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Perceptions and experiences of healthcare workers during the COVID-19 pandemic in the United Kingdom

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ABSTRACT

Objective: The COVID-19 pandemic has set unprecedented demand on the healthcare workforce around the world. The UK has been one of the most affected countries in Europe. The aim of this study was to explore the perceptions and experiences of healthcare workers in relation to COVID-19 and care delivery models implemented to deal with the pandemic in the UK.

Methods: The study was designed as a rapid appraisal combining: 1) a review of UK healthcare policies (n=35 policies), 2) mass media and social media analysis of frontline staff experiences and perceptions (n=101 newspaper articles and n=146,000 posts), and 3) in-depth (telephone) interviews with frontline staff (n=30 interviews). The findings from all streams were analysed using framework analysis.

Results: Limited PPE and lack of routine testing created anxiety and distress and had a tangible impact on the workforce. When PPE was available, incorrect size and overheating complicated routine work. Lack of training for redeployed staff and the failure to consider the skills of redeployed staff for new areas were identified as problems. Positive aspects of daily work reported by HCWs included solidarity between colleagues, the establishment of wellbeing support structures, and feeling valued by society.

Conclusion: Our study highlighted the importance of taking into consideration the experiences and concerns of frontline staff during a pandemic. In the case of COVID-19 in the

UK, staff have advocated in favour of clear and consistent guidelines, streamlined testing of HCWs, administration of PPE and acknowledgement of the effects of PPE on routine practice.

STRENGHTS AND LIMITATIONS OF THIS STUDY

- The study captured the experiences of healthcare workers during the pre-peak, peak and early post-peak of the COVID-19 pandemic in the UK
- The study combined data from three sources: media (newspaper articles and social media), public policies and interviews with frontline staff
- Data were collected over a period of five months, potentially missing information in the post-peak period
- Even though the media analysis and policy review were national in scope, the interviews were mainly carried out in London (potentially missing other experiences across the country)

BACKGROUND

Research on the design and implementation of global epidemic response efforts has pointed to the importance of considering staff perceptions and experiences of care delivery. Research from high-income settings highlights the following factors as influencing the behaviour of healthcare workers (HCWs) during epidemics: fear of contagion, concern for family health, interpersonal isolation, quarantine, trust in and support from their organisation, information about risks and what is expected of them, and stigma (1-3). Experience from the 2003 SARS outbreak provides evidence that healthcare workers experience anxiety, stress and fear due to providing direct patient care (4). During an outbreak, HCWs work long hours under pressure, often without proper resources and while accepting inherent dangers. These conditions can also cause discomfort with government policies and guidelines (e.g. guidelines of reuse of personal protective equipment (PPE)) (4, 5).

In order to offset the fears and uncertainties mentioned above, staff benefit from strong leadership, supportive supervision, peer support networks and access to reliable communication technology (4, 6). Potential strategies to mitigate stress include: organisational implementation of infection prevention control (IPC), delivery of staff training, and complying with the supply of PPE (1, 7-9). These studies have called for more research into factors that influence HCWs' experiences of providing care during infectious disease outbreaks.

The COVID-19 pandemic has set unprecedented demand on healthcare systems globally. Emerging research from multiple countries have included reports of HCW fatigue, distress and anxiety as well as positive emotional responses (e.g. 'growth under pressure') and helpful coping mechanisms (10). In the case of the United Kingdom (UK), the COVID-19 pandemic impacted a public healthcare system, the National Health Service (NHS), already struggling with workforce issues including high vacancy and low retention rates of staff, limited bed capacity, and funding cuts (11). On 23 March 2020, the UK went into lockdown, trying to enforce social distancing policies across the population to reduce the burden on the healthcare system. In order to increase capacity across hospitals, the NHS announced on 15 April 2020 the prioritisation of cancer treatments and suspension of all non-urgent elective surgery for three months. Operating theatres were also repurposed, and private facilities were commissioned for NHS services (12).

Strategies to address workforce gaps included: the redeployment of staff, the reintegration of recently retired staff into the active workforce, and early graduation of medical students (12). Recent surveys have reported staff anxiety and fears regarding their ability to safely carry out their daily work (13, 14). However, more in-depth, qualitative analyses of the experiences of frontline staff in the UK during the COVID-19 pandemic are missing. We have sought to

address this gap by carrying out a rapid appraisal to explore the perceptions and experiences of healthcare workers in relation to COVID-19 and care delivery models implemented to deal with the pandemic in the UK.

RESEARCH QUESTIONS

The main research questions guiding the study were:

1. What are HCWs experiences of delivering care in the context of the COVID-19 pandemic?
2. Do HCWs feel they have the proper training and supplies to work with patients potentially infected with COVID-19? If not, what additional resources would help them to do their work more effectively?
3. Do HCWs experience any concerns delivering care in the context of a pandemic? If so, what are the underlying causes of their concerns with regards to COVID-19 and how can these be addressed?

METHODS

The study was designed as a rapid appraisal combining three streams of work: 1) a review of UK healthcare policies, 2) mass media and social media analysis of frontline staff experiences and perceptions during the pandemic, and 3) in-depth (telephone) interviews with frontline staff (see Table 1). In this article, we share emerging findings from this study based on data collected from December 2019 to the end of April 2020 (covering the pandemic pre-peak, peak and early post-peak). Rapid appraisals are commonly developed to collect and analyse data in a targeted and iterative way within limited timeframes, often to 'diagnose' a situation (15, 16). A rapid appraisal design often combines two or more methods of data collection and then uses triangulation from different sources as a form of data validation (16).

UK healthcare policy review

The aim of the healthcare policy review was to understand how healthcare delivery has been reorganised in light of the COVID-19 pandemic in the UK. We followed the framework set out by Tricco et al. (17) for rapid evidence synthesis. We searched for government policies on legislation.gov.uk, gov.uk, National Health Service England (NHSE) and Public Health England (PHE) databases using the search strategy and inclusion criteria included in Appendix 1.

One researcher selected the policies that met these criteria. A second researcher extracted and inputted the data in an Excel spreadsheet. Data were cross-checked across reviewers. A third researcher with expertise in health systems analysis identified the main topics emerging from the data and developed a conceptual framework tailored to the unique characteristics of the COVID-19 response, but its development was cross-referenced with elements described in the WHO's Strategic Framework for Emergency Preparedness and Khan et al.'s (18) Public Health Emergency Preparedness Framework. The tailored framework became a working document that was modified as new policies were added to the analysis and as existing policies were amended by government authorities.

Mass media and social media analysis

The aim of the media analysis was to capture the perceptions and experiences of healthcare workers as reported by them or third parties in the media. We used the same approach for rapid evidence synthesis as in the case of the policy review. The media analysis included a review of mass media (mainly newspaper articles) and social media.

Mass media

We reviewed published newspaper articles by running a search on the Nexis database. The full search strategy and inclusion criteria can be found in Appendix 1. Results were exported in Excel spreadsheets. We also hand searched newspaper and magazine articles in relevant media sources. One researcher screened the articles in the title and full text phase, and two researchers cross-checked exclusions. Disagreements were discussed until consensus was reached.

The included articles were analysed using a data extraction form developed in REDCap (Research Electronic Data Capture). The form was developed and piloted after the initial screening of full-text articles by two independent researchers using a random sample of five articles. Disagreements were discussed until consensus was reached. The data extraction form was finalised based on the findings from the pilot. Data were exported from REDCap and the main article characteristics were synthesised. The information entered was exported from REDCap and analysed using framework analysis (19).

Social media

Our sample concentrated on Twitter, but we also searched for relevant content on Reddit, Facebook (publicly available groups), Instagram (public accounts), and YouTube from December 2019 to April 2020 (for the purpose of this paper, analysis is currently ongoing). Using the media monitoring software 'Meltwater', we conducted an English language Boolean query keyword search. The search terms were adapted from those used for the mass media search, excluding for irrelevant posts. All posts were coded by two researchers into pre-defined categories to create a final dataset. We checked inter-coder reliability and code in parallel to determine if this diverged too greatly below a pre-determined accuracy score.

Once the initial coding was complete, we cleaned the dataset of duplicates or semi-duplicates (e.g. when a post is retweeted with the prefix 'RT' or by a user/bot that uses random characters to avoid being recognised by Twitter detection algorithms for mass postings). We used a semantic discourse and topic analysis in order to understand the most frequent and weighted keywords, viral hashtags and prioritised themes of discussion, and clusters of topics (within and across countries) with a primary focus on the UK. The analysis was put into context with the outbreak situation in the UK, and the corresponding response of the government and public to the operation of the health system.

