

ORIGINAL PAPER

Predictors of UK healthcare worker burnout during the COVID-19 pandemic

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Summary

Background: The COVID-19 pandemic is putting health professionals under increasing pressure. This population is already acknowledged to be at risk of burnout.

Aim: We aim to provide a 'snapshot' of the levels of burnout, anxiety, depression and distress among healthcare workers during the COVID-19 pandemic.

Methods: We distributed an online survey via social media in June 2020 open to any UK healthcare worker. The primary outcome measure was symptoms of burnout measured using the Copenhagen Burnout Inventory. Secondary outcomes of depression, anxiety, distress and subjective measures of stress were also recorded. Multivariate logistic regression analysis was performed to identify factors associated with burnout, depression, anxiety and distress.

Results: A total of 539 persons responded to the survey; 90% female and 53% nurses. Participants with moderate-to-severe burnout were younger (49% vs. 33% under 40 years, $P = 0.004$), more likely to have pre-existing comorbidities (21% vs. 12%, $P = 0.031$), twice as likely to have been redeployed from their usual role (22% vs. 11%; $P = 0.042$), or to work in an area dedicated to COVID-19 patients (50% vs. 32%, $P < 0.001$) and were almost 4 times more likely to have previous depression (24% vs. 7%; $P = 0.012$).

Conclusion: Independent predictors of burnout were being younger, redeployment, exposure to patients with COVID-19, being female and a history of depression. Evaluation of existing psychological support interventions is required with targeted approaches to ensure support is available to those most at risk.

Introduction

Healthcare workers in both the acute and community settings have played a key role in responding to the global COVID-19 pandemic. As person-to-person transmission was confirmed,¹ healthcare workers were faced with increased risk of exposure to SARS-CoV-2 and put under considerable psychological stress

with the risk of developing adverse mental health outcomes.² Previous investigations have shown that direct contact with highly infectious patients in the Ebola, H1N1 and SARS epidemics were associated with stress in healthcare workers,^{3–5} therefore, burnout among this professional group is of great concern. During the COVID-19 pandemic, healthcare staff have been

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exposed to increased workload, working in unfamiliar areas, returning to clinical practice from non-frontline roles, pervasive media coverage and concerns about access to appropriate personal protective equipment (PPE), layered on top of concerns for the health of family and friends—all factors which could contribute to mental stress. As the well-being of health professionals is likely to influence the care they deliver, caring for staff may also indirectly impact patient outcomes.⁶

Burnout is characterized by excessive work demands causing stress (exhaustion), a detached attitude toward work and colleagues (depersonalization) and reduced feelings of efficiency and attainment (professional efficacy).⁷ These feelings may be exacerbated during a pandemic due to the unknown nature of the disease, working with a high volume of infected patients and personal risk of contracting the virus. Burnout also has consequences for patients and colleagues due to higher risk of making poor decisions; possible hostile attitude toward patients; medical errors and difficult relationships with co-workers.⁸

We aim to provide a ‘snapshot’ of the levels of burnout, anxiety, depression and distress among UK healthcare workers during the COVID-19 pandemic. Identifying factors associated with increased prevalence of these measures will highlight the need for interventions and identify staff groups who may be more at risk of adverse psychological outcomes. This will better inform future government and health board decisions about allocation of resources to staff well-being, and better inform how these resources can be targeted to those with the highest risk of adverse mental-well-being outcomes.⁹

Materials and methods

Study population

The study was designed to evaluate the impact of the COVID-19 pandemic on the mental-well-being of those working in healthcare in the UK. Anybody working in this sector was eligible for inclusion in the study. Participants were recruited through a non-funded social media campaign initiated by the study investigators (one male and two female) on Twitter using snowball sampling (sharing of the survey link among networks). Twitter was considered the most appropriate platform to initiate sharing of the survey through tagging of professional bodies and healthcare institutions by the study authors. All information was collected anonymously.

Questionnaire design

The questionnaire was administered through [onlinesurveys.ac.uk](https://www.onlinesurveys.ac.uk). It collected participant demographics (including age, sex, past medical history, professional role, social living situation and caring responsibilities within the family), concerns over COVID-19 (exposure to patients with COVID-19, access to PPE and sources of stress) and access to health and well-being support (informal team support, professional support offered by the workplace and external professional support). Questions were developed by the team who were working in clinical roles during this period, piloted locally with colleagues and reviewed by a clinical psychologist working within the National Health Service (NHS) in Scotland. In addition, validated measures of burnout, depression, anxiety and distress were used to evaluate the incidence of these factors using the Copenhagen Burnout

Inventory (CBI),¹⁰ Patient Health Questionnaire-9 (PHQ-9),¹¹ General Anxiety Disorder-7 (GAD-7)¹² and the Impact of Event Scale (IES-R),¹³ respectively. These scales have previously been effective in determining incidence of our chosen outcomes in a healthcare staff population.^{2,4,14,15} There were no mandatory questions in the survey and participants could end or skip questions if they felt unwilling or unable to answer. A copy of the questionnaire is available from the authors on request.

