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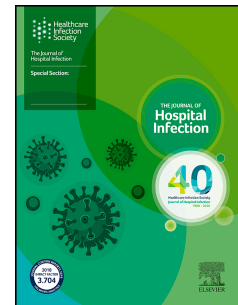
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COVID-19 Vaccination Strategy for Hospital Staff in Germany: A Cross-Sectional Study in March-April 2021

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Background: SARS-CoV-2 vaccination for healthcare workers (HCW) started in Germany in December 2020. Hospitals did not have much time to prepare a vaccination strategy.

Aim: This study aims to get information on the initial vaccination strategy for HCW from the infection control practitioners in Germany.

Methods: A cross-sectional, ethically-approved questionnaire was developed, formatted as an online survey and pre-tested. We invited infection control practitioners responsible for hygiene/infection prevention in 987 randomly-selected German hospitals in March and April 2021 to participate in the survey. For statistical analysis, the hospitals were categorised into two groups based on bed capacity (<500 beds=small; ≥500 beds=large).

Findings: 100 of 987 (10%) infection control practitioners completed the survey. In 80% of the participating hospitals, HCW vaccination prioritisation was based on recommendations of the German standing committee on vaccination (STIKO). Even so, only 54% prioritised the vaccination of HCW with contact to vulnerable patients, thus deviating from STIKO recommendations. HCW with a high personal health risk were prioritised for vaccination in 24% of the hospitals. Transferring unvaccinated HCW to an area with less infection risk was considered by 2% of large and 12% of small hospitals.

Conclusion: Vaccination prioritisation differed across hospitals and deviated from STIKO recommendations. A pandemic preparedness concept should address the potential impact of divergent strategies compared to a common approach. In addition, further studies analysing the reasons why HCW remain unvaccinated are needed in order to adopt effective strategies. This is particularly important against the background of facility-based compulsory vaccination.

Keywords: infection control, healthcare workers, SARS-CoV-2, vaccination campaign, vaccination hesitancy

Introduction

Since March 2020, the coronavirus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome coronavirus type 2 (SARS-CoV-2), has been declared a pandemic by the director of the World Health Organisation (WHO) [1]. According to the WHO dashboard [2], there have been more than 380 million confirmed cases including more than 5.7 million death cases around the world by the beginning of February 2022. In Germany, about 11 million COVID-19 cases have been confirmed and more than 400.000 cases were hospitalised by the beginning of February 2022 [3].

The high number of hospitalised COVID-19 patients has increased the risk for healthcare workers (HCW) and non-COVID-19 patients to contract nosocomial COVID-19 [4]. Many infected persons are asymptomatic [5, 6, 7] or presymptomatic [8, 9, 10]. Currently, transmission of the newest Omicron variant of concern has been observed to be greater than for other variants, even in fully vaccinated persons [11, 12]. Persons in hospital (patients, HCW, visitors) shedding this variant may spread the infection further among staff and patients.

The vaccination campaign in Germany started in late December 2020 [13]. During the first weeks, there were repeated vaccine bottlenecks because demand exceeded supply [14, 15].

According to the German Infection Protection Act (IfSG), hospitals are obliged to provide necessary strategies to prevent nosocomial infections. COVID-19 vaccination for hospital staff is one of organisational infection prevention strategies recommended by both the Commission on Hospital Hygiene and Infection Protection (KRINKO) and the German Standing Committee on Vaccination (STIKO) [16]. HCW working in an area with high risk of exposure to SARS-CoV-2, particularly in COVID-19 areas and emergency departments, were the highest priority for vaccination according to the recommendations. Priority was also given to HCW who regularly have contact with patients at high risk of severe COVID-19. The next level of priority for vaccination was HCW working in COVID-19 testing centres. The lowest priority was for other HCW with low exposure risk, for example laboratory personnel and staff working in non-clinical areas [17]. HCW at high personal risk were not explicitly prioritised beyond the level for their job role [17].

Vaccination for HCW in some federal states in Germany started in late December 2020. However, about 17% of hospital staff in Germany, who participated in an online survey on COVID-19 vaccination by the German Public Health authority Robert Koch Institute (RKI) [18] in March – April 2021, had not yet been vaccinated. About 10% of HCW categorised as highest priority did not have full immunisation at this time. Of these unvaccinated HCW, most reported that they were not offered vaccination (44%). Some were afraid of permanent side effects (25%) or vaccination reactions (25%). Other reasons for being unvaccinated included lack of adequate vaccine information (7%) and problems making appointments (11%) or finding a vaccination location (1%) [18].

