Very few rejected vaccination in general ([Figure 2](#)). In the free-text responses, the following reasons were also listed: lack of confidence and criticism of the vaccination policy, perceived social pressure to be vaccinated, and uncertainty with regard to fertility. A total of 65 individuals stated that they had been previously diagnosed with COVID-19. Of these, 43% wanted to be vaccinated or were undecided, while 57% no longer wanted to be inoculated.

3.5. Vaccination Willingness in the Workplace and Attitudes toward Mandatory Vaccination

Vaccination willingness in the workplace was described as high by 58% of the respondents, while 31% considered it to be moderate. Just 7% felt it to be low (“don’t know” = 4%). Participating social workers were most likely to describe vaccination willingness as high (71%), while the percentage in geriatric care and nursing stood at 54% and 57% respectively. In answer to the question of what could help improve vaccination willingness in the workplace, respondents agreed with the following points most frequently: detailed information about vaccine safety and how the vaccines work (64%), transparent reporting on possible side effects and long-term consequences (63%), evidence of fewer COVID-19 infections among vaccinated colleagues (60%), and a longer period of observing the vaccination drive to gain a better picture of side effects and long-term consequences (51%). Just 7% advocated a financial incentive for vaccination (no figure). Furthermore, the following reasons ($n = 334$) were cited in free text (listed here by frequency):

- More freedoms for vaccinated individuals and easing of restrictions in the workplace (e.g., fewer tests, no mandatory FFP2/N95 mask);
- Free choice of vaccine;
- Clear rules and a sensible information and vaccination policy;
- Transparent, objective, and balanced reporting;
- Reliable, accessible vaccination options in the workplace (e.g., vaccinations during the working day or vaccinations at work by company doctors or mobile vaccination teams);
- Non-bureaucratic access to vaccination appointments;
- Good information and transparency towards employees;
- Mandatory vaccination for healthcare workers/restrictions for unvaccinated staff;
- Evidence of efficacy and post-vaccination support;
- Role model function for managers and staff;
- No mandatory vaccination.

Around 58% of respondents were against mandatory vaccination. Medical, educational, and therapeutic staff in particular (63% of each group) thought mandatory vaccination was unreasonable.

3.6. Information on COVID-19 Vaccination

The majority of respondents (89%) obtained detailed information about the benefits and personal risks of the COVID-19 vaccines. Most obtained information from the websites/information portals of the federal states or the government (74% of cases). Other frequently used sources of information were television, radio, or podcasts (52%), daily newspapers or weekly magazines (print and online; 46%), at the workplace (e.g., notices, information events, newsletters; 29%), or from colleagues (28%). Social media or online video sites (e.g., YouTube), on the other hand, were rarely used to obtain information (18% and 10%, respectively).

4. Discussion

Our data showed that a high rate of care workers were already vaccinated. Vaccination willingness stood at a similarly high level among nursing staff and doctors at 84% and 85%, respectively, when vaccinated individuals and those willing to be inoculated were taken together. However, doctors were under-represented in this sample. The vaccination rate and willingness to be inoculated against COVID-19 were high overall across all professional groups and fields of work (over 80%). Although the percentage of individuals who refused to be vaccinated varied by age and profession, it was low among all subgroups at a maximum of 14%. Furthermore, it is possible that among the unvaccinated, willingness to be vaccinated tends to decline, suggesting that many of those willing to be vaccinated are already immunized. As expected, vaccination willingness was higher among older workers because the health risk posed by a SARS-CoV-2 infection is considerably greater for them. Our results are also comparable to those from the general population with regard to vaccination status, willingness, and vaccine preference. Since May 2020, COVID-19 Snapshot Monitoring (COSMO) has been conducted at regular intervals among the population in Germany. In addition to other pandemic-relevant topics, vaccination readiness is repeatedly surveyed. The authors have found that vaccination readiness in the population has risen continuously since December 2020 (average 50%) and currently stands at 78% (June 2021; consisting of those already vaccinated and those willing to be vaccinated). The BioNTech/Pfizer vaccine was most preferred (51%), while 1.4% preferred the AstraZeneca vaccine. About a quarter had no preference for a certain vaccine [21].

