



BMJ Open Healthcare workers' perceptions and attitudes towards the UK's COVID-19 vaccination programme: a rapid qualitative appraisal

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ABSTRACT

Objectives While there is research relating to perceptions of vaccines among healthcare workers (HCWs), the evidence base in relation to COVID-19 remains limited. The aim of this study was to explore HCWs' perceptions and attitudes towards vaccines and the COVID-19 vaccination programme in the UK, including their expectations and views on promoting vaccination to others.

Design This study was designed as a rapid qualitative appraisal, integrating data from a review of UK policies and guidance on COVID-19 vaccination with data from in-depth semistructured telephone interviews with frontline HCWs in the UK. Data were analysed using framework analysis.

Participants Interviews were carried out with a purposive sample of HCWs from two large London-based hospital Trusts (n=24) and 24 government policies, and guidelines on the vaccination programme were reviewed.

Results The level of uncertainty about the long-term safety of vaccines and efficacy against mutant strains made it difficult for HCWs to balance the benefits against the risks of vaccination. HCWs felt that government decisions on vaccine rollout had not been supported by evidence-based science, and this impacted their level of trust and confidence in the programme. The spread of misinformation online also impacted HCWs' attitudes towards vaccination, particularly among junior level and black, Asian and minority ethnic (BAME) HCWs. Most HCWs felt encouraged to promote vaccination to their patients, and the majority said they would advocate vaccination or engage in conversations about vaccination with others when relevant.

Conclusion In order to improve HCWs' trust and confidence in the UK's COVID-19 vaccination programme, there needs to be clarity about what is known and not known about the vaccines and transparency around the evidence-base supporting government decisions on vaccine rollout. Effort is also needed to dispel the spread of vaccine-related misinformation online and to address specific concerns, particularly among BAME and junior-level HCWs.

BACKGROUND

COVID-19 and the UK's COVID-19 vaccination programme

The COVID-19 pandemic was declared a public health emergency on 11 March 2020

Strengths and limitations of this study

- This is the first qualitative study to understand the factors influencing healthcare workers' (HCWs) attitudes towards COVID-19 vaccination in the UK.
- This study integrated interview and policy data and captured HCWs' perceptions and attitudes in real-time as the vaccination programme was being rolled out in the UK.
- Our interview study sample was limited in its representation of junior-level HCWs and HCWs outside of London.
- This research may have been impacted by selection bias as those with stronger views on vaccination may have been more likely to participate in the study.

and has taken 4.98 million lives worldwide, as of 30 October 2021.¹ In the UK, the government has implemented stringent measures, such as social distancing, the use of face masks and numerous national lockdowns in attempts to flatten the epidemic curve. Since December 2020, the UK has also been carrying out mass vaccination to provide the population with protection against COVID-19.²

The rollout of the mRNA Pfizer-BioNTech and viral vector Oxford-AstraZeneca vaccines reflects the largest vaccination programme in UK history.³ The UK's vaccination programme is set to be rolled out from a mixture of hospitals, clinics, pharmacies and vaccination centres. A key element of the programme was the prioritisation scheme, developed by the Joint Committee on Vaccination and Immunisation (JCVI), which specified who should receive the vaccine first. Frontline HCWs were listed as a priority group, and the government has estimated that this will include 2.4 million HCWs in the UK.² So far, crucial milestones have been met, and by 29

October 2021, 102 million doses had been administered and 45.6 million people (67.9% of the population) had been fully vaccinated.

Although the gains and cost-effectiveness of vaccines are undisputed, the individual and collective benefits achieved by them are ultimately contingent on the behaviours and attitudes of individuals.

Known factors that influence attitudes towards vaccination

Vaccine hesitancy, which is defined by the WHO as a 'delay in acceptance or refusal of vaccines despite availability of vaccine services', could be a potential barrier facing the COVID-19 immunisation programme.⁴ Vaccine hesitancy is a complex issue with many contributing factors, which vary across time, place and type of vaccine.⁴ Hesitancy develops when there is a low perception of need for a vaccine, concerns over the efficacy and safety of the vaccine along with consideration of ease of accessing the vaccine.^{4 5} Determinants of vaccine hesitancy are complex and variable, fuelled in part by misinformation or limited and controversial information, sociocultural factors, increasing individuals' perceptions of their right to refuse medical services and decreasing trust in governmental institutions.⁵ They are also highly context specific, for example, non-uptake of the H1N1 vaccine in 2009 was related to the belief it had been expedited into circulation without rigorous testing.⁶