The aim of this study was to gather information from hospitals' perspectives regarding vaccination strategies for hospital staff. These strategies include the distribution of vaccination information, staff prioritisation and registration, and dealing with unvaccinated staff.

Methods

This was a multicentre observational cross-sectional study of a sample of German hospitals. Data were collected in March and April 2021.

Sampling process

A random sample of hospitals across Germany, stratified according to size, were invited to participate. Hospital infection control practitioners responsible for implementing infection control strategies for their hospital were surveyed about the strategies of the individual hospitals, and not their personal attitudes and perceptions. Further details of the sampling process are provided as supplementary material.

Questionnaire

An interdisciplinary and interprofessional team of experts in infection control, infectious diseases, hygiene, microbiology and virology, infectious epidemiology, public health and general medicine developed the questionnaire to collect information regarding characteristics of respondents and vaccination strategy for hospital staff. A preliminary questionnaire was prepared and pre-tested on infection control experts from the Scientific Working Group “Hospital Hygiene: Prevention of Infection and Antibiotic Resistance” and Standing Committee “General and Hospital Hygiene” (N=5) of the Deutsche Gesellschaft für Hygiene und Mikrobiologie (DGHM), who have been not selected in the whole sampling process. Adjustments to the questionnaire were made accordingly. The questionnaire is provided as supplementary material.

For the survey, we used the online survey tool LimeSurvey (<https://www.limesurvey.org/>). Infection control practitioners in 987 hospitals across Germany were invited to participate by email. Participation was anonymous. This project previously received positive ethical consent by the ethics committee of the University Medical Centre Göttingen under the file no. 5/2/21 An.

Data analysis

Data were analysed using SPSS 26 (IBM Deutschland GmbH, Ehningen, Germany). For statistical analysis, hospitals were defined as small (0-499 beds) or large (>500 beds). Relative frequencies were calculated for each item. To estimate the relevance of statistical differences according to hospital size, we calculated with Fisher’s exact test. Statistical significance was defined as $p < .05$.

Results

Respondent characteristics

151 of 987 invited infection control practitioners accessed the survey but only 100 (10%) completed it. 49 small hospitals (response rate 6%) and 51 large hospitals (response rate 22%) were represented. The survey was performed during the second wave of the pandemic in Germany and the target group was under high pressure to implement infection control strategies and prevent hospital outbreaks at this time. The characteristics of the respondents are shown in Table I. 61% were directors or heads of their departments, and around 90% had a clear qualification in hygiene and infection control. The hospitals were mostly located in the west

region of Germany (36%) followed by the south (26%) and north (21%) regions. 19% of the hospitals were university hospitals.

Information to staff

In most (97%) of hospitals, staff were informed about vaccination (Table II). The most prevalent mode of information delivery was electronic text format (e.g. email, intranet posts). Some, hospitals provided information through other types of digital media (e.g. audio podcasts, short videos). In-house communication platforms were the most prevalent distribution source in all hospitals regardless of size. Relatively few hospitals (12%) used homepages and social media accounts to communicate vaccine information to their staff.

Vaccination

The majority of clinical staff in both hospital size groups with or without direct contact with COVID-19 patients received a vaccination offer from their employers (Table III). Other HCW (e.g. cleaning service or laboratory staff), were also offered vaccination in 90% of both large and small hospitals. Vaccination offers to scientific staff and students was more prevalent in large hospitals.

All large hospitals and about 90% of the small hospitals prioritised vaccination of the staff working in COVID-19 areas. However, prioritisation of staff treating extremely vulnerable patients, which were supposed to have equal priority, was reported by only 54% of hospitals. Interestingly, only 24% of hospitals prioritised the vaccination of staff with a high personal health risk.

Self-reported prioritisation of offers were mostly (80%) based on the recommendation of the STIKO. However, prioritisation based on agreements between the local vaccination task forces and ethics committee (20%) or based on the decision of the directors (23%) were also reported. The latter was more prevalent in large (29%) than small hospitals (10%).

The option of registering for vaccination by email was reported by 58% of the hospitals; 36% offered registration via a telephone vaccination hotline (36%), and 24% offered booking directly via an in-house website (24%). A specific website for this purpose was more frequent in large (28%) than small (8%) hospitals. Most (87%) of hospitals offered vaccination through an on-site centre. However, 6% of hospitals referred their staff to communal vaccination centres.

