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COVID-19 vaccination and infection among people with self-reported chronic health conditions and disabilities vs. people without medical risk factors in a survey sample from Oslo

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ABSTRACT

People with disabilities and chronic health conditions are at higher risk of poor outcomes to COVID-19, yet may have lower rates of vaccination due to differences in prioritization strategies, accessibility issues, vaccine hesitancy, and other factors. Survey data from Oslo are used to investigate differences in self-reported vaccine offer, uptake, and hesitancy, as well as COVID-19 infection, for individuals with self-reported medical risk factors classified as chronic health conditions or disabilities according to likely societal perceptions. Compared to participants who reported no pre-existing medical conditions, people with chronic health conditions were more likely to have a confirmed diagnosis, be offered and take the vaccine, and have lower hesitancy, while people with disabilities generally had either no differences in or less optimal outcomes. Results suggest possible biases in vaccine recommendations and raise questions about accessibility and communication strategies, with important implications for pandemic preparedness and public health communication and practice.

Introduction

Because people with pre-existing medical conditions are at higher risk for worse outcomes during the COVID-19 pandemic, many government and public health authorities included these groups in vaccine prioritization recommendations. However, which conditions were indicated varied. For example, recommendations issued by the Advisory Committee on Immunization Practices of the US Centers for Disease Control and Prevention in December 2020 did not include almost all individuals with intellectual and developmental disabilities, although they were revised to include those with Down Syndrome later that month [1]. Jain et al. [2] compared state strategies to federal guidelines in the US, finding that prioritization of people with pre-existing medical conditions (e.g., cancer, chronic kidney disease, heart conditions, immunocompromised state) varied widely. Twenty of forty states assigned this group a higher priority than the federal guidelines while six states gave them a lower priority. Further, ten states prioritized additional groups, including individuals living with mental, physical, and developmental disabilities, that were not included in federal guidance [2]. One explanation for why certain populations or conditions may have been excluded from recommendations is the lack of public health surveillance and research on disability as a risk factor for COVID-19 [3–6]. A lack of attention in research, policy, and/or communication, along with accessibility concerns, could thus contribute to lower vaccine uptake among people with disabilities.

Previous research suggests potential suboptimal vaccination rates among people with disabilities, higher rates of hesitancy and/or difficulties accessing vaccination sites. For example, an Australian survey found that vaccination coverage was similar between people with disabilities and the population overall, but higher for people with severe long-term health conditions and lower for people with severe mental health conditions. Further, hesitancy was high among priority groups [7]. Conversely, US data showed that people who reported having a disability were less likely to have received at least one dose but also reported less hesitancy and more anticipated or experienced difficulty with getting a vaccine [3].

Definitions of disability [8,9] emphasize the interactions of personal factors, functioning, and the environment that can affect activities of daily living. Thus, there may be overlap between disabilities and conditions commonly referred to as chronic health conditions. However, social implications of the terms, including differences in lived experiences, stigma, and structural barriers to health care and other services, mean that potential distinctions between them, as understood by public health professionals, medical researchers, and the general population,

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are important to consider when trying to understand vaccine policies and practices.

Here, I present survey (i.e., self-reported) results for individuals in Oslo with medical risk factors that have been classified as chronic health conditions or disabilities according to likely societal perceptions. In Norway, the order of priority for vaccination was based on residing in a nursing home, older age, selected underlying health conditions, and employment in health care with patient contact. Health conditions included, among others, immunodeficiency, cancer, neurological diseases or muscle diseases that cause reduced lung function, Down syndrome, chronic cardiovascular or lung disease, and stroke [10,11]. Tools made in early 2021 aided general practitioners in identifying patients with prioritized conditions from their offices' electronic medical records, so information could be sent to the municipality medical officer for prioritization based on both health and age. Individuals were sent personal messages by SMS, or called if they did not respond, to book vaccinations. People living in nursing homes were vaccinated on site. In some municipalities, home nursing services brought vaccines to people who could not easily get to the vaccine centers, while other municipalities established transportation services. By June 2021, the time of the survey, all prioritized adults should have been offered at least the first dose [12,13], personal communication – Kjersti Margrethe Rydland]. Below, I describe the survey method and sample, and then present and discuss results that consider vaccination and disease experiences for people in the different health and disability categories compared to those who did not report health conditions.