Data from the UK suggests that HCWs are perceived as the most reliable source of vaccine-related advice.⁵ A sense of duty in advocating vaccination to their patients, as well as belief in the benefits of immunisation programmes appear to be the primary reasons for HCWs to recommend uptake among patients.⁵ However, a number of obstacles can impede promotion, namely a lack of time to develop trusting relationships with patients, a lack of awareness of national vaccination guidelines and personal reservations about the safety of certain vaccinations for specific populations.⁷⁻⁹ Most cited reasons for HCWs to self-vaccinate in non-pandemic contexts is to protect their patients, protect themselves and protect against absenteeism at work.¹⁰ While numerous studies identify that HCWs are more likely to promote vaccination to patients if they have been vaccinated themselves,¹¹ research also demonstrates that self-vaccination rates among HCWs are in decline, particularly in relation to the influenza vaccine.¹¹ Concerns over safety and side effects, lack of time to get the vaccination for themselves and belief they are at low risk are cited as the most prominent reasons for refusal.¹² Vaccine hesitancy, from a patient or HCW perspective, does not necessarily result in vaccination refusal but can cause delay in uptake and/or willingness to accept certain vaccines over others.¹³

HCWs' attitudes towards the COVID-19 vaccination programme in the UK

While there is much research relating to vaccine hesitancy among HCWs, the evidence base on vaccine hesitancy in relation to COVID-19, although rapidly emerging,

remains limited.¹⁴ Given their increased risk of exposure to COVID-19 and high risk of transmitting the infection to vulnerable patients, it is crucial to protect HCWs from the virus through vaccination.¹⁵ There is a lot still unknown about the vaccines that have been developed to protect against COVID-19, and amidst this backdrop of uncertainty, HCWs are having to make sense of their feelings about COVID-19 vaccination and responsibilities within the COVID-19 vaccination programme.¹⁴ Recent research has identified that COVID-19 vaccine hesitancy exists among HCWs in the UK, particularly among certain groups.¹⁵ However, there is a lack of understanding about the factors shaping HCWs' views on COVID-19 vaccination. Given that their intention to use and promote the vaccine to others is highly dependent on their knowledge and attitudes towards vaccination, it is crucial that we improve our understanding of these factors to guide public health communications encouraging vaccination among this group.¹⁶

METHODS

Research questions

The principal research questions guiding this study were: (1) what are HCWs' attitudes towards the vaccination programme? (2) what are the factors influencing HCWs' attitudes towards vaccination?; and (3) what are HCWs' attitudes towards promoting vaccination?

Design

This study was designed as part of a larger, ongoing study investigating HCWs' perceptions and experiences delivering care during the COVID-19 pandemic.¹⁷ This study used a rapid appraisal methodology with two different streams of data collection: telephone interviews with frontline HCWs and a review of UK government policies and guidance. Rapid appraisal designs often combine two or more different methods of data collection, which are then triangulated to improve the validity of the findings.¹⁸

Sampling and participant recruitment

Interviews were conducted with a purposive sample of HCWs across two large hospital trusts in London. Purposive sampling was carried out to obtain a varied sample in terms of professional role, level of experience and ethnicity. A detailed description of the characteristics of the sample can be found in online supplemental appendix 1. Participants were approached by clinical leads at their Trusts who gathered verbal consent for the research team to contact them via email. Researchers then contacted participants and provided them with a participant information sheet and consent form. After receiving participants' signed consent forms, researchers arranged a telephone interview via email at a convenient date and time. At the interview, participants were reminded that their participation was voluntary, they could withdraw from the study at any point and researchers would ensure their anonymity was maintained.

Table 1 Summary of data collection and analysis methods

Type of data	Method of collection	Included sample	Method of analysis
Interviews	In-depth, semistructured telephone interviews with frontline healthcare staff were conducted.	24 interviews were conducted between 16 December 2020 and 3 March 2021.	Emerging findings were summarised using RAP sheets, and verbatim transcripts were coded and analysed using framework analysis.
Policies	Relevant policies on the COVID-19 vaccination programme were selected from legislation.gov.uk, https://www.england.nhs.uk and https://www.gov.uk/	24 policies and guidance documents published between 4 December 2020 and 15 February 2021 were identified.	Data were extracted into Excel by hand, cross-checked by another researcher and analysed using the analytical framework.

RAP, rapid assessment procedure.

Data collection

Data collection and analysis methods are detailed in [table 1](#).

Interviews

In-depth, semistructured telephone interviews were conducted with frontline HCWs. Interviews were carried out by researchers from the Rapid Research, Evaluation and Appraisal Lab (RREAL) using a semistructured topic guide. Interview topics centred around HCWs' perceptions towards the efficacy and safety of the COVID-19 vaccines as well as towards the delivery of the COVID-19 vaccination programme. The questions in the interview topic guide were developed in line with previous studies on vaccine hesitancy in HCWs for other diseases^{10–12} as well as an ongoing study on the experiences of HCWs delivering care during the COVID-19 pandemic in the UK (see online supplemental appendix 2 for the interview topic guide).¹⁷ All interviews were audio-recorded and transcribed verbatim. Researchers summarised emerging interview findings using rapid assessment procedures (RAP) sheets, which improved familiarisation with the data and facilitated analysis while data collection was ongoing.¹⁹

Policies

A review of policies and guidelines published by the UK government was conducted to contextualise HCWs' experiences of the COVID-19 vaccination programme. Relevant policies were searched for using the search strategy detailed in online supplemental appendix 3. CVP selected policies that met the inclusion criteria (see appendix 3), LM and SL-J then extracted and cross-checked the relevant data in Excel. The full list of included policies can be found in online supplemental appendix 4.