Unvaccinated staff

The majority of respondents reported provision of information as their approach to unvaccinated HCW (Table IV). Transfer of unvaccinated staff working in a high risk area to lower risk areas was deployed by 12% of small and 2% of large hospitals. Moving unvaccinated staff with a high personal health risk employed by 10% of hospitals. Around 10% of hospitals had no specific strategy for handling unvaccinated staff.

Discussion

Our data show that hospitals in Germany implemented a vaccination strategy to assure a safe environment for employees and patients during the COVID-19 pandemic. To increase staff awareness and participation in vaccination, hospitals promoted and communicated the latest information through various media, especially digital media. In early 2021, vaccination offers were made based on priority. Besides the main challenge of organising these vaccinations during a wave and despite the vaccine shortage, there was also the question of how to deal with unvaccinated staff.

A large proportion of hospitals reported providing staff with the most up-to-date information on vaccination, contrasting with the RKI report that some HCWs in Germany felt underinformed [18]. One possible reason for this divergence is that the format for delivery of information was mainly electronic, and this format may not be readily accessible to all types of HCW, either because they had no time at work during the pandemic [19, 20], or they had limited access to electronic media at work. Information overload during the COVID-19 pandemic could also be a reason [21, 22], e.g. vaccination information may have been overshadowed by other more important information, such as changes in clinical protocols. Thirdly, the information provided may not have been adequately targeted towards different HCWs' background knowledge. Fourthly, employer-produced information may have become lost in the huge amount of divergent and emotional information in everyday media including social media. Therefore, a good communication strategy that allows feedback and adaptation is important.

The RKI study also reported that some employees had problems making appointments and accessing vaccination [18]. Our data showed that although various registration methods had been developed, 60% of hospitals offered only one method for making appointments. Also, in small hospitals especially HCW were sometimes expected to attend off-site community vaccination centres, which may have proven a disincentive for many reasons, including access to transport, having time to attend an off-site location. However, hospital-based vaccination centres present financial and organisational challenges that are not sustainable for all hospitals. By contrast, community vaccination centres are financed by the states as well as the statutory and private health insurances (§7 Coronavirus-Impfverordnung).

Rather than the STIKO guidelines, some hospitals followed local vaccination prioritisation recommendations or the decision of the hospital directors. Unfortunately, we did not ascertain how local practices deviated from the STIKO recommendations. It might be expected that local rules would be tailored to meet local need, but remain true to the principles of the STIKO recommendations. However, we found that HCW with contact to vulnerable patients were not prioritised in almost half of hospitals. We also found that HCW with high personal health risk were prioritised in only 24% of hospitals, which is important from the point of view of employee protection and avoidance of time off work. Unfortunately, we did not explore the reasons for this lack of prioritisation.

Since this study was performed vaccination prioritisation has been lifted, and every HCW is now offered vaccination. Hospitals in Germany have a high vaccination rate with 91% of the participating hospital staff fully vaccinated, 4% incompletely vaccinated and 5% unvaccinated (study period June-July 2021) [18]. However, in January 2022 11% of patient-facing HCW were unvaccinated [23], and without official regulation of the documentation of vaccination status among HCW implementation of targeted interventions impossible. At the time of writing the German government decided on a facility-based mandatory vaccination, which, among others, applies to hospitals (§ 20a IfSG). Employees must provide their employer with proof of

completed vaccination, proof of recovery, or a doctor's certificate that they cannot be vaccinated by 15 March 2022. A study showed that half of German hospitals expected limitations on patient care because of this requirement [23].

Limitations

Our questionnaire was long, taking at least 15 minutes to complete. That, and fact that the survey was undertaken during the second wave of the pandemic when infection control practitioners were busy, may have reduced the participation rate. This may have had an impact on participation and dropout rates. The response rate of small hospitals was particularly low, and these results may not therefore be generalisable. A further limitation of the study is that a cross-sectional study performed at a single time point cannot take into account the rapid dynamic change during the pandemic. Like all self-reporting questionnaires, the responses may have been subjective, and they could not be verified. Overall however, we feel that our study does provide a useful overview of the initial phase of HCW vaccination across in Germany.

Conclusions

The vaccination prioritisation in many hospitals was based on, but deviated from, the STIKO recommendation. We found that good communication between employers and HCW is vital; feedback loops may be useful to ensure that all staff groups are reached. There was widespread use of electronic systems for communication and booking vaccination appointments, but not all staff have ready access to this format. Hospitals should consider offering alternative systems, such as printed and verbal information. HCW may also benefit from easy access to vaccination centres, which is a particular challenge in smaller hospitals that may not be able to establish an internal centre. Further studies are required to understand why some HCW remain unvaccinated, and how best to encourage them to accept vaccination.