In-depth (telephone) interviews

In-depth, semi-structured interviews with frontline staff were carried out over the phone during April 2020 and audio recorded with consent of the participants. Interviews with staff are ongoing and will continue to document perceptions and experiences as the pandemic evolves. Interview topics focused upon HCW perceptions of the virus, patients, and the healthcare system. A purposive sample of thirty HCWs was selected for interview based on their role as a health service provider (see Table 1). Following a rapid appraisal design, five interviewers documented the primary themes arising from their discussions with detailed notes imported into a summarising Rapid Assessment Procedures (RAP) sheet. RAP sheets allowed for the early identification of findings and facilitated the implementation of analysis as data collection was ongoing. Key segments of interview data were also selectively transcribed to provide representative quotes from identified themes.

Table 1. Rapid appraisal design. See Appendix 1 for additional details.

Data source	Method of data collection	Sample	Method of data analysis
Policy review	Policies were selected from legislation.gov.uk, gov.uk, NHSE and PHE databases.	35 policies published between 1 December 2019 and 20 April 2020.	Data were extracted into Excel by one researcher and cross-checked by a second researcher who created a conceptual framework to categorise the policies.
Media analysis	Review of newspaper articles obtained from LexisNexis.	101 newspaper articles published between 1 December 2019 and 20 April 2020.	Data extracted using REDCap and analysed for content using framework analysis (coding carried out by two researchers).
	Data were selected using the software 'Meltwater' and sorted into pre-established categories.	146,000 social media posts were collected from the period between 1 December 2019 and 30 April 2020.	Two researchers analysed content using inclusion and exclusion framework, and coded the selected posts independently.
Frontline staff interviews	In-depth, semi-structured telephone interviews with a purposive sample of staff.	30 staff members working in emergency departments and intensive care units in three hospitals (doctors, nurses and allied health professionals with different levels of training and expertise).	RAP sheets were used to synthesise findings on an ongoing basis. Selected transcripts were generated and analysed using framework analysis.

RESULTS

In this section, we present the main emerging findings from the three streams of work (see Table 2 for a summary).

Table 2. Summary of findings from all three workstreams.

Emerging findings from all three workstreams	Examples from media analysis (including social media)	Representative quotes from the interviews	Content from UK policies
Concerns about changing and inconsistent guidelines	Staff used social media to share guidelines among colleagues.	*"A protocol a day for every single step [...] becomes obsolete after 24 hours."*	Policies related to PPE, for instance, changed over the course of the pandemic, with one major change being the allowance of PPE reuse.
Lack of training (for redeployed staff but also in relation to PPE)	Newspaper articles indicated that HCWs felt that advice, information and	*"We had training on a specific kind of face mask but other than that have not really had training."*	

	training were insufficient.	*"In ICU the non-specialist nurses change every day and have to relearn skills."*	
Lack of streamlined and inconsistent testing of NHS staff	"Many healthcare professionals are questioning why they, as frontline NHS staff, are continuing to be denied testing for COVID-19 whilst an MP [Member of Parliament] has not" (News article, 12 March 2020).	*"Staff are jeopardising the life of their own families."* *"At one point we were told we might not get tested even though one person in the team had confirmed COVID which seemed to go against previous suggestions."*	Policies and the infrastructure on testing HCWs increased throughout the study.
Difficulties with PPE use (size, overheating, dehydration)	HCWs tweeted about dehydration and fasting during Ramadan.	*"Claustrophobic, even for half an hour. You can't breathe, it is hot and heavy. Can't interact properly."* *"Even the small sized masks are designed for small men rather than women."*	Guidelines urged HCWs following Ramadan, and their NHS colleagues to support the need to take breaks and stay hydrated while fasting and wearing PPE.
Good wellbeing support		*"We've got a whole well-being group that we've set up…there's been a lot of focus on trying to help staff through this."* *"We are busting a gut to do what we can for staff morale."*	National guidelines have included more information on revised methods of delivering mental health services than on their availability and use by health workers.
Solidarity among colleagues	On social media some affirmed pride in their jobs.	*"The way people come together in a crisis has been a very enjoyable part of it…staff have formed new connections which I think they'll strengthen our network at work and strengthen the way we work together."*	
Demonstration that quick changes are possible in the healthcare system	"We would not expect our system to be overwhelmed but would expect it to be radically changed (News	*"Demonstrated that change can be done quickly, what normally takes a year can be done in week (red tape). We are able to do more in a short time."*	Rapid establishment of 3 laboratories to develop testing kits for COVID-19 to test HCWs.

	article, 05/03/2020)."	*"'Some of what we've had to do will be the catalyst for changes that we thought we would make at some point in the future but hadn't had the means to do."*	

Changing guidelines and limited training

Some HCWs were redeployed and relieved of their regular duties to provide support for a surge in admissions and increase capacity in ICU. Staff reported feelings of apprehension regarding redeployment, but described colleagues as very supportive through the transition. Very few HCWs reported being adequately trained for their redeployment; often, PPE training or PPE simulation was the only support available from management. The analysis of newspaper articles indicated that HCWs felt that advice, information, and training were insufficient (or too rapidly changing), demonstrated further in the social media analysis. This repeatedly included HCWs feeling that there was inconsistency in advice and in many cases, this led to an increased sense of lack of preparedness and ability to cope.

Social media analysis found that to support each other through the need for training and changes in delivery of care and redeployment, HCWs were setting up weekly chats via Twitter around specific hashtags (e.g. #PhysioTalk), where discussions of new COVID-19 procedures in the treatment and rehabilitation of patients and online training slides were shared. Remote training materials were also utilised for newly redeployed staff, while evolving guidelines were adapted to help train medical students close to graduating. Transcripts of these chats and any policy or other documents shared were archived on related websites/dropboxes, so that HCWs could refer to these on an ongoing basis.

Testing of HCWs

Our policy review indicated that, by 27 March 2020, the government set to establish a testing programme using three laboratories to develop testing kits for all NHS staff with the objective of testing all HCWs for COVID-19 (20). Our interviews indicated that staff perceived the testing of HCWs as an intrinsic component of sustaining a healthy workforce throughout the pandemic, though there was ambivalence about the speed and effectiveness of tests. This was especially true during the first few weeks of the pandemic, when staff reported having to stay home if they or someone in their household presented with symptoms indicative of COVID-19, putting extra pressure on the remaining staff. This reportedly improved towards the end of data collection, but tests were still difficult to access for some and high levels of false negatives remained an issue.

Concerns about contagion and personal wellbeing

One of the main areas of concern, particularly towards the end of data collection was related to PPE. The policy review indicated that, prior to addressing a patient's needs, healthcare workers must don the appropriate PPE and ensure adequate hand hygiene. Despite the fact that some of the PPE recommended for use during the COVID-19 outbreak is single use, on 17 April 2020, PHE approved the reuse of PPE in cases where there was an acute shortage and where it was "safe to do so" (21).

The analysis of newspaper articles indicated that there was frustration expressed by HCWs at changing advice, hospitals not keeping up to date or lack of advice all together. Advice, information and training enveloped PPE, self-isolation, quarantining of patients, testing and the protection of HCW's (and their families). In the interviews, many HCWs stated that PPE guidance had changed multiple times for specific procedures and across the hospital (sometimes every week); donning PPE incorrectly and then bringing the virus home to their

families had therefore become a source of anxiety. One senior doctor reported, “PPE training only happened because of local engagement from clinicians rather than management”. Anxiety was worsened by media reports of HCWs becoming ill. Where staff were confident with PPE supply, this was because managers fought to ensure their staff had enough. Visors were mentioned as being specifically hard to locate.

There were reports of staff overheating during long shifts wearing PPE combined with difficulties taking water and toilet breaks while wearing equipment. This was exacerbated during the interviews carried out towards the end of April due to warmer climate (and lack of air-conditioned hospital facilities) and the start of Ramadan. Some staff reported that regulations implemented to allow HCW breaks every two hours wearing PPE were often not feasible due to limited staff capacity, guilt at ‘wasting’ PPE (in single use equipment) and the time burden of changing in and out of PPE. On social media, worry surrounding dehydration was also expressed by HCWs tweeting about dehydration and fasting during Ramadan (n=30 tweets between 15 – 26th April). This was met with response from various NHS hospital and hospital Twitter accounts and a collaboration between the NHS Muslim network, the BIMA (British Islamic Medical Association) and the NHS (n=10 tweets). They shared links and infographic guidelines on Twitter, urging HCWs following Ramadan and their NHS colleagues to support the need to take breaks and stay hydrated while fasting and wearing PPE (22).