Trial outcomes

The primary outcome was the incidence of moderate or severe burnout of healthcare staff. Secondary outcomes included the incidence of moderate or severe depression, anxiety and distress. A score of 50 or greater on the CBI was used as a threshold to indicate moderate or above burnout (calculated as a mean of the three subscales representing total burnout), whereas scores of greater than 10 were used as a threshold for moderate or above depression or anxiety on the PHQ-9 and GAD-7 scale. A score above 26 indicated at least moderate distress on the IES-R. A breakdown for how the scores were calculated is included in the [Supplementary Appendix \(Supplementary Table S1\)](#). Additional secondary outcomes included subjective measurement of increased stress during the COVID pandemic, and the reasons for this, as well as the reasons participants may not have accessed support services available in the workplace. Emerging data from Singapore, India and China suggests that ~10% of healthcare professionals managing patients with COVID-19 experience moderate-to-severe anxiety.^{2,16} We estimate that recruitment of 500 participants into our study will identify at least 50 participants who have at least a moderate level of anxiety.

Ethical approval

The study was reviewed and approved by the University of Edinburgh ethics review panel from the school of Philosophy, Psychology and Language Sciences. Participants indicated that they wished to complete the survey before accessing the content. Consent was therefore implied by accessing and completing the survey content.

Statistical analysis

Baseline characteristics were summarized for the study population and in groups according to the presence or absence of moderate-severe burnout, depression, anxiety and distress. Continuous variables are presented as mean (SD) or median (IQR), as appropriate. Categorical variables are presented as absolute numbers (%). Group-wise comparisons were performed using Chi-square, Kruskal-Wallis or one-way analysis of variance tests as appropriate. Univariable and multivariable logistic regression models were used to estimate the odds of the primary outcome, or either secondary outcome and influence of baseline variables. Baseline variables for the model were selected *a priori* based on their clinical relevance, including age, sex, past medical history (including known ischemic heart disease or coronary artery disease, diabetes mellitus or immunocompromise), previous history of mental illness, as well as descriptors of their working environment. All analyses were performed in R (Version 3.5.1).

Results

Population demographics

Between 17th and 24th June 2020, 539 participants completed the study questionnaire (90% [480/533] female, 53% [286/539] nurses). The majority of participants lived and worked in Scotland (97%, 512/530) (Supplementary Table S2). Accordingly, the occupation and sex of participants in the study closely reflected the NHS workforce.¹⁷ Baseline characteristics of the study population are summarized stratified by the presence or absence of moderate-to-severe burnout (Table 1).

Population with moderate-severe burnout

Burnout was present in the majority of participants (79%, 424/539). Compared to participants who did not have moderate-to-severe burnout, those who met the CBI criteria tended to be younger (49% [206/424] vs. 33% [38/115] under 40 years, $P=0.004$) and female (92% vs. 82%, $P=0.004$). They were twice as likely to have pre-existing comorbidities [21% vs. 12%, unadjusted odds ratio (OR) 1.9, 95% CI 1.4–2.6, $P=0.031$], and were 4-times more likely to have previous mental illness, such as depression (24% vs. 7%, unadjusted OR 4.2, 95% CI 2.6–6.1, $P<0.001$). After adjusting for other variables (Table 2), previous depression remained

Table 1. Baseline characteristics of study population stratified by the presence of moderate or severe burnout using the CBI