Data analysis

All sources of data were analysed using the Framework Method guided by Gale *et al*²⁰ in order to triangulate the findings between the interview and policy data. RREAL RAP sheets were initially reviewed by all researchers for familiarisation purposes. After reviewing the RREAL RAP sheets and interview transcripts, members of the research

team developed an initial coding framework, which was guided by our principal research questions. In order to develop a timely analysis, we summarised our key findings using this coding framework set up in Excel. As the matrix allowed data from various sources to be compared, we were able to draw out the similarities and differences from the various data types for triangulation purposes.

Patient and public involvement

Neither patients nor the public were involved in the design, conduct, reporting, or dissemination plans of our research.

RESULTS

In this section, we present the main emerging findings on HCWs' attitudes and perceptions towards the COVID-19 vaccination programme (representative interview quotes are provided in [table 2](#)).

Theme 1: HCWs' perceptions and attitudes towards the COVID-19 vaccination programme

Hopes for the COVID-19 vaccination programme

There was a general consensus among HCWs that vaccination offered a '*light at the end of the tunnel*'. They argued that vaccination was the only viable exit strategy, because they felt that infection prevention and control strategies, which relied heavily on the behaviour of the general public, had not been able to effectively control the spread of disease. Our policy review found that this was in line with the government's view on the vaccination programme being a 'foundation of our way out of this pandemic and the best way to protect people from COVID-19'.²¹ HCWs hoped that the vaccination programme would relieve pressure on the National Health Service (NHS) by reducing the number, complexity and acuity of COVID-19 cases and that in doing so would allow them to return to their usual standard of care. HCWs also noted the potential wider societal implications of vaccination, including its impact on the economy and on general day-to-day life. HCWs commented that by reducing the transmission of the virus, vaccination could minimise the potential of the virus to mutate into more dangerous variants.

Table 2 Representative interview quotes

Emerging findings	Representative quotes from interviews
Hopes for the COVID-19 vaccination programme	We think it's going to end and it's not ending. So, the only real hope is a vaccine. I mean the only light at the end of the tunnel will be provided by mass vaccination; we're going to achieve mass immunity. (Surgeon)
Perceptions of vaccine effectiveness	It does seem they will protect the population, particularly from the severer forms of COVID, which is where the problems arise. (Clinical director)
Perceptions of vaccine safety and risks	I think we have to be hopeful that these vaccines, that they've been trialled and researched as much as they can to make sure we don't have any long-term effects. (Physiotherapist) So, we already know that the instance of adverse effects is very low. So, they seem safe and particularly if you balance the risk of having the vaccine against your risks of a serious illness with COVID, it's clearly in favour of having the vaccine. (Clinical director)
Degree of uncertainty about the COVID-19 vaccines	Frankly, I'm scared to take the vaccine. I don't know if it's going to work, and I don't know if I want to put something in my body where there's no evidence to suggest that it is going to provide me with the immunity that I need to fight this virus. (General manager)
Government decisions on programme implementation	Why the prime minister, who has no—clearly no medical competence, evidently, decides to change the scientific protocol with no collateral study to support this decision and no one agrees with him- how is that possible? (Nurse, sister)
Different sources of information on vaccination	I have seen the people on higher grades, they went for the vaccine and they have had no issues but actually we have really, really struggled to engage people at the more junior level, and I think [social media] are having much more impact on them. (Divisional Manager) I was like, I'm not going to get the vaccine until I read something that reassures me that the overall scientific communities, and not just the UK say that it is safe to do. (Nurse, sister)
HCWs' attitudes towards promoting vaccination	So, I guess it's, so, if it was a patient of mine or our teams and we really want, you know, we really advised them to have it done, I guess I would spend quite, myself or the nurse or the doctor, we would spend quite a lot of time understanding what their worries are, what their concerns are, and try and address that, and then, sort of, looking at the advantages and the disadvantages of having it or not having it. So, we would try and put the extra effort in to give them, it would be about them having a better-informed decision, rather than relying on things that they've read on social media or word of mouth from friends and family. (Clinical lead nurse)

HCWs, healthcare workers.

Perceptions of vaccine effectiveness

Our policy review indicated that the two-dose vaccine efficacy for the Oxford-AstraZeneca and Pfizer vaccines were 70.4% and 95% in phase III clinical trials, respectively.²² HCWs felt that it was important to trust the scientific evidence on vaccine effectiveness, and they widely felt that the data available from clinical trials was convincing. In particular, HCWs were encouraged by the data that highlighted the vaccines were highly effective in reducing the severity of infections, given that the number of people with severe illness requiring hospitalisation and treatment in intensive care was reportedly the main factor causing strain on the healthcare system. Although HCWs were generally optimistic, some felt that the vaccines would not be totally effective in isolation. They argued that other infection prevention and control measures such as border controls would be necessary to reduce the global spread of infection while mass vaccination was rolled out worldwide. HCWs acknowledged the threat of mutant COVID-19 strains on the effectiveness of the vaccines, noting the difficulty of keeping the vaccines up to speed with changes to the virus. They feared this could compromise the vaccination programmes success. HCWs also noted that the success of the programme overall would rely on large-scale participation and political support.