Methods

The survey was developed by the Centre for Research on Pandemics & Society at Oslo Metropolitan University and the Pandemic Centre at the University of Bergen, and carried out June 16–24, 2021, by Kantar, a company providing research services that was contracted to facilitate implementation of the survey. Text messages were sent to 59,978 potential participants, sampled proportionately to population size of the targeted districts. As one goal of the project was to address questions related to migrant status, six eastern districts of Oslo where many migrants live, which also eventually received extra vaccine doses based on high levels of infection, were targeted [14]. Recipients were directed to a web link where they were provided with further instructions and contact information, asked for informed consent, and allowed to select their preferred language among several options. Participants were eligible for a drawing for three gift cards valued at NOK 1000 (approximately 100 euros) each. The survey was approved by the Regional Committees for Medical and Health Research Ethics (REK, approval number 250310). Although 5447 surveys (9.1 %) were completed, responses from five participants were removed due to concerns about rapid completion, many skipped questions, and/or nonsensical answers to open-ended questions.

Relevant variables for this analysis include whether the respondent had a diagnosed or a probable case of COVID-19; whether they had been offered the vaccine and, if so, whether they had taken it, or if they had not yet taken or been offered it, if they intended to take it; age group (18–29, 30–44, 45–59, and 60 +); and job type categorized as health care with patient contact vs. other. Additionally, respondents were asked whether they had any risk factors for severe COVID-19 and were allowed to select more than one option. Possible responses, which were subsequently categorized as chronic health conditions or disabilities based on phrasing and the possibility that someone with the condition would identify as or be perceived socially as disabled, are listed in Table 1 (see supplemental file 1 for full text of questions).

Respondents were classified as having any disability or any chronic health condition if they answered yes to one of the associated responses. Individuals who answered yes to a condition in *both* categories were excluded from analyses to avoid confounding; however, individuals who reported multiple conditions *within* a category were retained.

Table 1
Classification of pre-existing medical risk factors included in the survey.

Classified as chronic health conditions:
1. Chronic lung disease. For example, chronic obstructive pulmonary disease (COPD), treatment-requiring asthma.
2. Chronic cardiovascular disease. Does not apply to those who only have high blood pressure. For example, heart failure, atrial fibrillation.
3. Liver failure. Does not include gallstones.
4. Kidney failure. Does not include kidney stones.
5. Impaired immune system confirmed by a doctor or hospital.
6. Diabetes. Type 1 or 2.
Classified as disabilities:
1. Mental or other learning or developmental disabilities.
2. Impaired hearing or vision, blindness or deafness.
3. Physical mobility impairment.
4. Neurological disease or injury. For example, epilepsy, Parkinson's disease, complications after stroke, multiple sclerosis, and conditions that affect lung function (such as various types of paralysis).

Respondents were classified as vaccine hesitant if they responded that they did not or will not take the vaccine or were uncertain whether they would. Logistic regression analyses were conducted to determine associations between a) disease outcomes and vaccination offer, uptake, and hesitancy and b) chronic health condition and disability status. Age group and job type, the other primary indicators for vaccine prioritization, were included as covariates. Further, chi-square analyses were used to test associations between outcomes and specific disability types, i.e., mental, intellectual, and developmental (MIDD), sensory (SD), mobility (MD), and neurological (ND) disabilities. A weighting variable calculated by Kantar to account for differences between the sample and population based on sex, age group, and district was applied to the chi-square analyses. In all cases, the reference group was those who did not report medical risk factors.

Results

Sample details are presented in Table 2. Some category totals do not match the full sample, due to removal based on incomplete answers or reporting multiple conditions. Analyses only included people with valid answers for the relevant variables. There were high rates of reported vaccine offer and uptake, with people with at least one chronic health condition having higher rates than those with at least one disability and those with no medical risk factors. Vaccine hesitancy was also higher among the latter two groups. Approximately 10 % of each group reported having either a probable or diagnosed case of COVID-19.