	All	Moderate-severe burnout		P-value
		Present	Absent	
No. of participants	539 (100)	424 (79)	115 (21)	—
Age (years)				
21–30	121 (22)	101 (24)	20 (17)	0.012
31–40	122 (23)	104 (25)	18 (16)	
41–50	141 (26)	106 (25)	35 (30)	
51–60	126 (23)	96 (23)	30 (26)	
>60	27 (5)	16 (4)	11 (10)	
Males	53 (10)	33 (8)	20 (18)	0.004
Females	486 (90)	390 (92)	96 (82)	0.004
Significant past medical history	104 (19)	90 (21)	14 (12)	0.04
Coronary artery disease	12 (2)	10 (2)	2 (2)	1
Malignancy	7 (1)	6 (1)	1 (1)	1
COPD	60 (11)	51 (12)	9 (8)	0.27
Diabetes mellitus	16 (3)	15 (4)	1 (1)	0.236
Immunocompromized	25 (5)	21 (5)	4 (4)	0.677
Previous mental health diagnosis	177 (33)	159 (38)	18 (16)	<0.001
Previous anxiety	131 (24)	119 (28)	12 (10)	<0.001
Previous depression	109 (20)	101 (24)	8 (7)	<0.001
Other mental health condition	21 (4)	18 (4)	3 (3)	0.594
Family member at high risk	99 (19)	87 (21)	12 (11)	0.019
Main carer for another adult	39 (7)	35 (8)	4 (4)	0.125
Main occupation				
Allied health professional ^a	32 (6)	24 (6)	8 (7)	<0.001
Clinical support worker	54 (10)	47 (11)	7 (6)	
Doctor	57 (11)	34 (8)	23 (20)	
Nurse	286 (53)	245 (58)	41 (36)	
Pharmacist	4 (1)	2 (1)	2 (2)	
Other	106 (20)	72 (17)	34 (10)	
Redeployed from normal workplace	105 (20)	93 (22)	12 (10)	0.008
Exposure to patients with COVID-19				
No known contact	94 (17)	62 (15)	32 (28)	<0.001
Patients with suspected COVID-19	64 (12)	43 (10)	21 (18)	
Patients with confirmed COVID-19	131 (24)	106 (25)	25 (22)	
Work in a dedicated COVID-19 unit	250 (46)	213 (50)	37 (32)	
PPE (PPE)				
Properly trained with PPE	300 (57)	232 (55)	68 (61)	0.365
Always have access to PPE when needed	359 (67)	273 (64)	86 (75)	0.047
Properly fitted for specialist PPE if required	280 (71)	225 (71)	55 (73)	0.868
Feel safe or very safe when using PPE	234 (43)	166 (39)	68 (59)	<0.001
Psychological support				
Support is available in the workplace	411 (77)	308 (73)	103 (90)	<0.001
Support was accessed from the workplace if available	91 (22)	76 (25)	15 (15)	0.064
Support accessed exclusively from outside the workplace	44 (8)	36 (9)	8 (7)	0.999
Rating of support within team median [IQR] ^b	3.0 [2.0, 4.0]	3.0 [2.0, 4.0]	4.0 [3.0, 5.0]	<0.001

Note: Values are expressed as n (%) unless otherwise stated. A P value of <0.05 is considered significant.

^aAllied health professional group includes dieticians (n = 1), radiographers (n = 4), physiotherapists (n = 11) and occupational therapists (n = 16).

^bRating of support within workplace team is on a self-reported integer scale with 1—least supportive to 5—most supportive.

Table 2. Predictors of moderate-severe burnout

	Univariate OR for type moderate-severe burnout (95% CI)	P-value for term	Multivariate OR for type moderate-severe burnout (95% CI)	P-value for term
Age 20–30	—	—	—	—
31–40	1.1 (0.8–1.6)	0.703	1.2 (0.8–1.8)	0.64
41–50	0.6 (0.4–0.8)	0.102	0.9 (0.6–1.4)	0.869
51–60	0.6 (0.5–0.9)	0.156	0.6 (0.4–0.9)	0.24
61–70	0.3 (0.2–0.5)	0.007	0.4 (0.2–0.8)	0.174
Sex (M)	0.4 (0.3–0.5)	0.003	0.3 (0.2–0.5)	0.003
Significant past medical history ^a , including immunocompromised	1.9 (1.4–2.6)	0.031	1.6 (1.1–2.4)	0.215
Previous anxiety	3.3 (2.4–4.6)	<0.001	1.8 (1.2–2.7)	0.128
Previous depression	4.2 (2.8–6.1)	<0.001	3.6 (2.2–5.9)	0.012
Other previous significant mental health condition	1.7 (0.9–3.1)	0.426	0.9 (0.4–1.9)	0.856
Family member in a high-risk category of COVID	2.2 (1.6–3.1)	0.015	1.9 (1.3–2.8)	0.117
Main carer for another adult	2.5 (1.4–4.2)	0.092	2.3 (1.1–4.6)	0.246
Redeployed from normal working role	2.4 (1.7–3.4)	0.007	2.2 (1.5–3.3)	0.042
Exposure level to COVID-19 in working role (per unit increase, scale 1–4)	1.5 (1.4–1.6)	<0.001	1.6 (1.4–1.8)	<0.001
Workplace support available	0.3 (0.2–0.4)	<0.001	0.7 (0.4–1)	0.314
Supportive workplace team environment (per unit increase, scale 1–4)	0.5 (0.5–0.6)	<0.001	0.6 (0.5–0.7)	<0.001
PPE (PPE):				
Adequate training received in use of PPE (Yes)	0.8 (0.6–1)	0.311	0.8 (0.6–1.1)	0.482
Access to PPE (scale 1–5)	0.7 (0.6–0.8)	0.001	0.9 (0.8–1.1)	0.709
Feeling of safety when using supplied PPE (scale 1–5)	0.7 (0.6–0.7)	<0.001	0.9 (0.8–1)	0.355

Multivariate logistic regression model adjusted for all variables described with univariate and multivariate odds ratios. A P value of < 0.05 is considered significant.