The willingness to be inoculated against COVID-19 was higher among individuals who had received a seasonal flu vaccination than among those who had not been inoculated against flu. This was also to be expected. Of those who had been vaccinated against influenza at least once in the past five years, the majority had also been inoculated against SARS-CoV-2 or intended to be immunized. However, at 77%, the willingness to receive a COVID-19 vaccination was also high among individuals who had not been inoculated against influenza. Our data confirm the observation by Spinewine and colleagues that individuals who receive influenza vaccines also show positive attitudes toward COVID-19 vaccines [22]. Using the 5C theoretical model to determine psychological antecedents for vaccination, Kwok et al. showed that influenza vaccination was associated with stronger vaccination confidence, collective responsibility, and weaker

risk perception (complacency), perceived barriers (constraints), and benefit-risk trade-offs (calculation). Similarly, stronger vaccination confidence, collective responsibility, and weaker complacency were predictive of COVID-19 vaccination [19].

Vaccinations are a crucial means of controlling infection in the workplace to protect workers' health. Since HCWs in particular are on the front line in the fight against COVID-19, they are at a high risk of infecting themselves or other vulnerable groups. According to a meta-analysis, nursing staff were the most frequently affected group of workers at 48% [23]. However, surveys showed that the vaccination willingness among nursing staff in particular was low [11,13,15,19]. At the beginning of the vaccination campaign, vaccination willingness rates stood between 50% and 70% depending on the professional group. Just a few weeks after the vaccination campaign began, however, a constant rise in vaccination willingness was observed in all professional groups [12,14,24]. There are various reasons for the increase. Firstly, observation of the efficacy of vaccination at population level [25] or among healthcare workers [26,27] may have increased vaccination willingness. Secondly, individuals' confidence in the safety and efficacy of the vaccines may have grown as more and more people in their immediate environment were vaccinated against COVID-19 [28]. Social desirability may have increased vaccination willingness, especially for inoculations at healthcare facilities. Alongside infection protection, our data show that the prospect of further easing restrictions and more opportunities for social contact are important reasons for vaccination. This is tied to the high expectations people have for vaccinations. Health protection remains the primary objective of the vaccination campaign: restrictions can only be eased consistently when the vaccination rate is high enough to end the pandemic.

In our survey, almost 60% oppose mandatory vaccination. This is also consistent with the results of regular monitoring surveys of the population in Germany. Only 1/3 of respondents were in favor of mandatory vaccination for HCWs. It is suspected that mandatory vaccination may have psychological side effects. If support for mandatory vaccination is low in the population, an imposed requirement to vaccinate may lead to reactance, which in turn may negatively affect compliance with other protective measures in the population [29]. In Germany, there is no general obligation to vaccinate against COVID-19, not even for professions with a high risk of infection. However, the federal government advocates for a strong vaccination recommendation to ensure protection at the individual and community level [3]. Nevertheless, it is possible that in some cases societal expectations and pressure from employers may lead to de facto mandatory vaccination.

Although it was a small number ($n = 43$), surprisingly, those who had regular contact with COVID-19 patients were more hesitant to be vaccinated. This could be due to the assumption that they already have natural immunity without knowing that vaccination boosts the immune system after infection and is therefore recommended.

The concerns cited by the respondents with regard to the COVID-19 vaccines were largely shared with participants in other studies [16,17,18,24]. To counteract these concerns, it may be helpful to highlight what is known so far about the adverse effects of COVID-19, so that people can weigh the risks and benefits of vaccination.