Perceptions of vaccine safety and risks

Our policy review indicated that the frequency of severe adverse events following COVID-19 vaccination was low and that common side effects were short lasting and included headaches, muscle aches and fever.²³ Many HCWs felt that there was sufficient evidence available to demonstrate the short-term safety of the COVID-19 vaccines. HCWs commented that the known side effects were no different from those that arise from other vaccines. Concerns about vaccine safety generally pertained to the long-term, unknown side effects of the vaccines. In particular, there were concerns raised about the vaccines' long-term impact on fertility. In balancing the risk of being vaccinated against the risk of experiencing severe illness from COVID-19, HCWs were generally prepared to accept the risk associated with vaccination to minimise their risk of severe disease from COVID-19.

Theme 2: factors influencing HCWs' attitudes towards the vaccination programme

Degree of uncertainty about the COVID-19 vaccines

Hesitancy towards COVID-19 vaccination was driven, in part, by the lack of information available on the vaccines. Some HCWs who generally had confidence in vaccination and who reported to get the influenza vaccine every

year expressed that they were unwilling to be vaccinated against COVID-19 due to the lack of evidence available. There were also concerns that the development process for the vaccines was rushed, as this meant a lot was still unknown about the vaccines when the programme was rolled out, making it difficult to reach a decision. With new, emerging data and changing government guidelines, HCWs' level of uncertainty increased, and they were left questioning 'what is evidence and what is not evidence?'.²³

There was a great deal of uncertainty among HCWs about the impact of mutant strains of the disease on vaccine effectiveness, as well as the vaccines' optimum dosing schedules and long-term side effects. Given the amount unknown, some HCWs found it difficult to weigh up the risks and benefits of vaccination. Although some expressed that they wanted to wait for more evidence to emerge before making a decision, many ultimately decided that they were prepared to take the unknown risk given the lack of alternative options available. As the Oxford-AstraZeneca vaccine works by a known technology that has been tested previously with other vaccines, some HCWs expressed that they would be more confident in being vaccinated with this type over others.

Government decisions on programme implementation

The decision to prioritise vaccination for frontline health and social care workers and those at increased risk of vulnerability to infection was positively perceived.²⁴ HCWs felt that it was important they were vaccinated to reduce sickness rates among staff and, ultimately, to ensure that the workforce available to treat patients was not compromised by infection with COVID-19. They also felt that it would help to reduce their levels of anxiety about becoming infected. Although the guidance was to prioritise among HCWs on the basis of their exposure and vulnerability to COVID-19, HCWs felt a sense of unfairness when this did not translate to practice as vaccines were predominantly given on a first-come, first-served basis.²⁴

On 22 December 2020, a report was published by the government estimating that the efficacy of a single dose of either the Oxford-AstraZeneca or Pfizer vaccines was ~73% and ~90%, respectively.²⁵ Following on from this, the Department of Health and Social Care, with support from the JCVI, changed its recommendation to advise that the interval between vaccines doses be extended to 12 weeks.^{26 27} Widespread concern was expressed by HCWs about this decision. HCWs were worried that the decision was motivated by political agendas that ignored the evidence-based scientific protocols for the vaccines. Mixed and changing messages from the government were found to affect HCWs' trust in the vaccination programme overall, and there were concerns about there being 'no evidence or collateral study that says that it will be okay'. HCWs felt that this went against the views of their Trusts, and they called for more transparency from the government about the evidence supporting this. Very few HCWs felt that this was the right decision, and over-riding

feelings were of outrage and disappointment. These feelings were predominantly driven by fears that the decision would decrease their personal level of protection from COVID-19 and compromise the overall effectiveness of the vaccination programme. HCWs were also concerned that the delay between the doses would increase the likelihood of the second vaccine being missed due to people being 'lost in the ether of not knowing when they need to go back for their second dose'.

Different sources of information on vaccination

Our policy review found several documents targeted at HCWs, addressing why it is important for them to be vaccinated against COVID-19 as well as providing information on the vaccines, their side effects and the level of protection they offer.^{23 28} Many HCWs reported that a key source of information they used to inform their decision on vaccination came from scientific communities and professional bodies. HCWs' attitudes towards vaccination were also reported to be influenced by information being spread online, particularly that which was shared by senior clinicians and medical professionals. HCWs reported that the spread of misinformation on social media had ignited concerns and fears about the safety profile of the vaccines, particularly among certain groups. The impact of misinformation online appeared to vary depending on HCWs' level of seniority and ethnicity, with more junior level and BAME HCWs being the most affected. There were reports about conspiracy theories being propagated online, many of which were targeted specifically at BAME groups with 'people saying that it is no coincidence that the majority of patients ventilated in ITU are Asian, it's a deliberate genocide attempt and the vaccine has been engineered to adversely affect those populations. So, there is this kind of whole fake news circulating around the vaccine'. Attitudes towards vaccination among HCWs' family and friends were also noted to have an influence on their personal feelings towards the vaccines, particularly among BAME groups. Of those who discussed concerns regarding long-term effects, the majority appeared to be from the BAME community: 'The research isn't being done well in wider BAME communities who are the affected ones'. Our policy review indicated that the government planned to take steps to involve BAME HCWs in conversations around vaccine rollout to ensure that their needs were understood and met.²¹