Areas of good practice

Many staff members reported that working conditions were very stressful and anxiety-inducing, but that wellbeing support was variable across hospitals. Many HCWs appreciated the increased availability of psychological support and having a physical space they could utilise for breaks (e.g. ‘wobble rooms’, sofas, health hubs) but called for more support on site. HCWs expressed many positive feelings regarding the morale and camaraderie of staff. Many voiced their appreciation of food support from neighbours and local businesses and felt that the public really recognised the importance of the NHS. On social media, a wide variety of HCWs affirmed pride in their jobs and called on the need to be adaptable, resilient and flexible, often using the #NHSheroes hashtag. HCWs were appreciative of the positive messages and rainbow pictures from the public and donations, especially visors. Several HCWs called for a better celebration of successes by sharing good news stories and figures about patients recovering and being discharged.

Recommendations for other countries and future pandemics

When asked about recommendations, staff continuously requested improved testing and consistent guidance for PPE for all staff. Staff also explained that allowing breaks every two hours while wearing PPE was effective in preventing dehydration. It was mentioned that there needed to be improved redeployment of staff, specifically nurses, where some nurses were sent to new areas without considering their skillset. Clearer guidance at an earlier stage was also called for, specifically in relation to training. Some senior doctors felt that they had to take control and offer training, rather than it being delivered by managers.

Overall, it was widely reported that the pandemic had instigated rapid changes to the system, of which many would usually take a long time to implement. Several HCWs believed that change in the system should be continued and that improvements should not be undone. For example, one senior doctor explained that with moving forward, “the key thing is to not reduce the care capacity once it’s been increased”.

DISCUSSION

The COVID-19 pandemic in the UK shed light on existing fractures and deficiencies in the healthcare system related to underfunding, workforce deficiencies, and fragmentation. Our study found similar concerns from frontline staff relating to care delivery during COVID-19 as those reported by other countries (23-25). Limited PPE and lack of routine testing created

anxiety and distress and had a tangible impact on efforts to maintain a sustainable workforce. When PPE was available, incorrect size and overheating complicated routine work. The most recent literature on the use of PPE during the COVID-19 pandemic does not recognise the experiences of frontline staff using this equipment and the impact of incorrect sizes (normally too large for women) and heating (26). This represents a significant limitation in our understanding of PPE use, potential misuse, and its impact on HCWs' physical and mental health.

The redeployment of HCWs was used as a strategy to deal with capacity concerns, but lack of training for redeployed staff and the failure to consider the skills of redeployed staff and their match to the skills needed in new areas were identified as problems. Positive aspects of daily work reported by HCWs included solidarity between colleagues (in person and through social media platforms), the establishment of wellbeing support structures, and feeling valued by society. Sun and colleagues (10) report a similar situation in China, where good teamwork within nursing teams generated positive emotions during the pandemic. Staff also felt that changes carried out during the pandemic indicated that, when necessary, the healthcare system was able to implement changes in routine practice at a rapid pace. The pressures generated by the pandemic restructured internal processes, so clinicians and managers working on the frontline felt their proposals were heard by senior staff. HCWs hoped that these approaches to transformation and quality improvement would remain after the pandemic had subsided.

Our study highlights the importance of taking into consideration the experiences and concerns of frontline staff during a pandemic. In the case of COVID-19, staff have advocated in favour of clear and consistent guidelines, streamlined testing of HCWs, administration of PPE and acknowledgement of the effects of PPE on movement and heat. Our study has also shown that supportive working environments can be motivating for staff under pressure and valuable learning – particularly in relation to the processes used to make improvements in care delivery – can emerge from the challenging circumstances of delivering care in the context of a pandemic.

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We do not have any funding to declare.

COMPETING INTERESTS

The authors do not have any competing interests to declare.

PATIENT AND PUBLIC INVOLVEMENT STATEMENT

Patients or the public were not involved in the design, or conduct, or reporting, or dissemination plans of our research.

ETHICAL APPROVAL STATEMENT

The study was approved by the Health Research Authority (HRA) in the UK (IRAS: 282069).

CONTRIBUTORSHIP STATEMENT

CVP and GJ designed the study. LA, EBG, HR, SS, SM and SV contributed to the media analysis. LM and SLJ contributed to the policy review. AD, HF, LMi, NR, KS, GS, AS contributed to the telephone interviews. All authors participated in the analysis of data. CVP led the drafting of the manuscript, but all authors contributed to the writing and approved the final version before submission.

DATA SHARING STATEMENT

All data relevant to the study are included in the article or uploaded as supplementary information.

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APPENDIX 1 – Search strategies and article selection.

Search strategy for rapid analysis of newspaper articles (LexisNexis): ("healthcare professionals"[All Fields] OR "healthcare worker"[All Fields] OR "doctor"[All Fields] OR "nurse"[All Fields]) AND (("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields]) OR corona[All Fields] OR ("COVID-19"[All Fields] OR "severe acute respiratory syndrome coronavirus 2"[Supplementary Concept] OR "severe acute respiratory syndrome coronavirus 2"[All Fields] OR "2019-nCoV"[All Fields] OR "SARS-CoV-2"[All Fields] OR "2019nCoV"[All Fields] AND ("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields])) AND 2019/12[PDAT] : 2030[PDAT])))

The inclusion criteria for newspaper articles included in our analysis were:

1) Focus on the perspectives or experiences of healthcare workers (self-reported or narrated in third person);
2) Focus on the response strategies aimed at COVID-19;
3) Published from 1 December 2019 to 17 March 2020 (for the purpose of this paper); and
4) Published in English.

Search strategy for UK policy review: COVID-19 OR coronavirus OR corona.

Inclusion criteria:

1) Published from 1 December 2019 to 20 April 2020;
2) Aimed at healthcare delivery (i.e. not focusing on prevention, social isolation, etc.);
3) Related to the COVID-19 pandemic.

Search strategy for social media analysis (Meltwater):

Search terms

((bio:"healthcare professional" OR bio:"healthcare worker" OR bio:"doctor" OR bio:"NHS" OR bio:"nurse" OR bio:"physio*" OR bio:"Paramedic" OR bio:"Ambulance work*" OR bio:"Ambulance driver*") AND ("coronavirus" OR "#coronavirus" OR “corona” OR "COVID-19" OR "COVID 19" OR "COVID19" OR "#COVID19" OR "COVID_19" OR "COVID" OR "severe acute respiratory syndrome coronavirus 2" OR "severe acute respiratory syndrome coronavirus 2" OR "2019-nCoV" OR "SARS-CoV-2" OR "2019nCoV" OR "physio*" OR "PPE") OR

("i am" OR "as a" OR "source: I" OR "I'm a") near/5 ("doctor" OR "nurse" OR "doctors" OR "nurses" OR "Paramedic" OR "Ambulance worker" OR "Ambulance driver") AND ("coronavirus" OR "#coronavirus" OR “corona” OR "COVID-19" OR "COVID 19" OR "COVID19" OR "#COVID19" OR "COVID_19" OR "severe acute respiratory syndrome coronavirus 2" OR "severe acute respiratory syndrome coronavirus 2" OR "2019-nCoV" OR "SARS-CoV-2" OR "2019nCoV" OR "physio*" OR "PPE") NOT ("I am not" OR "I'm not"))

NOT ("RT" OR "QT")

Inclusion/Exclusion Criteria

To assess for predefined inclusion and exclusion criteria, imported news articles and news blogs use the URL’s in Excel to access the full article. For social media data, the Hit Sentence was used to assess relevance and if they meet inclusion and exclusion criteria. For YouTube Media the URL was used to generate a transcription of the video and was screened for inclusion and exclusion data.

Inclusion Criteria

1. Content refers specifically to experience of Healthcare Workers (HCW) of healthcare delivery during the COVID-19 pandemic

Note: We are privileging first-hand accounts of experience but also included second-hand accounts if they refered directly to HCW experience of healthcare delivery.