An odds ratio of >1 is a predictor of burnout, whereas an odds ratio of <1 is protective against burnout. For example, a supportive workplace team is protective against burnout.

^aSignificant past medical history includes participants with diabetes mellitus, chronic cardiovascular disease, chronic airways disease, current malignancy and those receiving oral or intravenous steroids, or immunotherapy agents.

the most powerful independent predictor of moderate-severe burnout, increasing the odds by more than 3-fold (adjusted OR 3.6, 95% CI 2.2–5.9, $P = 0.012$).

Participant occupation and working environment also had a significant impact on the incidence of burnout (Table 2). Those with moderate-severe burnout were twice as likely to have been redeployed from their normal place of work (22% vs. 11%, adjusted OR 2.2, 95% CI 1.5–3.3, $P = 0.042$), and work in an area dedicated to treating patients with confirmed COVID-19 infection (50% vs. 32%, adjusted OR 1.6, 95% CI 1.4–1.8, $P < 0.001$). Participants with burnout also had less frequent access to all of the PPE required to work safely (64% vs. 75% always having access to PPE, $P = 0.047$); however, in adjusted models, this association was attenuated. A supportive workplace team and male sex were both powerful independent predictors protecting against burnout, reducing the odds by 40% (adjusted OR 0.6, 95% CI 0.5–0.7, $P < 0.001$) and 70% (adjusted OR 0.3, 95% CI 0.2–0.5, $P = 0.003$), respectively.

Secondary outcomes of moderate-severe depression, anxiety and distress

Baseline characteristics stratified by the presence of moderate-severe depression, anxiety and distress are summarized in Supplementary Table S3. In participants with moderate or severe depression, as classified by the PHQ-9 score, treating patients with confirmed COVID-19 infection (adjusted OR 1.3, 95% CI 1.1–1.4, $P = 0.023$) and previous depression (adjusted OR 3.6, 95% CI 2.6–4.9, $P < 0.001$), were important independent predictors of the odds of depression. Similar results were seen in models to predict moderate-severe anxiety (Supplementary Table S4). A supportive workplace team was protective against depression (adjusted OR 0.7, 95% CI 0.7–0.8, $P = 0.001$). Only

5/539 participants scored above the threshold for moderate distress as classified by IES-R (Supplementary Table S3).

Stress and workplace staff support

The majority of participants (76%, 408/539) recorded increased stress (Figure 1), primarily because of concern about their family's health (73%, 296/408), or their own risk of contracting COVID-19 (64%, 262/408). Other reasons for increased stress included concern about access to PPE (36% 148/408), their ability to do their job properly (32%, 131/408) and having to cope with higher patient mortality (35%, 144/408), with nearly one-third of participants remarking that these reasons had caused them concern. Only a minority of participants who reported stress had accessed local workplace support (23%, 70/306). The most common reason for not doing so was not feeling a need for support, despite increased stress (48%, 113/236), although 38% (89/236) felt they needed support but did not have time, while 1 in 7 participants felt that they needed support but they did not want their colleagues to know (14%, 34/236) or that the support was not relevant to them (15%, 36/236). Dedicated workplace support was not available to one in four participants (25%, 102/408).

Discussion

Prior to COVID-19, burnout among healthcare workers was already a concern. While estimates vary, systematic reviews have reported a prevalence of 11% among nurses, and between 31% and 54% among UK doctors.^{18,19} Irregular hours, understaffing, physical and psychological stress and the provision of complex care are all elements thought to contribute to the development of burnout.¹⁹ We report that the independent predictors of



Figure 1. Alluvial diagram showing proportion of participants with increased stress during the COVID-19 pandemic, causes of stress and whether workplace support was available and accessed. Causes of stress are shown as a stacked bar chart, with size of bar representing proportion, with participants able to select multiple responses.

overall burnout among our sample population are being younger, female, redeployed to a new working area, working with patients with confirmed COVID-19 infection, concerns over access to adequate PPE and a prior history of depression. Our findings are consistent with other studies reporting a higher incidence of burnout among women and those with younger age,^{2,20-22} those working in areas with high COVID-19 exposure, concerns over PPE provision and a history of pre-existing psychological problems.²³⁻²⁵

Previous work has suggested that women in healthcare may be at higher risk of burnout due to the large proportion involved in front line care in the nursing profession thereby increasing their exposure to COVID-19.² It is also possible that the large proportion of nurses in this study represent a younger population, who often have less experience in their respective positions and who may therefore be at increased risk of adverse psychological outcomes.