Theme 3: HCWs' attitudes towards promoting vaccination

Although HCWs generally reported that they did not feel obliged to promote vaccination, they felt strongly motivated to do so. Some HCWs believed they had a moral responsibility to advocate vaccination and they reported to play a very active role in encouraging their patients to get vaccinated by 'directing them, signposting them to links, phoning up patients who have questions about the vaccine' with the aim of helping them to make informed decisions about vaccination. Many reported that patients often enquired whether they had been vaccinated. They

felt that this was because patients wanted to ask HCWs that they trusted about their decision on vaccination for reassurance. However, not all HCWs advocated vaccination to patients and some felt that this did not fall under the remit of their role, given that there was ‘*not much time and scope at the moment to discuss other things than the surgery they’re facing*’. Some HCWs also felt uncomfortable with the notion of trying to persuade people outside of their immediate family as they felt that it was everyone’s own right to make the decision for themselves; however, if directly asked by friends, colleagues or patients, many said they would explain their reasoning behind being vaccinated.

DISCUSSION

During the rollout of the UK’s COVID-19 mass vaccination programme, HCWs had to rapidly make sense of their feelings about COVID-19 vaccination and responsibilities within the COVID-19 vaccination programme in a changing and uncertain context. The findings from this study demonstrate that, although HCWs were generally hopeful about the vaccines, their level of trust and confidence in the programme was impacted by political decisions and concerns about the unknown long-term side effects of the vaccines. HCWs were encouraged to promote vaccination, and the majority of HCWs we interviewed said they would actively promote vaccination or engage in conversations about vaccination with others, where relevant.

Several other publications have also highlighted the impact of the unknown future effects of the COVID-19 vaccines on attitudes towards vaccination.^{14 29 30} Paul *et al*¹⁴ found that concerns about the vaccines’ unknown future effects led to feelings of ambivalence with almost one quarter (23%) of respondents saying that they were unsure about whether to be vaccinated against COVID-19. These publications also found that willingness to be vaccinated was impacted by mistrust in the safety of the COVID-19 vaccines. Generally, the level of confidence in government to handle the pandemic and to ensure the safety of the vaccines was low.^{14 29} In our study, we found that concerns about vaccine safety were particularly prevalent among BAME and junior level HCWs and appeared to be fuelled, in part, by the spread of misinformation on social media. Several other publications have also revealed marked differences in attitudes towards COVID-19 vaccination among various subgroups of the UK population. These studies have found associations between vaccine hesitancy and younger age, female gender, lower income and ethnicity.^{15 30 31} Murphy *et al*³¹ also found that respondents opposing COVID-19 vaccination were less likely to obtain information about the pandemic from traditional and authoritative sources. Two recent studies found that BAME HCWs expressed greater hesitancy towards the COVID-19 vaccine.^{32 33} Some prevalent reasons for this a lack of trust in vaccine manufacturers and healthcare organisations could be previous unethical practice, a lack

of representation of ethnic communities in vaccine trials and institutional racism.³⁴ Martin *et al*’s¹⁵ observational analysis among HCWs demonstrated that differences in vaccine uptake were most marked in those of black or certain South Asian HCW groups (with lowest rates of vaccination being among black ethnic groups). This study also revealed that uptake varied depending on occupational group, with more administrative and executive staff (73.2%) reporting to be vaccinated compared with doctors (57.4%) and nurses (62.5%). This may reflect different opportunities among HCWs to get vaccinated, as we found in our study that vaccination was predominantly being delivered to HCWs on a first-come, first served basis.

We found that many HCWs advocated COVID-19 vaccination at both personal and professional levels. Verger *et al* reported similar findings in their cross-sectional analysis undertaken among HCWs in France, Belgium and Canada in which 79.6% of HCWs reported that they were likely to recommend the COVID-19 vaccine to their patients.²⁹ Only 4.1% of HCWs in this study said that they were unlikely to promote vaccination and 16.3% were unsure. Interestingly, the proportion of HCWs who said they were likely to recommend the vaccine to their patients (79.6%) was higher than the proportion who said they were likely to be vaccinated themselves (72.4%), which indicates that some HCWs were likely to promote vaccination to their patients, even when they were personally hesitant about being vaccinated.²⁹