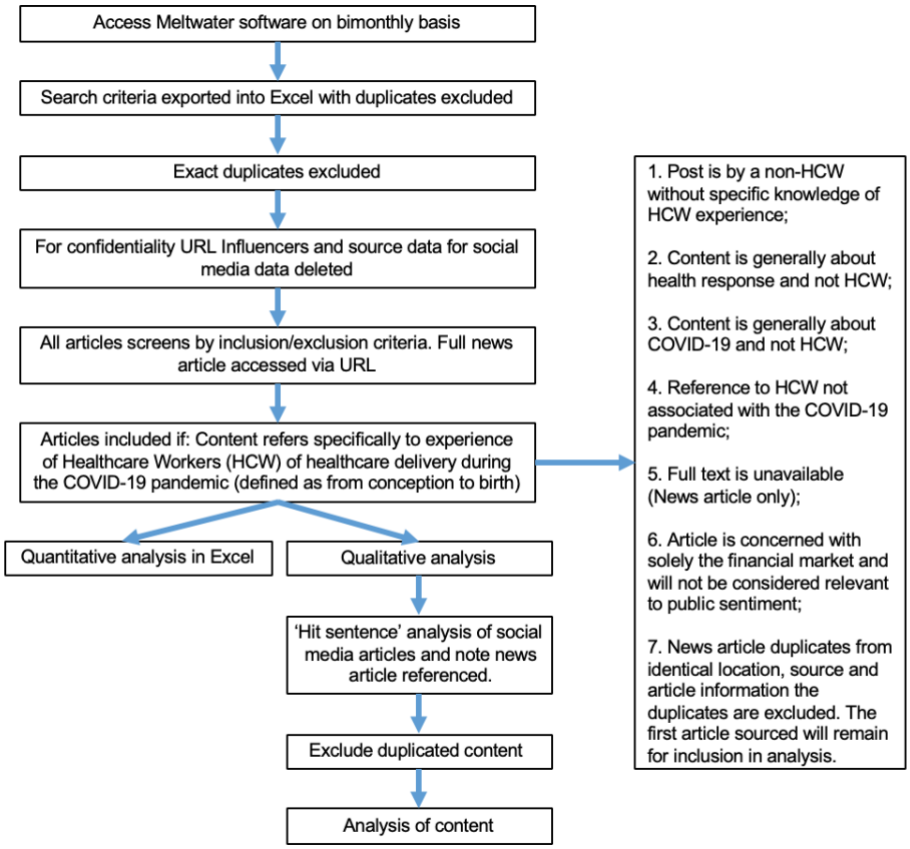
Information source:

- HCW: first-had account
- HCW: second-hand account
    - Influencer (e.g. social media figure)
    - Public figure (e.g. celebrity, politician, academic)
    - Media story reference (news reporting)
    - Social media post reference
    - Public health or health organisation messaging
    - Government messaging
- Other

Exclusion Criteria

1. Post is by a non-HCW without specific knowledge of HCW experience;
2. Content is generally about health response and not HCW;
3. Content is generally about COVID-19 and not HCW;
4. Reference to HCW not associated with the COVID-19 pandemic;
5. Full text is unavailable (News article only);
6. Article is concerned with solely the financial market and will not be considered relevant to public sentiment;
7. News article duplicates from identical location, source and article information the duplicates are excluded. The first article sourced remained for inclusion in analysis.

Flow diagram of social media assessment:



Key aspects of UK newspaper reporting of the perceptions and experiences of healthcare workers (HCWs) with COVID-19:

Coverage in UK newspapers	Overall		Jan		Feb		March	
N articles (row)	N=50	100 %	N=1	2%	N=7	14%	N=43	86%
Key issues reported								
Insufficient advice/info/training	23	46%	0	0%	4	57.14%	19	44.19%
Adaption	23	46%	0	0%	1	14.29%	22	51.16%
Concerns over ability to cope	19	38%	0	0%	2	28.57%	17	39.53%
Personal protective equipment	18	36%	1	100%	0	0%	17	39.53%
Personal fears / family	17	34%	0	0%	1	14.29%	17	39.53%
Diagnostic resources	17	34%	1	100%	0	0%	16	37.21%
Contact tracing	8	16%	0	0%	3	42.86%	5	11.63%
Hospital infrastructure	14	28%	0	0%	1	14.29%	13	30.23%
Re-prioritisation/ Knock on effects	8	16%	0	0%	1	14.29%	7	16.28%

COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	
Occupation	3	What was their occupation at the time of the study?	
Gender	4	Was the researcher male or female?	
Experience and training	5	What experience or training did the researcher have?	
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	
Sample size	12	How many participants were in the study?	
Non-participation	13	How many people refused to participate or dropped out? Reasons?	
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	
Field notes	20	Were field notes made during and/or after the inter view or focus group?	
Duration	21	What was the duration of the inter views or focus group?	
Data saturation	22	Was data saturation discussed?	
Transcripts returned	23	Were transcripts returned to participants for comment and/or	

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	
Description of the coding tree	25	Did authors provide a description of the coding tree?	
Derivation of themes	26	Were themes identified in advance or derived from the data?	
Software	27	What software, if applicable, was used to manage the data?	
Participant checking	28	Did participants provide feedback on the findings?	
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	
Data and findings consistent	30	Was there consistency between the data presented and the findings?	
Clarity of major themes	31	Were major themes clearly presented in the findings?	
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

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BMJ Open

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Perceptions and experiences of healthcare workers during the COVID-19 pandemic in the United Kingdom

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ABSTRACT

Objective: The COVID-19 pandemic has set unprecedented demand on the healthcare workforce around the world. The UK has been one of the most affected countries in Europe. The aim of this study was to explore the perceptions and experiences of healthcare workers (HCWs) in relation to COVID-19 and care delivery models implemented to deal with the pandemic in the UK.

Methods: The study was designed as a rapid appraisal combining: 1) a review of UK healthcare policies (n=35 policies), 2) mass media and social media analysis of frontline staff experiences and perceptions (n=101 newspaper articles, n=146,000 posts), and 3) in-depth (telephone) interviews with frontline staff (n=30 interviews). The findings from all streams were analysed using framework analysis.

Results: Limited personal protective equipment (PPE) and lack of routine testing created anxiety and distress and had a tangible impact on the workforce. When PPE was available, incorrect size and overheating complicated routine work. Lack of training for redeployed staff and the failure to consider the skills of redeployed staff for new areas were identified as problems. Positive aspects of daily work reported by HCWs included solidarity between colleagues, the establishment of wellbeing support structures, and feeling valued by society.

Conclusion: Our study highlighted the importance of taking into consideration the experiences and concerns of frontline staff during a pandemic. Staff working in the UK during

the COVID-19 pandemic advocated clear and consistent guidelines, streamlined testing of HCWs, administration of PPE and acknowledgement of the effects of PPE on routine practice.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- The study captured the experiences of HCWs during the pre-peak, peak and early post-peak of the COVID-19 pandemic in the UK;
- The study combined data from three sources: public policies, media (newspaper articles and social media), and interviews with frontline staff;
- Most of the interview participants were doctors and had high levels of seniority leading to the limited representation of the views of HCWs;
- We made an effort to identify themes that cut across media, policy and interview data through a process of triangulation, but it is important to consider that this data was generated in different contexts and for different purposes;
- Even though the media analysis and policy review were national in scope, the interviews were mainly carried out in London (potentially missing other experiences across the country).

BACKGROUND

Research on the design and implementation of global epidemic response efforts has pointed to the importance of considering staff perceptions and experiences of care delivery. Research from high-income settings highlights the following factors as influencing the behaviour of healthcare workers (HCWs) during epidemics: fear of contagion, concern for family health, interpersonal isolation, quarantine, trust in and support from their organisation, information about risks and what is expected of them, and stigma (1-3). Experience from the 2003 SARS outbreak provides evidence that HCWs experience anxiety, stress and fear due to providing direct patient care (4). During an outbreak, HCWs work long hours under pressure, often without adequate resources and while accepting inherent dangers. These conditions can also cause discomfort with government policies and guidelines (e.g. guidelines of reuse of personal protective equipment (PPE)) (4, 5).

In order to offset the fears and uncertainties mentioned above, staff benefit from strong leadership, supportive supervision, peer support networks and access to reliable communication technology (4, 6). Potential strategies to mitigate stress include: organisational implementation of infection prevention control (IPC), delivery of staff training, and complying with the supply of PPE (1, 7-9). These studies have called for more research into factors that influence HCWs' experiences of providing care during infectious disease outbreaks.