At the start of a healthcare crisis, there is an initial sense of eagerness to contribute to the healthcare effort and a sense of obligation to work through the pandemic.²⁶ Staff volunteered to work in roles, or were redeployed to roles, that were unfamiliar to them as regular NHS services were paused. These redeployed staff are also identified as a high-risk group so should be a target for health and well-being interventions. Interventions can be focused at the level of the individual or within organizational structures. Organization directed interventions (teamwork, leadership, workload and shift rotation) were seen to reduce physician burnout more than individual directed interventions.²⁷ Examples of organization directed interventions are prioritizing staff safety (access to PPE), organizing rotas to maintain existing teams, supporting staff to implement recommendations and ensuring visibility of managers.²⁸ These are all modifiable factors that if addressed could prevent the development of burnout.²⁵ Telephone helplines are an example of an individual targeted intervention and while staff appreciated the availability of this service, it could also be viewed as too impersonal to be an effective support mechanism.²⁹

In addition to burnout, we recorded subjective measures of stress. More than three quarters of the workforce surveyed

reported feeling heightened stress levels at work during the COVID-19 pandemic, but fewer than one in four of those with stress had accessed workplace support. The main reason reported was that support was not required, despite feeling heightened stress levels. This phenomenon is not unusual amongst healthcare workers with a delay between event-timing, and reflective practice that allows staff to acknowledge the emotional impact of their work.²⁹ As not all of those recognizing their need for support accessed support, this suggests that the structure through which the support is being offered may not be meeting the needs of those it is intended to serve. Inadequate time, and not wanting colleagues to know they were seeking support were two of the main barriers to access. Digital platforms are effective in delivering psychological treatment,³⁰ therefore can be offered by organizations and accessed discreetly at an appropriate time for the individual. One of the few factors found to be protective against burnout, depression and anxiety was feeling supported at work. Peer supervision and strong teamwork have been previously shown to strengthen workplace well-being.³¹ Healthcare employers could support service leads, ward managers, senior nurses and local supervisors to understand their critical role in supporting their staff to prevent the development of burnout.

Heavy emotional burden has been previously shown to be a predictor of burnout among healthcare workers.^{14,32} Working in COVID-19 designated areas with a high concentration of critically ill and dying patients with relatives unable to visit has placed an even higher emotional demand on staff which may be a contributing cause to burnout seen in this staff group.

As well as a professional identity, healthcare workers also occupy multiple other identities including that of parents, children, siblings and friends. The major causes of stress among those surveyed were fears for personal health and that of the family. Previous studies have reported that prioritizing well-being of family members represented a barrier to working during an influenza pandemic with degree of worry related to intentional absenteeism.^{26,33} With burnout currently present in the majority (79%) of survey participants, employers risk losing staff during subsequent waves if not supported adequately.

As current health and well-being interventions do not appear to be optimized, employers should aim to revise the support offered through thorough evaluation with intended service users and target future interventions to staff groups most at risk.

Limitations

This study has several limitations. The majority of respondents were female, which is perhaps not unsurprising given that more than half were from the nursing profession where 89% of the workforce are women.¹⁷ We did not collect data on ethnicity of respondents. As it is now known that black and ethnic minority groups are more adversely affected by COVID-19 this may have an impact on mental health outcomes among these staff groups. However, in Scotland, 96% of the population identify as white³⁴ therefore it is unlikely we could have performed analyses stratified by ethnicity in our respondent population. Additionally, it is possible that a mental health social media survey has captured the responses of those that are already engaged with the topic and may therefore overestimate the prevalence burnout, anxiety and depression in the target population.

Supplementary material

Supplementary material is available at QJMED online.

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Data sharing

A de-identified data set can be made available for sharing upon request.

Author's contribution

A.F., R.W. and F.S. designed the study and carried out the initial acquisition, analysis or interpretation of data. All authors were involved in drafting and revising the manuscript and have given final approval of the version to be published.

Transparency declaration

The lead author (the manuscript's guarantor) affirms that the manuscript is an honest, accurate and transparent account of the study being reported; that no important aspects of the study have been omitted and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

Conflict of interest. None declared.

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