Logistic regression results (Table 3) showed that individuals with at least one chronic health condition, compared to those who reported no medical risk factors, had significantly higher odds ratios (ORs) for having been offered the vaccine and taking the vaccine, if offered. This group also has a marginally higher OR for reporting a diagnosed case of COVID-19 and a marginally lower OR for vaccine hesitancy. Individuals with at least one disability had a significantly higher OR for reporting a probable case, with no other statistically significant differences when compared to those with no medical conditions.

Considering specific disabilities, chi-square analyses showed that more individuals with MIDD and SD reported a probable case than would be expected if there were no association (Table 3). More people with SD, MD, and ND reported being offered the vaccine than would be expected, while more people with ND took an offered vaccine. Further, more people with SD were vaccine hesitant than would be expected.

Discussion

Compared to individuals who reported no medical risk factors, respondents classified as having chronic health conditions had different patterns in vaccine and disease experiences during the COVID-19

Table 2
Sample characteristics.

Variable	At least one disability (%)	At least one chronic health condition (%)	No pre-existing condition (%)	MIDD only (%)	SD only (%)	MD only (%)	ND only (%)
Sample size	355 (6.5)	809 (14.9)	4026 (74.0)	21 (0.4)	195 (3.6)	41 (0.8)	56 (1.0)
(% of 5442)							
Probable case	22 (6.2)	25 (3.1)	177 (4.4)	3 (14.3)	13 (6.7)	1 (2.4)	2 (3.6)
Diagnosed case	13 (3.7)	52 (6.4)	219 (5.4)	2 (9.5)	7 (3.6)	3 (7.3)	0 (0.0)
Offered vaccine	293 (82.5)	752 (93.0)	2920 (72.5)	13 (61.9)	158 (81.0)	37 (90.2)	50 (89.3)
Taken vaccine	253 (86.3)	710 (94.4)	2480 (84.9)	10 (76.9)	130 (82.3)	32 (86.5)	48 (96.0)
(% of offered)							
Vaccine hesitant	24 (6.8)	28 (3.5)	247 (6.1)	2 (9.5)	18 (9.2)	2 (4.9)	1 (1.8)
Age: 18–29	54 (15.2)	57 (7.0)	610 (15.2)	11 (52.4)	33 (16.9)	5 (12.2)	3 (5.4)
Age: 30–44	73 (20.6)	137 (16.9)	1391 (34.6)	5 (23.8)	40 (20.5)	7 (17.1)	10 (17.9)
Age: 45–95	75 (21.1)	254 (31.4)	1098 (27.3)	2 (9.5)	46 (23.6)	4 (9.8)	13 (23.2)
Age: 60+	153 (43.1)	361 (44.6)	926 (23.0)	3 (14.3)	76 (39.0)	25 (61.0)	30 (53.6)
Job type: Not health	139 (39.2)	372 (46.0)	2523 (62.7)	10 (47.6)	93 (47.7)	6 (14.6)	20 (35.7)
Job type: Health/patient contact	19 (5.4)	52 (6.4)	394 (9.8)	0 (0.0)	10 (5.1)	2 (4.9)	6 (10.7)

Table 3
Results of logistic regression analyses (odds ratios with 95% confidence intervals) or weighted chi-square analyses (Fisher's Exact or X^2 statistic) of outcomes for different groups.[†,‡].

Group	Probable case	Diagnosed case	Offered vaccine	Took vaccine, if offered	Vaccine hesitant
At least one disability	2.03 (1.13–3.62)**	0.52 (0.21–1.29)	1.28 (0.80–2.04)	0.64 (0.36–1.15)	1.63 (0.91–2.91)
					p = 0.100
At least one chronic health condition	0.96 (0.57–1.61)	1.45 (0.97–2.16) *	4.21 (2.86–6.19) **	3.64 (2.23–5.92) **	0.55 (0.29–1.03) *
MIDD only	Fisher's Exact**	Fisher's Exact	0.34	Fisher's Exact	Fisher's Exact
SD only	6.00**	0.82	6.91**	2.10	4.74**
MD only	Fisher's Exact	Fisher's Exact	6.63**	0.45	Fisher's Exact
ND only	Fisher's Exact	Fisher's Exact	7.19**	5.72**	Fisher's Exact