The COVID-19 pandemic has set unprecedented demand on healthcare systems globally. Emerging research from multiple countries have included reports of HCW fatigue, distress and anxiety as well as positive emotional responses (e.g. 'growth under pressure') and helpful coping mechanisms (10-12). In the case of the United Kingdom (UK), the COVID-19 pandemic impacted a public healthcare system, the National Health Service (NHS), already struggling with workforce issues including high vacancy and low retention rates of staff, limited bed capacity, and funding cuts (13). On 23rd March 2020, the UK went into lockdown with social distancing policies implemented across the population in an attempt to reduce the transmission of COVID-19 and the burden on the healthcare system. In order to increase capacity across hospitals, the NHS announced on 15th April 2020 the prioritisation of cancer treatments and suspension of all non-urgent elective surgery for three months. Operating theatres were also repurposed, and private facilities were commissioned for NHS services (14).

Strategies to address workforce gaps included: the redeployment of staff, the reintegration of recently retired staff into the active workforce, and early graduation of medical students (12). Recent surveys have reported staff anxiety and fears regarding their ability to safely carry out their daily work (15, 16). However, more in-depth, qualitative analyses of the experiences of frontline staff in the UK during the COVID-19 pandemic are missing. We have sought to address this gap by carrying out a rapid appraisal to explore the perceptions and experiences of HCWs in relation to COVID-19 and care delivery models implemented to deal with the pandemic in the UK.

RESEARCH QUESTIONS

The main research questions guiding the study were:

1. What are HCWs experiences of delivering care in the context of the COVID-19 pandemic?
2. Do HCWs feel they have the proper training and supplies to work with patients potentially infected with COVID-19? If not, what additional resources would help them to do their work more effectively?
3. Do HCWs experience any concerns delivering care in the context of a pandemic? If so, what are the underlying causes of their concerns with regards to COVID-19 and how can these be addressed?

METHODS

The study was designed as a rapid appraisal combining three streams of work: 1) a review of UK healthcare policies, 2) mass media and social media analysis of frontline staff experiences and perceptions during the pandemic, and 3) in-depth (telephone) interviews with frontline staff (see Table 1). In this article, we share emerging findings from this study based on data collected from December 2019 to the end of April 2020 (covering the pandemic pre-peak, peak and early post-peak). Rapid appraisals are commonly developed to collect and analyse data in a targeted and iterative way within limited timeframes, often to 'diagnose' a situation (17, 18). A rapid appraisal design often combines two or more methods of data collection and then uses triangulation from different sources as a form of data validation (19). The research team included junior and senior researchers with backgrounds in medical anthropology, public health and medicine. The team leads had experience carrying out rapid qualitative research in the context of infectious epidemics.

UK healthcare policy review

The aim of the healthcare policy review was to understand how healthcare delivery has been reorganised in light of the COVID-19 pandemic in the UK. We followed the framework set out by Tricco et al. (19) for rapid evidence synthesis. We searched for government policies on legislation.gov.uk, gov.uk, National Health Service England (NHSE) and Public Health England (PHE) databases using the search strategy and inclusion criteria included in Appendix 1.

One researcher selected the policies that met these criteria. A second researcher reviewed the policies and extracted data regarding the type of policy, healthcare sector it was aimed at, the type of changes in healthcare delivery it proposed and the duration of these changes. Data were cross-checked across reviewers. Using framework analysis (20), a third researcher with expertise in health systems analysis identified the main topics emerging from the data and developed a conceptual framework tailored to the unique characteristics of the COVID-19 response. The framework development was cross-referenced with elements described in the WHO's Strategic Framework for Emergency Preparedness and Khan et al.'s (21) Public

Health Emergency Preparedness Framework. The tailored framework became a working document that was modified as new policies were added to the analysis, and as existing policies were amended by government authorities.

Mass media and social media analysis

The aim of the media analysis was to capture the perceptions and experiences of HCWs as reported by them or third parties in the media. We used the same approach for rapid evidence synthesis as in the case of the policy review. The media analysis included a review of mass media (mainly newspaper articles) and social media.

Mass media

We reviewed published newspaper articles by running a search on the Nexis database. The full search strategy and inclusion criteria can be found in Appendix 1. Results were exported into Excel spreadsheets. We also hand-searched newspaper and magazine articles in relevant media sources. One researcher screened the articles in the title and full-text phase, and two researchers cross-checked exclusions. Disagreements were discussed until consensus was reached.

The included articles were analysed using a data extraction form developed in REDCap (Research Electronic Data Capture). The form was developed and piloted after the initial screening of full-text articles by two independent researchers using a random sample of five articles. Disagreements were discussed until consensus was reached. The data extraction form was finalised based on the findings from the pilot. Data were exported from REDCap and the main article characteristics were synthesised. The information entered was exported from REDCap and analysed using framework analysis (20).

Social media

Our sample concentrated on Twitter, but we also searched for relevant content on Reddit, Facebook (publicly available groups), Instagram (public accounts), and YouTube. Using the media monitoring software 'Meltwater' (22), we conducted an English language Boolean query keyword search. The search terms were adapted from those used for the mass media search, excluding for irrelevant posts. All posts were coded by two researchers into pre-defined categories to create a final dataset. We checked inter-coder reliability and code in parallel to determine if this diverged too greatly below a pre-determined accuracy score.

Once the initial coding was complete, we cleaned the dataset of duplicates or semi-duplicates (e.g. when a post is retweeted with the prefix 'RT' or by a user/bot that uses random characters to avoid being recognised by Twitter detection algorithms for mass postings). We used semantic discourse and topic analysis in order to understand the most frequent and weighted keywords, viral hashtags and prioritised themes of discussion, and clusters of topics (within and across countries) with a primary focus on the UK. The analysis was put into context with the outbreak situation in the UK, and the corresponding response of the government and public to the operation of the health system.

In-depth (telephone) interviews

In-depth, semi-structured interviews with frontline staff were carried out over the telephone during April 2020, and audio recorded with consent of the participants. Interviews with staff are ongoing and will continue to document perceptions and experiences as the pandemic evolves. Interview topics focused upon HCW perceptions of the virus, patients, and the healthcare system (see interview topic guide in Appendix 2). Following a rapid appraisal

design, five interviewers took detailed notes during the interviews (in addition to the audio recording).

Recruitment and ethical review

Local hospital leads identified potential research participants based on a pre-established sampling framework. Potential participants were provided with a copy of the participant information sheet and were asked if they would be interested in being contacted by a researcher. If they agreed, the researcher then sent them the participant information sheet again and asked them if they had any questions about the study. If the staff member agreed to take part in the study, they were asked to sign a consent form and the researcher arranged a time for the telephone interview. Participants were reminded that their participation in the study was voluntary, they could withdraw at any time and the research team would maintain their anonymity. No participants decided to withdraw throughout the course of the study. The study was reviewed and approved by the Health Research Authority (HRA) (IRAS: 282069) and the R&D offices of the hospitals where the study took place.

Sampling

The interviews were carried out with a purposive sample of HCWs delivering care in three hospitals (see Table 1 for a description of the professional groups). The sampling was guided by a sampling framework designed to recruit participants from different professional groups, gender and levels of seniority.

Analysis of interview data

The interview notes were imported into a summarising Rapid Assessment Procedures (RAP) sheet (23). RAP sheets allowed for the early identification of findings and facilitated the implementation of analysis as data collection was ongoing. Key segments of interview data were also selectively transcribed and analysed using framework analysis. Members of the research team familiarised themselves with the data and developed an initial coding framework. After the framework was agreed, it was applied to the interview transcripts and data were charted in an Excel spreadsheet. The categories used for the framework were informed by our research questions but we were also sensitive to topics emerging from the data. After the data were charted, we explored the framework categories for relationships.

Table 1. Rapid appraisal design

Data source	Method of data collection	Sample	Method of data analysis
Policy review	Policies were selected from legislation.gov.uk, gov.uk, NHSE and PHE databases.	35 policies published between 1 December 2019 and 20 April 2020.	Data were extracted into Excel by one researcher and cross-checked by a second researcher who created a conceptual framework to categorise the policies.
Media analysis	Review of newspaper articles obtained from LexisNexis.	101 newspaper articles published between 1 December 2019 and 20 April 2020.	Data extracted using REDCap and analysed for content using framework analysis (coding carried out by two researchers).
	Data were selected using the software 'Meltwater' and sorted into pre-established categories.	146,000 social media posts were collected from the period between 1 December 2019 and 30 April 2020.	Two researchers analysed content using inclusion and exclusion framework, and coded the selected posts independently.
Frontline staff interviews	In-depth, semi-structured telephone interviews with a purposive sample of	30 staff members working in emergency departments and intensive care units in three hospitals:	RAP sheets were used to synthesise findings on an ongoing basis. Selected transcripts were generated and analysed using framework analysis.

	staff.	Male: 13 Female: 17 Nurses: 3 Doctors: 25 Allied Health Professionals (AHPs): 2 Senior staff: 18 Junior staff: 12	

RESULTS

In this section, we present the main emerging findings from the three streams of work (see Table 2 for a summary).