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Conflict of interest

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Table I. Characteristics of participating hospitals/personnel

Characteristic	% (n=100)**
Infection control practitioners position	
Director/head of department	61
Acting director/head of department	5
Not in the leader position	34
Infection control practitioners competence area (multiple answer possible)	
(Hospital) Hygiene	93
Microbiology	17
Virology	6
Public health	8
Region	
North (Bremen, Hamburg, Niedersachsen, Mecklenburg-Vorpommern, Schleswig-Holstein)	21
East (Brandenburg, Berlin, Sachsen, Sachsen-Anhalt, Thüringen)	17
South (Bayern, Baden-Württemberg)	26
West (Nordrhein-Westfalen, Hessen, Rheinland-Pfalz, Saarland)	36
Hospital status	
University hospital	19
Non-university hospital	71
Others*	10
Hospital size	
Small hospitals	49
Large hospitals	51

*Outpatients clinic, rehabilitation centre, medical care centre.

**The relative and absolute frequencies are identical.

Table II. Vaccine information targeted towards staff

	Small hospitals n=49	Large hospitals n=51	Total n=100	<i>p</i> value
Deliver up-to-date vaccine information to staff	95.9	98.0	97.0	0.614
Form of media (multiple answers possible)				
Print text	22.4	11.8	17.0	0.248
Electronic text	46.9	45.1	46.0	1.000
Audio-video podcast	8.2	11.8	10.0	0.792
Audio podcast	2.0	0.0	1.0	0.990
Platform to deliver information (multiple answers possible)				
In-house communication platforms	49.0	45.1	47.0	0.841
Homepage of the hospital	12.2	11.8	12.0	1.000
Social media of the hospital	6.1	7.8	7.0	1.000

Fisher's exact test was used. *P* value < .05 defined as significant.

Table III. Vaccination strategy for staff

	Small hospitals n=49	Large hospitals n=51	Total n=100	<i>p</i> value
Vaccination offer (multiple answers possible)				
Medical staff with direct contact to COVID-19 patient	91.8	98.0	95.0	0.200
Medical staff without direct contact to COVID-19 patient	93.9	98.0	96.0	0.357
Scientific staff*	36.7	56.9	47.0	0.048
Administrative staff	71.4	74.5	73.0	0.823
Other (e.g. cleaning service, laboratory staff)	89.8	90.2	90.0	1.000
Students	49.0	74.5	62.0	0.013
Trainees	73.5	76.5	75.0	0.819
Prioritised invitation for vaccination (multiple answers possible)				
Staff in high infection risk area	91.8	100.0	96.0	0.054
Staff with high personal health risk	26.5	21.6	24.0	0.642
Staff contact to vulnerable patient	49.0	58.8	54.0	0.422
Staff in administrative department	26.5	21.6	24.0	0.642
Establish prioritisation (multiple answers possible)				
Recommendation of STIKO	79.6	80.4	80.0	1.000
Agreement between Corona-Vaccination task force and ethics committee	10.2	29.4	20.0	0.024
Decision of the hospital directors	18.4	27.5	23.0	0.345
Registration (multiple answers possible)				
In-house internet website	18.4	29.4	24.0	0.244
Specific website	8.2	27.5	18.0	0.018
Telephone vaccination hotline	38.8	33.3	36.0	0.678
Email	65.3	51.0	58.0	0.162
In person	6.1	2.0	4.0	0.587
Written registration	6.1	3.9	5.0	0.962
Vaccination location				
Vaccination centre in the hospital	83.7	90.2	87.0	0.239
In the hospital medical service	6.1	7.8	7.0	
In the communal vaccination centre	10.2	2.0	6.0	

Fisher's exact test was used. *P* value < .05 defined as significant.

*Scientific staff is e.g. a research assistant with or without contact to COVID-19 patients.

Table IV. Considerations on the perspective of dealing with the unvaccinated staff

	Small hospitals n=49	Large hospitals n=51	Total n=100	<i>p</i> value
Medical personnel at very high risk of SARS-CoV-2 infection				0.203
No further strategy	6.1	13.7	10.0	
Deliver further vaccination information	71.4	68.6	70.0	
Transfer to another working area	12.2	2.0	7.0	
Staff with a high health risk				0.288
No further strategy	8.2	7.8	8.0	
Deliver further vaccination information	73.5	62.7	68.0	
Transfer to another working area	12.2	7.8	10.0	

Fisher's exact test was used. *P* value < .05 defined as significant.