To our knowledge, this is the first qualitative study that has been undertaken to understand the factors influencing HCWs’ attitudes towards COVID-19 vaccination in the UK. This study captured HCWs’ perceptions and attitudes in real time as the vaccination programme was being rolled out in the UK. As this study was conducted during the COVID-19 pandemic, telephone interviews were the most appropriate method for capturing HCWs’ perceptions and attitudes; however, this did make it more difficult for interviewers to pick up on participants’ non-verbal cues. Even though our policy review was national in scope, the participants we interviewed were from large, London-based hospital Trusts, and this may impact the generalisability of our findings. Furthermore, although our sampling framework aimed to ensure a varied sample of HCWs, the majority of the HCWs we interviewed were senior level doctors, and we had limited representation of junior level HCWs. Our research may have also been impacted by selection bias as those with stronger views on vaccination may have been more likely to participate. As mass vaccination is still underway in the UK, our study will have missed any changes in attitudes since the end of the data collection period. It is important to recognise that attitudes to vaccination are constantly changing as both the pandemic and vaccination programmes progress. One multinational meta-analysis of studies examining COVID-19 vaccination uptake found that the proportion of the population intending to vaccinate has declined as the pandemic has progressed.³⁵ A recent study on the

perceptions of Italian HCWs also demonstrated changes in knowledge and perceptions regarding COVID-19 vaccination over time, showing that knowledge and willingness to get vaccinated increased in about a year.³⁶

First, our study highlights the importance of providing more clarity to HCWs on what is known and not known about the COVID-19 vaccines to enable them to feel more informed when making their decisions on vaccination. Second, our study also signifies the need for more clarity and transparency from government on the evidence base for their decisions affecting vaccine rollout to improve HCWs' confidence and trust in the vaccination programme overall. This study also highlights the need to directly engage with vaccine-hesitant subgroups, including more junior-level and BAME HCWs, understanding how a history of exclusion and racism might shape attitudes and practices in relation to vaccination.³⁷ NHS England has recently called for there to be one-to-one sessions arranged by line managers with vaccine hesitant HCWs to discuss the health benefits of vaccination. It is important that these conversations are handled carefully to enable open conversations to address HCWs' concerns and dispel the mistruths that have been circulating online about the COVID-19 vaccines.³⁸ There have also been recent reports that the government is considering making COVID-19 vaccination mandatory among frontline HCWs in the UK, and a wide range of public opinions have been expressed in relation to this measure. The mandatory vaccination of HCWs will shed light on tensions between the rights of the individual and the rights of society. In light of the findings of this study, it will be paramount that the UK government work to build trust and address uncertainty among HCWs before mandating vaccination in the UK.^{39 40}

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Appendix 1: Characteristics of study participants

Professional role	Sector/ Type of Facility	Time in service (years)	Education level	Ethnicity	Age	Gender
Occupational Therapist	Orthopaedics	9	Undergraduate Degree	Unknown/not reported	Unknown/not reported	F
Service Manager in Theatres	Theatres & Anaesthetics/ Intensive Care	20	Undergraduate Degree	Mixed – White British & Black Caribbean	41	F
Geriatric Registrar	Geriatrics	9	Medical Degree	White British	Unknown/not reported	M
Charge Nurse	Intensive Care	7	Unknown/not reported	White Other (European)	31	M
Consultant Anaesthetist	Theatres & Anaesthetics/ Intensive Care	2	Medical Degree	White Other	52	M
General Practitioner	General Practitioner Surgery	>6	Medical Degree & Masters	White British	29	M
Consultant Anaesthetist	Theatres & Anaesthetics/ Intensive Care	16	Medical Degree & Masters	White Other	46	F
Nurse	A & E	7	Masters	White Other	26	F
Specialist Nurse	Oncology	Unknown/not reported	Unknown/not reported	Mixed- Black & Scottish	Unknown/not reported	F
Divisional Manager	Theatres & Anaesthetics	20	Masters	White Other	45	M
Consultant Anaesthetist	Acute care	17	Medical Degree	British	48	M
Consultant Anaesthetist	Theatres & Anaesthetics	27	Medical Degree & Masters	Indian	51	F
Neuro-physiotherapist	Outpatients & Community	15	Masters	British	37	F
General Manager	Intensive Care	26	Masters	Mixed- British & Asian	26	F
Plastic and reconstructive surgeon	Oncology	Unknown/not reported	Medical Degree & Masters	White Other (Greek)	Unknown/not reported	M
Nurse	A & E/ Intensive Care	13	Unknown/not reported	Unknown/not reported	35	F
Consultant anaesthetist and Clinical Director	Theatres & Anaesthetics	33	Medical Degree & Masters	White British	56	F
Senior Clinical Pharmacist	Pharmacy	21	Masters	British Asian	43	F

Data Manager	Bone Marrow Transplant	6	Masters	Asian (Sri-Lankan)	28	F
Clinical Specialist Physiotherapist	adolescent and the young adult rheumatology.	23	Undergraduate Degree	White British (European)	53	F
Specialist Nurse	Gastroenterology/ Surgical Ward	>5	Masters	White Other (Italian)	55	F
Consultant Anaesthetist	Theatres & Anaesthetics	18	Masters & Medical Degree	British Indian	40	M
Consultant Anaesthetist	Theatres & Anaesthetics	13	Medical Degree & Masters	Asian Other	36	F
Pathway Coordinator	Interventional Oncology Service	10	Degree	Black British	54	F

Appendix 2: Interview topic guide

“How much time do you have available today? The interview takes about 30 minutes on average, but it can go on longer depending on how much you want to say”

First, I want to ask you again about your work and the services you provide.