Table 2. Summary of findings from all three workstreams.

Emerging findings from all three workstreams	**Examples from media analysis (including social media)**	**Representative quotes from the interviews**	**Content from UK policies**
Concerns about changing and inconsistent guidelines	Staff used social media to share guidelines among colleagues.	*"A protocol a day for every single step [...] becomes obsolete after 24 hours."*	Policies related to PPE, for instance, changed over the course of the pandemic, with one major change being the allowance of PPE reuse.
Lack of training (for redeployed staff but also in relation to PPE)	Newspaper articles indicated that HCWs felt that advice, information and training were insufficient.	*"We had training on a specific kind of face mask but other than that have not really had training."* *"In ICU the non-specialist nurses change every day and have to relearn skills."*	
Lack of streamlined and inconsistent testing of NHS staff	"Many healthcare professionals are questioning why they, as frontline NHS staff, are continuing to be denied testing for COVID-19 whilst an MP [Member of Parliament] has not" (News article, 12 March 2020).	*"Staff are jeopardising the life of their own families."* *"At one point we were told we might not get tested even though one person in the team had confirmed COVID which seemed to go against previous suggestions."*	Policies and the infrastructure for testing HCWs increased throughout the study.
Difficulties with PPE use (size,	HCWs tweeted about dehydration	*"Claustrophobic, even for half an hour. You*	Guidelines urged HCWs following Ramadan, and

overheating, dehydration)	and the challenges of PPE use when fasting during Ramadan.	*can't breathe, it is hot and heavy. Can't interact properly."* *"Even the small sized masks are designed for small men rather than women."*	their NHS colleagues, to support their need to take breaks and stay hydrated while fasting and wearing PPE.
Good wellbeing support		*"We've got a whole well-being group that we've set up…there's been a lot of focus on trying to help staff through this."* *"We are busting a gut to do what we can for staff morale."*	National guidelines have included more information on revised methods of delivering mental health services than on their availability and use by health workers.
Solidarity among colleagues	On social media some HCWs affirmed pride in doing their jobs on the frontline despite challenges and fatigue.	*"The way people come together in a crisis has been a very enjoyable part of it…staff have formed new connections which I think they'll strengthen our network at work and strengthen the way we work together."*	
Demonstration that quick changes are possible in the healthcare system	"We would not expect our system to be overwhelmed but would expect it to be radically changed (News article, 05/03/2020)."	*"Demonstrated that change can be done quickly, what normally takes a year can be done in week (red tape). We are able to do more in a short time."* *"'Some of what we've had to do will be the catalyst for changes that we thought we would make at some point in the future but hadn't had the means to do."*	Rapid establishment of 3 laboratories to develop COVID-19 testing kits to test HCWs.

Changing guidelines and limited training

Some HCWs were redeployed and relieved of their regular duties to provide support for a surge in admissions and increase capacity in ICU. Staff reported feelings of apprehension regarding redeployment, but described colleagues as very supportive through the transition. Very few HCWs reported being adequately trained for their redeployment; often, PPE training or PPE simulation was the only support available from management. The analysis of newspaper articles indicated that HCWs felt that advice, information, and training were insufficient (or too rapidly changing), this feeling was demonstrated further in the social media analysis. HCWs communicated the inconsistency in advice and in many cases, this led to an increased sense of lack of preparedness and ability to cope.

Social media analysis found that to support each other through the need for training and changes in delivery of care and redeployment, HCWs were setting up weekly chats via Twitter around specific hashtags (e.g. #PhysioTalk), where discussions of new COVID-19 procedures in the treatment and rehabilitation of patients and online training slides were shared. Remote training materials were also utilised for newly redeployed staff, while evolving guidelines were adapted to help train medical students close to graduating. Transcripts of these chats and any policy or other documents shared were archived on related websites/online platforms, so that HCWs could refer to these on an ongoing basis.

Testing of HCWs

Our policy review indicated that, by 27th March 2020, the government set to establish a testing programme using three laboratories to develop testing kits for all NHS staff with the objective of testing all HCWs for COVID-19 (24). Our interviews indicated that staff perceived the testing of HCWs as an intrinsic component of sustaining a healthy workforce throughout the pandemic, though there was ambivalence about the speed and effectiveness of tests. This ambivalence was especially true during the first few weeks of the pandemic, when staff reported having to stay home if they or someone in their household presented with symptoms indicative of COVID-19, putting extra pressure on the remaining staff. This reportedly improved towards the end of data collection, but tests were still difficult to access for some and high levels of false negatives remained an issue.

Concerns about contagion and personal wellbeing

One of the main areas of concern, particularly towards the end of data collection was related to PPE. The policy review indicated that, prior to addressing a patient's needs, HCWs must don the appropriate PPE and ensure adequate hand hygiene. Despite the fact that some of the PPE recommended for use during the COVID-19 outbreak is single use, on 17 April 2020, Public Health England (PHE) approved the reuse of PPE in cases where there was an acute shortage and where it was "safe to do so" (25).

The analysis of newspaper articles indicated that there was frustration expressed by HCWs at changing advice, hospitals not keeping up-to-date or lack of advice all together. Advice, information and training enveloped PPE, self-isolation, quarantining of patients, testing and the protection of HCW's (and their families). In the interviews, many HCWs stated that PPE guidance had changed multiple times for specific procedures and across the hospital (sometimes every week); donning PPE incorrectly and then bringing the virus home to their families had therefore become a source of anxiety. One senior doctor reported, "*PPE training only happened because of local engagement from clinicians rather than management.*" Anxiety was worsened by media reports of HCWs becoming ill. Where staff were confident with PPE supply, this was because managers fought to ensure their staff had enough. Visors were mentioned as being specifically hard to locate.

PPE sizes were considered too large by some of the female staff and there were reports of staff overheating during long shifts wearing PPE combined with difficulties taking water and toilet breaks while wearing equipment. The interviews carried out towards the end of April found that the warmer climate (and lack of air-conditioned hospital facilities) and the start of Ramadan exacerbated these difficulties. Some staff reported that regulations implemented to allow HCW breaks every two hours wearing PPE were often not feasible due to limited staff capacity, guilt at 'wasting' PPE (in single use equipment) and the time burden of changing in and out of PPE. On social media, worry surrounding dehydration was also expressed by HCWs tweeting about dehydration and fasting during Ramadan (n=30 tweets between 15 – 26th April). This was met with response from various NHS hospital and hospital Twitter accounts and a collaboration between the NHS Muslim network, the BIMA (British Islamic Medical Association) and the NHS (n=10 tweets). They shared links and infographic guidelines on Twitter, urging HCWs following Ramadan and their NHS colleagues to support the need to take breaks and stay hydrated while fasting and wearing PPE (26).

Areas of good practice

Many staff members reported that working conditions were very stressful and anxiety-inducing, but that wellbeing support was variable across hospitals. Many HCWs appreciated the increased availability of psychological support and having a physical space they could utilise for breaks (e.g. 'wobble rooms', sofas, health hubs). However, some staff called for more support on site and the establishment of support programmes that could align to their current working dynamics: "*Part of the problem for the official support, there is a psychologist who's offering sessions, but they are in the middle of the day. So, you wouldn't be able to go if you were on nights, or if you are clinically busy you can't really attend that in the middle of the shift*" (Anaesthetist). HCWs expressed many positive feelings regarding the morale and camaraderie of staff. Many voiced their appreciation of food support from neighbours and local businesses and felt that the public really recognised the importance of the NHS. On social media, a wide variety of HCWs affirmed pride in their jobs and called on the need to be adaptable, resilient and flexible, often using the #NHSheroes hashtag. HCWs were appreciative of the positive messages and rainbow pictures from the public and donations, especially visors. Several HCWs called for a better celebration of successes by sharing good news stories and figures about patients recovering and being discharged.