* $p < 0.1$.
** $p < 0.05$.
† Reference for all comparisons: respondents who did not report any medical risk factors.
‡ Regression analyses include the covariates of age group and job type. Chi-square analyses are weighted to account for sex, age group, and district.

pandemic in eastern Oslo, while experiences of people classified as having disabilities were similar to the reference group. For example, while people who reported at least one disability were more likely to have had a probable case of COVID-19, those with at least one chronic health condition were marginally more likely to have had a diagnosed case. This difference raises concerns about accessibility or willingness to get tested. An alternative interpretation may be that those with disabilities were aware of higher risk and so may have had an increased tendency to assume symptoms reflected an unconfirmed case; however, a similar pattern may then be expected among people with chronic health conditions.

People with at least one chronic health condition were more likely to have been offered the vaccine and to have taken it, if offered, than the reference group. Although people with at least one disability had relatively high rates of vaccine uptake, results were similar to [7] in that there were no significant differences from the reference group for these measures. However, chi-square analyses suggest more work is needed to tease apart potential differences between specific disability types. These results are consistent with the fact that the majority of specifically named conditions listed in the prioritization guidelines would be considered chronic health conditions according to the classification scheme used in this analysis, while only a few (e.g., neurological conditions and Down syndrome) would be classified as disabilities here. If certain chronic health conditions or disabilities were prioritized over others, this could reflect biases in research that informed the evidence base on risks and consequently decision-making regarding resource allocation. Additionally, accessibility concerns could have affected recognition or receipt of an offer and vaccination itself. A potential solution for maximizing uptake for people with disabilities then may be to base prioritization not only on specific conditions but also on broader definitions of disability that integrate impairments in functioning with individual and social factors including accessibility.

Further, people with at least one chronic health condition were less likely to express vaccine hesitancy, while people with SD were more likely to be vaccine hesitant, than those without health conditions. Differences in actual vaccine uptake, as well as vaccine hesitancy, may be influenced by public health communication, for example which medical risk factors were included in discussion of vaccine prioritization. Further, negatively perceived messages of public health communication around different conditions or populations could have influenced trust in health authorities.

Limitations of these analyses must be considered. As answers are self-reported, there may be issues with interpretation of questions related to severity of disability or health status. Individuals with conditions that may not have been considered severe enough to warrant prioritization may have responded yes to the question about health status, potentially reflecting differences in self-identification vs. medical perception. Such potential discrepancies are particularly relevant to the analyses of vaccine offer, since all prioritized individuals should have been offered the first dose by the time of the survey. Further, the chronic health

condition/disability classification used here does not necessarily reflect respondents' self-identification or some universally accepted scheme. Finally, as noted above, survey sampling aimed to maximize responses from migrant populations, with no special strategies for recruiting people with disabilities. Analyses took some demographic variables into account as covariates or through weighting, but representativeness and non-response bias may still be issues. While I do not have detailed data on disability within the surveyed districts, data from Statistics Norway indicate 6.5 % of the population of Oslo received a disability benefit in 2020 [15] and 6 % of the national population reported in 2019 that they were severely limited in activity due to health problems in the past six months [16]. The proportion of people with disabilities in the sample is reasonably consistent with these measures. However, results should be considered preliminary and taken with caution. More research is needed on this topic, involving more nuanced measures of disability and larger samples.

Conclusions

People classified as having chronic health conditions in the sample followed patterns during the COVID-19 pandemic that might be expected for groups who are prioritized by public health authorities and/or recognize their own potential higher risk. However, people classified as having disabilities had either no differences in or less optimal outcomes especially related to vaccination compared to those without self-reported health risks. Considering the substantial morbidity and mortality observed worldwide for people with disabilities, these results have important implications for pandemic preparedness and public health communication and practice.

Authorship

All authors attest they meet the ICMJE criteria for authorship.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jvacx.2023.100409.

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