Frame questions 1-4 around reflecting on the differences between wave 1&2

- **How are things compared to wave 1/ last time you did an interview?**
- **Can you give me a picture of how things are now? How do you feel about the changes?**

1. Background: Can you tell me about your role?

- *Can you tell me a bit about your role? (e.g., Daily tasks, department, responsibilities)*

2. How has the COVID-19 outbreak affected health services in your department?

Probes:

- *How has this affected your normal daily tasks/responsibilities? Change of role?*
- *Impact of COVID-19 on the delivery of services to non-COVID-19+ patients (i.e., cancellation of elective surgeries)*
- *What tasks are you able to do more or less effectively?*
- *How do you manage the isolation of suspected cases and confirmed cases?*
- *Has there been appropriate transfer of patients within and out of hospital?*
- *Has there been an impact on staff's ability to make diagnoses and act on them?*
- *Has the supply of drugs, equipment and PPE been affected?*
- *Have staff been redeployed from or within your health facility?*

3. Do you currently have any concerns or fears in relation to ...

- Work (response efforts, PPE, services)
- The national effort

4. How has your life at home been impacted by COVID-19?

5. Mental health support (to address risk of moral injury, trauma and developing severe mental health problems)

- Are you aware of any support available for staff wellbeing and mental health?
- Have you had the opportunity to talk about your mental health with your supervisor/team leader?
- Have you had worrying experiences in the last week? Did you receive support after? If so, what type of support? (including formal and informal support)
- Interactions between peers: Do you have time to socialise with your team? What has changed with COVID-19?

6. Do you feel your experience has been different from other HCWs? Does gender play a role? How about race or ethnicity?

Probes (relevant to non-BAME participants who mention ethnicity/race too):

- Have you been impacted by the news that BAME HCWs have been disproportionately dying of COVID-19? [*Probe for how they have been impacted (e.g. emotionally, practically...) and whether (and how) they have been supported by management*]

- Have you received a risk assessment as a BAME HCW? [*Whether they answer yes or no:*] How do you feel about it? [*Background information for the interviewer: NHS England, in response to disproportionate impact of C19 on BAME HCWs, introduced risk assessments that specifically consider the physical and mental health of BAME staff*]
- Have wider news of BAME population in the UK being disproportionately impacted by COVID-19, as well as the wider BLM movement, affected you alongside your experiences working through the pandemic? [*Probe on how they were affected*]
- How was redeployment approached at your facility? [*Probe on any patterns of redeployment and if certain groups, e.g., BAME HCWs, seemed more likely to be redeployed*]

7. VACCINATION QUESTIONS

1. Have you heard anything about COVID-19 vaccines? Where?
2. What do you think about these vaccines?

Effectiveness:

General question – How effective do you think the vaccine will be?

Example prompts:

- What are the potential benefits of the vaccine?
- Do you think it will provide immunity? If so, how long do you think it will provide immunity?
- Do you think “booster” shots will be necessary to extend immunity?
- Do you think it will be effective in fighting different mutations of the virus?

Sub-question: (effectiveness of) different vaccine types:

- Did you know that there are different types of vaccines?
- Do you think the effectiveness of these vaccines varies?
- Does the general public feel differently about these vaccines?

Safety:

1. What do you think about the potential risks and benefits of having the vaccine?

Example prompts:

- If so, do you think they will be long-term?
- Are you personally willing to accept any of these risks?
- Have you ever discussed these potential risks with family, friends, or patients?
- Do you feel obligated to promote the vaccine?

Vaccine delivery:

1. (Delivering the vaccine to the population) What do think about the work of delivering the vaccine at scale??

Example prompts:

- How practical and probable do you think mass vaccination is?
- Have you heard anything about the strategies the UK will use to deliver the vaccine?
- Will you play a role in vaccination? If so, what role specifically?

2. (Delivering the vaccine to HCWs) How should we prioritise access to the vaccine for HCWs?

Example prompts:

- Do you think everyone will have access immediately or will a ranking system be implemented?
 - What place in the ranking do you think HCWS will occupy?
3. What impact do you think vaccination will have on the NHS?

Personal choices/decisions:

1. Do you think HCWs should be vaccinated? Should they be a priority group?
2. If the vaccine were available tomorrow, would you get vaccinated?