Recommendations for other countries and future pandemics

When asked about recommendations, staff continuously requested improved testing and consistent guidance for PPE for all staff. Staff also explained that allowing breaks every two hours while wearing PPE was effective in preventing dehydration. It was mentioned that there needed to be improved redeployment of staff, specifically nurses. There were concerns that some nurses were sent to new areas without considering their skillset. Clearer guidance at an earlier stage was also called for, specifically in relation to training. Some senior doctors felt that they had to take control and offer training, rather than it being delivered by managers.

Overall, it was widely reported that the pandemic had instigated rapid changes to the system, of which many would usually take a long time to implement. Several HCWs believed that change in the system should be continued and that improvements should not be undone. For example, one senior doctor explained that with moving forward, "*the key thing is to not reduce the care capacity once it's been increased."*

DISCUSSION

The COVID-19 pandemic in the UK shed light on existing fractures and deficiencies in the healthcare system related to underfunding, workforce deficiencies, and fragmentation. Our study found similar concerns from frontline staff relating to care delivery during COVID-19 as those reported by other countries (27-29). Rapidly changing guidelines, limited PPE and lack of routine testing created anxiety and distress and had a tangible impact on efforts to maintain a sustainable workforce. When PPE was available, incorrect sizes and overheating complicated routine work. A recent review on factors acting as barriers and enablers in HCWs' adherence to infection control guidelines confirmed these findings (30).

The redeployment of HCWs was used as a strategy to deal with capacity concerns, but lack of training for redeployed staff and the failure to consider the skills of redeployed staff and their match to the skills needed in new areas were identified as problems. Recent publications on staff redeployment to intensive care units (ICUs) during the pandemic have highlighted the importance of carrying out detailed skills assessments of redeployed staff to ensure their expertise are used proactively to address patient needs (31-32). Some publications have also underscored the importance of intensive, yet comprehensive, training programmes for redeployed staff, particularly those that combine classroom and practice-based training and seek to build skillsets in the workforce that will be maintained after the epidemiological peak (33-34). This last point on the sustainability of a skilled workforce has become particularly

relevant as several countries are having to rely on redeployment on a nearly continuous basis to deal with the demand of second and third surges of patients.

In the case of our study, positive aspects of daily work reported by HCWs included solidarity between colleagues (in person and through social media platforms), the establishment of wellbeing support structures, and feeling valued by society. Sun and colleagues (10) report a similar situation in China, where good teamwork within nursing teams generated positive emotions during the pandemic. Several authors have also highlighted the importance of clear guidelines for wellbeing support (11-12), but we would argue that these guidelines need to be developed without losing sight of the realities of HCWs working on the ground, where fatigue and work pressures might not allow them to visit group support meetings or make use of quiet rooms for relaxation (35).

A positive factor outlined by HCWs in the UK was that they felt that they were able to implement changes in routine practice at a rapid pace. The pressures generated by the pandemic restructured internal processes, so clinicians and managers working on the frontline felt their proposals were heard by senior staff, removing the usual 'red tape'. A question that remains is the extent to which these approaches to transformation and quality improvement will remain after the pandemic has subsided or as Swaithes and colleagues have asked, how can we 'lock' in this learning? (36). According to these authors, the maintenance of collaborative relationships, strategic leadership and a focus on organisational learning will be key components in the permanence of continuous service improvement.

Our study highlights the importance of taking into consideration the experiences and concerns of frontline staff during a pandemic. In the case of COVID-19, staff have advocated in favour of clear and consistent guidelines, streamlined testing of HCWs, administration of PPE and acknowledgement of the effects of PPE on movement and heat. Our study has also shown that supportive working environments can be motivating for staff under pressure and valuable learning – particularly in relation to the processes used to make improvements in care delivery – can emerge from the challenging circumstances of delivering care in the context of a pandemic.

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COMPETING INTERESTS

The authors do not have any competing interests to declare.

PATIENT AND PUBLIC INVOLVEMENT STATEMENT

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

ETHICAL APPROVAL STATEMENT

The study was approved by the Health Research Authority (HRA) in the UK (IRAS: 282069).

CONTRIBUTORSHIP STATEMENT

CVP and GJ designed the study. LA, EBG, HR, SMS, SM and SV contributed to the media analysis. LM and SLJ contributed to the policy review. AD, HF, LMi, NR, KS, GS, AS contributed to the telephone interviews. LA, SM, SV, ND, DJ, AD, LMi, NR, KS, GS, AS, LM, GJ, SMS and SLJ participated in the analysis of data. CVP led the drafting of the manuscript, but all authors contributed to the writing and approved the final version before submission.

DATA SHARING STATEMENT

All data relevant to the study are included in the article or uploaded as supplementary information.

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APPENDIX 1 – Search strategies and article selection.

Search strategy for rapid analysis of newspaper articles (LexisNexis): ("healthcare professionals"[All Fields] OR "healthcare worker"[All Fields] OR "doctor"[All Fields] OR "nurse"[All Fields]) AND (("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields]) OR corona[All Fields] OR ("COVID-19"[All Fields] OR "severe acute respiratory syndrome coronavirus 2"[Supplementary Concept] OR "severe acute respiratory syndrome coronavirus 2"[All Fields] OR "2019-nCoV"[All Fields] OR "SARS-CoV-2"[All Fields] OR "2019nCoV"[All Fields] AND ("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields])) AND 2019/12[PDAT] : 2030[PDAT])))

The inclusion criteria for newspaper articles included in our analysis were:

1) Focus on the perspectives or experiences of healthcare workers (self-reported or narrated in third person);
2) Focus on the response strategies aimed at COVID-19;
3) Published from 1 December 2019 to 17 March 2020 (for the purpose of this paper); and
4) Published in English.

Search strategy for UK policy review: COVID-19 OR coronavirus OR corona.

Inclusion criteria:

1) Published from 1 December 2019 to 20 April 2020;
2) Aimed at healthcare delivery (i.e. not focusing on prevention, social isolation, etc.);
3) Related to the COVID-19 pandemic.

Search strategy for social media analysis (Meltwater):

Search terms

((bio:"healthcare professional" OR bio:"healthcare worker" OR bio:"doctor" OR bio:"NHS" OR bio:"nurse" OR bio:"physio*" OR bio:"Paramedic" OR bio:"Ambulance work*" OR bio:"Ambulance driver*") AND ("coronavirus" OR "#coronavirus" OR “corona” OR "COVID-19" OR "COVID 19" OR "COVID19" OR "#COVID19" OR "COVID_19" OR "COVID" OR "severe acute respiratory syndrome coronavirus 2" OR "severe acute respiratory syndrome coronavirus 2" OR "2019-nCoV" OR "SARS-CoV-2" OR "2019nCoV" OR "physio*" OR "PPE") OR

("i am" OR "as a" OR "source: I" OR "I'm a") near/5 ("doctor" OR "nurse" OR "doctors" OR "nurses" OR "Paramedic" OR "Ambulance worker" OR "Ambulance driver") AND ("coronavirus" OR "#coronavirus" OR “corona” OR "COVID-19" OR "COVID 19" OR "COVID19" OR "#COVID19" OR "COVID_19" OR "severe acute respiratory syndrome coronavirus 2" OR "severe acute respiratory syndrome coronavirus 2" OR "2019-nCoV" OR "SARS-CoV-2" OR "2019nCoV" OR "physio*" OR "PPE") NOT ("I am not" OR "I'm not"))

NOT ("RT" OR "QT")

Inclusion/Exclusion Criteria

To assess for predefined inclusion and exclusion criteria, imported news articles and news blogs use the URL’s in Excel to access the full article. For social media data, the Hit Sentence was used to assess relevance and if they meet inclusion and exclusion criteria. For YouTube Media the URL was used to generate a transcription of the video and was screened for inclusion and exclusion data.

Inclusion Criteria

1. Content refers specifically to experience of Healthcare Workers (HCW) of healthcare delivery during the COVID-19 pandemic

Note: We are privileging first-hand accounts of experience but also included second-hand accounts if they refered directly to HCW experience of healthcare delivery.