Online surveys usually have limitations. Generalization of the results should be made with caution, as we used an opportunity sample with self-selection of participants. Besides, the population of heterogeneous occupational groups cannot be fully modeled. This may have resulted in

selection bias. The response rate could not be calculated because it was not possible to establish a clearly defined number of potential respondents in advance. It is also difficult to assess how representative the findings are because the socio-demographic data cannot be validated. Another limitation of web-based surveys can result from a high proportion of interview dropouts. In the current survey, the completion rate was moderate at 66.7%. We cannot rule out the possibility that individual participants completed the questionnaire more than once.

Furthermore, it is difficult to judge whether there was a difference in willingness among vaccination sceptics or vaccination supporters to participate in the survey. However, we can see no evidence to indicate that more vaccination supporters than vaccination sceptics took part.

It is also common for participants in online surveys to not provide their socio-demographic details or to terminate their participation prematurely, despite the anonymous survey design. However, we believe that that happened rarely with this particular survey. Furthermore, we cannot rule out the possibility that an individual took part more than once. Other limitations exist in that we collected no data on professional experience, occupational stress in connection with the COVID-19 pandemic, or vaccination side effects.

5. Conclusions

This survey took part at the height of the third wave in Germany, during which the vaccination campaign picked up pace. However, the campaign was thwarted by the report of serious side effects following immunization with the AstraZeneca vaccine. Nevertheless, these data show that health and welfare workers have weighed the risks of vaccination against the possible consequences of COVID-19 and that they demonstrate great willingness to be vaccinated despite the reported side effects. Our data suggest that a vaccination rate of over 80% has already been partially achieved or will soon be achieved among health and welfare workers. In all professional groups, the vaccination rate and vaccination willingness are well above the vaccination rate of 60% to 70% cited by the World Health Organization (WHO) as being necessary to achieve herd immunity [30]. Furthermore, COVID-19 immunization appears to enjoy a higher level of acceptance than influenza vaccinations because the focus is not just on health protection, but also on actively helping to tackle the pandemic. Nonetheless, young people and women remain hesitant about the new vaccines, primarily citing concerns about the long-term effects, safety, and efficacy of the vaccines being used. Workers in these professions will weigh the risks for the patients, residents, or clients they assist as well as their own convictions and personal concerns when they make decisions about COVID-19 vaccinations. These concerns and fears should therefore be taken seriously and addressed by means of transparent information and communication campaigns. Even if the willingness to vaccinate and the vaccination rate in some professions and settings is already above 80%, the subjective perception of vaccination readiness within the company is still perceived by many as moderate or low. Here, practical barriers need to be removed so that the effort to get vaccinated is low, e.g., through uncomplicated vaccination appointments, vaccination at the workplace, or free choice of vaccine. It is likely that as the vaccination campaign progresses, barriers to vaccination will increase among those who are still unvaccinated. Here, targeted information that is understandable to laypersons should be provided so that an individual risk assessment can be made. In our survey, the majority of respondents listed protection of others as a motivation for vaccination. The role of protecting others should be used more prominently in communicating the benefits of vaccination. The majority of respondents cite traditional media as their main source of infor-

mation related to COVID-19 vaccination. These media should continue to be used to provide evidence-based information to target groups (e.g., younger people) about the safety, risks, and benefits of vaccination.

Acknowledgments

Many thanks to the BGW communications department, for promoting this survey on internal communication sources. We also thank Johanna Stranzinger for her suggestions and networking with professional associations. We would also like to thank Ollie Kleinmüller for implementing and monitoring the online survey.

Author Contributions

A.K. and A.N. contributed to the conception, design, and implementation of the study as well as data analysis and interpretation. A.K. prepared the manuscript draft. A.K. and A.N. contributed to the revision of the manuscript. All authors have read and agreed to the published version of the manuscript.

Funding

This research received no external funding.

Institutional Review Board Statement

The study was conducted according to the guidelines of the Declaration of Helsinki.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

Data are available from a.kozak@uke.de.

Conflicts of Interest

The authors declare no conflict of interest.

Footnotes

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