GENERAL REFLECTIONS

Again – framing in relation to the first wave – ‘Based on what you have learnt and experienced over the past few months... ‘

8. How have health services been strengthened, or how could they be strengthened during the outbreak?

Probes:

- **Support to HCWs from the health system and partners?**
- **Capacity for rapid response**
- *Policies? e.g., Guidance and emergency protocols?*
- *What would help HCWs to maintain normal services as well as COVID related services?*
- *If GP: Health promotion and community engagement. How?*
- *If GP: Linkage to other support organisations, e.g., charities, schools?*

9. Is there anything you feel should be changed to make health services more effective in future emergencies?

Probes:

- **Support to HCWs? From whom and How?**
- *Coordination and official guidance of COVID-19 response.*
- **Early detection and reporting.**
- *On-going health promotion and community education. E.g., potential sources of infection, safe practice?*
- *Mobilisation? E.g., identifying and coordinating trusted community volunteers and support?*
- *Disease outbreak control activities?*
- **Testing (public and staff)**

10. Do you have any caring responsibilities, such as children or elderly family members?

If yes:

- a. How are you managing care during the COVID-19 pandemic?
- b. *(If they have children)* How has being a HCW during the pandemic impacted your ability to parent?
- c. What fears, worries, or emotions arise from the responsibility of caring for others during this time?

11. Are you pregnant?

- a. If so, how has this impacted your work and experience as a HCW during the COVID-19 pandemic?

12. Is there anything else you would like to mention that you feel is important?

Thank you for your time and for sharing your opinions and experiences with us.

Appendix 3

Policy review inclusion criteria:

- Published between 1 December 2020 and 15 February 2021;
- Related to the COVID-19 pandemic;
- Related to the UK's mass vaccination programme.

Appendix 4

Policy/guidance title	Publication location	Date of publication	Scope	Healthcare sector
Week One: Implementing the Covid Vaccination Programme	NHS England and NHS Improvement	4-Dec-20	50 hospital hubs only (in England - from Policy ID 3)	Secondary/tertiary care
COVID-19 vaccinator competency assessment tool	Public Health England	Document created 27-Nov-20 and updated 6-Dec-2020	United Kingdom	Facilities involved in the COVID-19 vaccination programme
COVID-19 vaccinations and care homes: programme launch	GOV.UK	4-Dec-20	England	Secondary/tertiary care
COVID-19 vaccination programme: Information for healthcare practitioners	Public Health England	Document created 27-Nov-20 and republished 31-Dec-20	United Kingdom	NA
Greenbook chapter 14a	GOV.UK	Document first published 27-Nov-20 and last updated 31-Dec-20	United Kingdom	NA
Joint Committee on Vaccination and Immunisation: advice on priority groups for COVID-19 vaccination	GOV.UK	30-Dec-20	United Kingdom	NA
COVID-19 vaccination: protection for healthcare workers	GOV.UK	Document first published 7-Dec-20 and last updated 31-Dec-20	United Kingdom	NA

COVID-19 vaccination: guide for older adults	GOV.UK	Document first published 7-Dec-20 and last updated 31-Dec-20	United Kingdom	NA
COVID-19 vaccination: a guide for women of childbearing age, those currently pregnant or breastfeeding	GOV.UK	Document first published 6-Dec-20 and last updated 31-Dec-20	United Kingdom	NA
COVID-19 vaccination: a guide for social care staff	GOV.UK	Document first published 7-Dec-20 and last updated 31-Dec-20	United Kingdom	Social care
The safety of COVID-19 vaccines when given in pregnancy	GOV.UK	Published 18-Dec-20	United Kingdom	NA
Training recommendations for COVID-19 vaccinators	GOV.UK	Last updated 8-Dec-20	United Kingdom	NA
Vaccination in pregnancy	GOV.UK	Published 1-May-10 and last updated 31-Dec-20	United Kingdom	NA
Annex A: Report to JCVI on estimated efficacy of a single dose of Pfizer BioNTech (BNT162b2 mRNA) vaccine and of a single dose of ChAdOx1 vaccine (AZD1222)	GOV.UK	Published 22-Dec-2020	United Kingdom	NA
Annex B: comparison between 1 and 2 dose prioritisation for a fixed number of doses	GOV.UK	Published Jan-2021	United Kingdom	NA
COVID-19 vaccination programme	BMA	Published 15-Feb-2021	England	General practice
COVID-19 vaccination programme: Information for healthcare practitioners	GOV.UK	Re-published 11-Feb-2021	United Kingdom	NA
PHE immunisation inequalities: local action plan template	GOV.UK	Published Feb-2021	England	NA

National Immunisation Programme: health equity audit	GOV.UK	Published Feb-2021	England	NA
PHE Immunisation Inequalities Strategy	GOV.UK	Published 2-Feb-2021	England	NA
Integration and Innovation: working together to improve health and social care for all	GOV.UK	Published Feb-2021	England	NA
Optimising the COVID-19 vaccination programme for maximum short-term impact	GOV.UK	Last updated 26-Jan-2021	United Kingdom	NA
UK COVID-19 vaccines delivery plan	GOV.UK	Published 11-Jan-2021	United Kingdom	NA