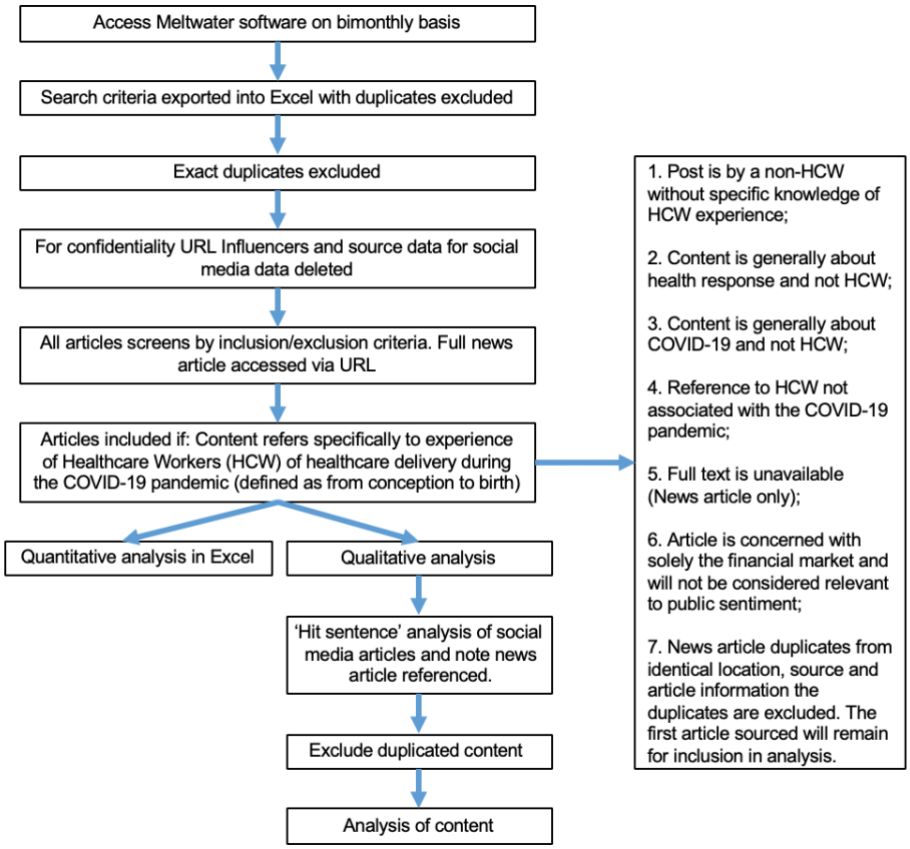
Information source:

- HCW: first-had account
- HCW: second-hand account
  - Influencer (e.g. social media figure)
  - Public figure (e.g. celebrity, politician, academic)
  - Media story reference (news reporting)
  - Social media post reference
  - Public health or health organisation messaging
  - Government messaging
- Other

Exclusion Criteria

1. Post is by a non-HCW without specific knowledge of HCW experience;
2. Content is generally about health response and not HCW;
3. Content is generally about COVID-19 and not HCW;
4. Reference to HCW not associated with the COVID-19 pandemic;
5. Full text is unavailable (News article only);
6. Article is concerned with solely the financial market and will not be considered relevant to public sentiment;
7. News article duplicates from identical location, source and article information the duplicates are excluded. The first article sourced remained for inclusion in analysis.

Flow diagram of social media assessment:



Key aspects of UK newspaper reporting of the perceptions and experiences of healthcare workers (HCWs) with COVID-19:

Coverage in UK newspapers	Overall		Jan		Feb		March	
N articles (row)	N=50	100 %	N=1	2%	N=7	14%	N=43	86%
Key issues reported								
Insufficient advice/info/training	23	46%	0	0%	4	57.14%	19	44.19%
Adaption	23	46%	0	0%	1	14.29%	22	51.16%
Concerns over ability to cope	19	38%	0	0%	2	28.57%	17	39.53%
Personal protective equipment	18	36%	1	100%	0	0%	17	39.53%
Personal fears / family	17	34%	0	0%	1	14.29%	17	39.53%
Diagnostic resources	17	34%	1	100%	0	0%	16	37.21%
Contact tracing	8	16%	0	0%	3	42.86%	5	11.63%
Hospital infrastructure	14	28%	0	0%	1	14.29%	13	30.23%
Re-prioritisation/ Knock on effects	8	16%	0	0%	1	14.29%	7	16.28%

INTERVIEW GUIDE: HEALTHCARE WORKERS (HCWs)

"The interview takes about 20-25 minutes on average but it can go on longer depending on how much you want to say"

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

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. **Have you been in contact with patients who had suspected and/or confirmed COVID-19?**

   Probes:
   - *In what capacity?*
   - *How have you found working around these patients?*
   - *PPE physical effects? (E.g. dehydration, discomfort, restriction in movement, difficulties communicating)*
   - *How has PPE impacted the type of care you provide patients?*
   - *What psychological/emotional impact did this have on you?*

3. **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*

4. What were the preparedness strategies implemented locally (department, hospital or Trust)?

- Did you feel these strategies were enough?
- What do you feel was particularly successful?
- Should the Trust have prepared differently?
- Did you receive any training? (including but not limited to PPE training such as mental health and well-being training)
- Did you have access to guidance on PPE?

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

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

6. Over the past months, have you experienced any problems with aspects of your daily life such as sleeping, eating, concentration, or additional worries or anxiety?

7. 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?

8. (If relevant based on previous discussion) Can you please tell me about the palliative care tasks you are involved in with COVID-19 patient?

Ask about each of these specifically:

- **Advanced care planning**
- **Symptom management and patient comfort at end of life.**
- **End of life decision making (e.g. triage of limited equipment)**
- **Working with families (e.g. updating on health, organising visits)**

  - *How have you found these tasks? (e.g. difficulties?, patients reactions?, preparedness? what works well?)*
  - *Was this part of your normal role prior to COVID-19?*
  - *What difficulties have you faced in these tasks?*
  - *How does this differ to normal palliative care?*
  - *How much choice do patients have?*
  - *What are the rules/policies relating to this? Do you feel these are suitable?*
  - *Was there training or support available relating to this?*
  - *Do you feel this has had an emotional impact on you?*

9. What do you feel is most important to offer COVID-19 patients at end of life and their families?

  - *What is working well?*
  - *What should we do more of?*

- *What can we improve?*
- *What support do we need to offer HCW delivering palliative care?*
- *Do you have any concerns for the future?*
- *Are you able to offer bereavement support to families?*

10. OTs/PTs and others in charge of rehab: What are your main concerns about the impact of COVID-19 to the body (e.g. muscle degeneration, dexterity, impact to the lungs etc.)?

- What resources do you have to deliver rehabilitation care? - ask their opinions on the Mary Seacole rehab hospital
- Is there a difference in resources for COVID-19 and non-COVID-19 patients?

11. (If relevant based on previous discussion) Can you please tell me about the rehabilitation care tasks you are involved in with recovered COVID-19 patients?

-Have you received any guidance on how to deliver rehabilitation services to recovered COVID-19 patients?
- OT: How does this differ from normal rehabilitation care e.g. delivering care at home?
- OT: How has COVID-19 impacted your contact with patients?
- Has the pandemic impacted the flow of your patients through hospital e.g. are more or less patients being discharged to homes and bed-based rehab? - What is the impact of this?
- How do you think your role will be impacted as a growing number of people will need rehabilitation? Any concerns?

General reflections

12. 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?*

13. 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)***

14. Do you feel your experience has been different from other HCWs? Does gender play a role?

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

16. 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?

18. 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.

COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	
Occupation	3	What was their occupation at the time of the study?	
Gender	4	Was the researcher male or female?	
Experience and training	5	What experience or training did the researcher have?	
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	
Sample size	12	How many participants were in the study?	
Non-participation	13	How many people refused to participate or dropped out? Reasons?	
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	
Field notes	20	Were field notes made during and/or after the inter view or focus group?	
Duration	21	What was the duration of the inter views or focus group?	
Data saturation	22	Was data saturation discussed?	
Transcripts returned	23	Were transcripts returned to participants for comment and/or	

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	
Description of the coding tree	25	Did authors provide a description of the coding tree?	
Derivation of themes	26	Were themes identified in advance or derived from the data?	
Software	27	What software, if applicable, was used to manage the data?	
Participant checking	28	Did participants provide feedback on the findings?	
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	
Data and findings consistent	30	Was there consistency between the data presented and the findings?	
Clarity of major themes	31	Were major themes clearly presented in the findings?	
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

Once you have completed this checklist, please save a copy and upload it as part of your submission. DO NOT include this checklist as part of the main manuscript document. It must be uploaded as a separate file.